

Request for Competitive Sealed Proposals

UNT MUSIC PRACTICE JAZZ LAB

RFCSP752-23-262094ER

TABLE OF CONTENTS

Document#

001100	Advertisement for Competitive Sealed Proposals Proposals due & HUB Plan due Project Description Questions Pre-Proposal Meeting Historically Underutilized Business (HUB)
002100	Instruction to Proposers Pre-Proposal Meeting Project Proposed Schedule General Requirements Submission of Proposals Evaluation Award Process
004100	Proposal Form Base Bid Altemate Bids Payment Terms Sales Tax Insurance Time of Completion Liquidated Damages Bond Addenda Qualifications-Complete & sign Attachment A – Qualifications form to complete
005200	Agreement Forms UNTS General Construction Agreement
006000	Project Forms Payment Bond Form Performance Bond Form Historically Underutilized Business (HUB) Subcontracting Plan SmithGroup Project Manual SmithGroup Drawings Walter P. Moore Project Manual – Structural
	Walter P. Moore Drawings

DOCUMENT 001100 RFCSP752-23-262094ER ADVERTISEMENT FOR COMPETITIVE SEALED PROPOSAL

University of North Texas UNT Music Practice Jazz Lab Response due: February 1, 2023, at 2:00PM CST HUB Plan due: February 2, 2023 at 2:00PM CST Date of Virtual Opening: February 7, 2023 at 2:00PM CST

In accordance with Education Code 51.783, the University of North Texas (UNT), subsequently referred to as Owner, is accepting proposals and intends to enter into an agreement with a vendor that specializes in General Construction in accordance with the terms and conditions and requirements set forth in this RFCSP. Sealed proposals for **RFCSP752-23-262094ER** will only be received by the Owner electronically through Jaggaer link provided below.

Proposals will be received up to 2:00p.m. CST on **February 1, 2023.** HUB Sub-contracting Plans must be received up to 2:00p.m. CST on **February 2, 2023.** Proposals received after the date and hour above stated will not receive consideration. Proposals will then be virtually opened and read aloud promptly at 2:00p.m. CST on **February 7, 2023**, via Teams meeting:

Microsoft Teams meeting Join on your computer, mobile app or room device <u>Click here to join the meeting</u> Meeting ID: 217 376 620 340 Passcode: Rmoi6K <u>Download Teams</u> | Join on the web Or call in (audio only) +1 940-304-2772,537132385# United States, Denton Phone Conference ID: 537 132 385# <u>Find a local number | Reset PIN</u> Learn More | Meeting options

Project Description

This project is approximately 3,932 GSF (gross square feet) to upgrade and improve the jazz lab areas located in the Music Building located at 415 S. Avenue C, Denton, Texas 76203. These spaces serve as rehearsal space for the nine (9) Lab Bands including the highly acclaimed One O'Clock Lab Band as well as four (4) vocal jazz ensembles and the "Zebras" cover band. Included in preliminary scope of work are interior upgrades, acoustic, and aesthetic improvements such as acoustical performance improvements; interior renovation for aesthetic upgrades; instructional technology; recording/webcasting capabilities; new furnishings; required HVAC/MEP modifications; required ADA compliance.

Also included in this package are technical specifications and drawings for the University of North Texas Music Jazz Lab Structural Modification.

*Roof repairs will be separate and handled by UNT. *Audio-Visual equipment and theatrical lighting will be separate and handled by UNT.

*Data cabling will be separate and handled by UNT.

Notice to Proceed for construction is anticipated to be April 2023, with final completion in August 2023.

Questions

Questions concerning this proposal should be directed to:

UNT Music Practice Jazz Lab SmithGroup Project No: 13746 Walter P. Moore Project No. D04.22037.00 001100 - 1

ADVERTISEMENT FOR COMPETITIVE SEALED PROPOSAL

Elaine Robbins Construction Contract Coordinator II University of North Texas System Office of Strategic Infrastructure, Planning & Construction

Elaine.robbins@untsystem.edu

All questions must be received no later than 2:00 p.m. CST on January 23, 2023. All questions and answers will be posted to the website by 5:00 p.m. CST on January 25, 2023.

The Owner may in its sole discretion respond in writing to questions concerning this Proposal. Only the Owner's responses made by formal written Addendum to this Proposal shall be binding and shall be posted on the UNT System's website located at https://finance.untsystem.edu/vendor-resources/bid-inquiry/bid-opportunities.php . Oral or other written interpretations or clarifications shall be without legal effect.

Pre-Proposal Meeting

The pre-proposal meeting will be held virtually via Microsoft Teams at 1:30p.m. CST on January 10, 2023.

Microsoft Teams meeting Join on your computer, mobile app or room device <u>Click here to join the meeting</u> Meeting ID: 241 332 881 729 Passcode: igb9io <u>Download Teams | Join on the web</u> Or call in (audio only) <u>+1 940-304-2772,,177163872#</u> United States, Denton Phone Conference ID: 177 163 872# <u>Find a local number | Reset PIN</u> <u>Learn More | Meeting options</u>

Site Visit: Site visit will be conducted on January 17, 2023 beginning at 10:00a.m. We will meet at the University of North Texas Music Building, 415 S. Avenue C, Denton, Texas 76203. This will be the only site visit conducted.

Bid Documents

Proposers may obtain or access plans, specifications, and addenda for this project through the following sources:

Online - Proposers can view bid documents at Electronic State Business Daily (<u>http://www.txsmartbuy.com/sp</u>), at the UNT System website at <u>https://finance.untsystem.edu/vendor-resources/bid-inquiry/bid-opportunities.php</u> and the UNTS Jaggaer website: <u>https://bids.sciquest.com/apps/Router/PublicEvent?CustomerOrg=UNTS</u>.

Plan Rooms with bid documents on file include: McGraw-Hill Construction Plan Center (Irving), ABC Plan Room (Irving), DFW Minority (Dallas), AGC TEXO and iSqFt Plan Room (Dallas). Contact information for the plan rooms can be found at <u>http://www.untsystem.edu/unt-plan-rooms</u>.

Historically Underutilized Business (HUB)

In accordance with Texas Government Code 2161, RFCSP for contracts with an expected value of \$100,000 or more will require HUB Subcontracting Plan. All subcontracted work whether identified by the Owner or not, are required to be identified in the HUB Subcontracting Plan. The Plan should reflect all subcontracting opportunities to be utilized in this project and can be found online at (<u>http://www.window.state.tx.us/procurement/prog/hub/hub-forms/hub-sbcont-plan--allfms.pdf</u>). Complete, print, sign and submit the HUB Subcontracting Plan form with the proposal response.

Only RFCSP responses with approved HUB Subcontracting Plans will be opened. Please return the HUB Subcontracting Plan in a clearly marked envelope if delivering in person to Business Service Center, <u>separate</u> from your RFCSP response <u>OR</u> through the UNTS Jaggaer link provided above. Only one (1) copy of the HUB plan is required with your response.

Questions regarding the completion of the HUB Subcontracting Plan should be directed to Ashley Salazar-Hernandez or Michelle McCauley at 940-369-5500 or <u>hub@untsystem.edu</u>.

The Owner is not bound to accept the lowest priced offer if that offer is not in its best interest, as determined by the Owner. The Owner reserves the right to: (a) enter into agreements or other contractual arrangements for all or any portion of the Scope of Work set forth in this Proposal with one or more respondents; (b) reject any and all offers and re-solicit offers; or (c) reject any and all offers and temporarily or permanently abandon this procurement, if deemed to be in the best interest of the Owner.

END OF SECTION

001100 - 1

DOCUMENT 002100 RFCSP752-23-262094ER INSTRUCTIONS FOR PROPOSAL

University of North Texas (UNT), subsequently referred to as the Owner, is accepting sealed proposals from contractors for a General Construction project, pursuant to Sec. 51.783, *Texas Education Code*, in accordance with the terms and conditions and requirements set forth in this Request for Competitive Sealed Proposal (RFCSP).

1. PRE-PROPOSAL MEETING:

A virtual pre-proposal meeting will be conducted to answer any questions regarding the scope of the project and the submission of the HUB Subcontracting Plan. Attendance is not mandatory but highly recommended. The pre-proposal meeting will be held virtually via Microsoft Teams.

January 10, 2023, at 1:30p.m. CST

Microsoft Teams meeting Join on your computer, mobile app or room device <u>Click here to join the meeting</u> Meeting ID: 241 332 881 729 Passcode: igb9io <u>Download Teams | Join on the web</u> **Or call in (audio only)** +1 940-304-2772,,177163872# United States, Denton Phone Conference ID: 177 163 872# <u>Find a local number | Reset PIN</u> Learn More | Meeting options

There will be a site visit on **January 17**, **2023 at 10:00a.m.** This will be the only site visit conducted. We will meet at the site, UNT Music Building, 415 S. Avenue C, Denton, Texas 76203.

2. PROJECT PROPOSED SCHEDULE

December 19, 2022 January 10, 2023 1:30 p.m. January 17, 2023 10:00 a.m. January 23, 2023 2:00 p.m. January 25, 2023 5:00 p.m. February 1, 2023 2:00 p.m. February 2, 2023 2:00 p.m. February 7, 2023 2:00 p.m. March 2023 March 2023 April 2023 August 2023

Issue RFCSP Pre-Proposal Conference - Virtual Site Visit Deadline for Submission of Questions Responses to Questions Post on Website Deadline for Submission of Proposal Deadline for HUB Sub-Contracting Plan Public Opening - Virtual Formal Contract Award Notification Agreement Authorized Anticipated Notice to Proceed Final Completion

3. GENERAL REQUIREMENTS

3.1 Pricing

Your proposal must include all labor, material, equipment and services necessary to complete the work required by the construction documents. Pricing reflects the full Scope of Work defined herein; inclusive of all associated cost for delivery, labor, insurance, taxes, overhead and profit, or as otherwise defined, as appropriate. The Contractor shall base their base proposal price on the set of 100 percent Construction Documents and Specification. Contractor must complete Division 00, Section 004100, *Proposal Form*. Proposal must also include all alternates.

3.2 Unit Prices

When requested, Respondents must price per unit shown. Unit prices shall govern in the event of extension errors. Respondents must give unit prices for each item to be purchased. An "All or None" response by Respondent may be rejected at the option of the Owner. Quote F.O.B destination, freight prepaid and allowed. Otherwise, specify exact delivery cost and terms.

3.3 Schedule

Time is of the essence in the performance of the Contractor's duties. It is critical that a realistic expedited schedule is provided.

- 3.4 Purchasing Items
 - A. Catalogs, brand names or manufacturer's references are descriptive only, and indicate type and quality desired. Substitution requests of like nature and quality will be considered if response specifies such. If responding on other than referenced, response should show manufacturer, brand or trade name, and other description of product offered. If other than brand(s) specified is offered, illustrations and a complete description of product offered are requested to be made part of the response. Failure to take exception to specifications or reference data will require respondent to furnish specified brand names, numbers, etc.
 - B. Unless otherwise specified, all material shall be new and unused.
 - C. In addition, all electrical items must meet all applicable state and federal standards and regulations, and bear the appropriate listing such as ANSI, FCC, NEMA, NTRL, and OSHA standards.
 - D. Samples, when requested, must be furnished free of expense to the Owner. If not destroyed in examination, they will be returned to Respondent, on request, at Respondent's expense. Each sample should be marked with Respondent's name, address, and requisition number. Do not enclose in or attach offer to sample.
 - E. A one (1) year warranty from substantial completion is required.
 - F. Delivery
 - i. Show number of days required to complete project under normal conditions.
 - ii. No substitutions permitted without written approval of Owner.
 - G. Inspection and Tests

All work will be subject to inspection and test by the Owner. All costs shall be borne by the respondent in the event of failed inspection or tests.

3.5 Eligible Respondents

Only individual firms or formal joint ventures may apply. Two (2) firms may not apply jointly unless they have formed a joint venture. Any associates will be disqualified. (This does not preclude a respondent from having consultants.)

4. SUBMISSION OF PROPOSALS

- 4.1 Submit a total of one (1) complete copy of the entire response including the questionnaire. Responses are limited to no more than twenty-five (25) pages. Please submit (1) copy of your signed HSP the following day. No QR codes will be accepted as part of your response and may disqualify your response. An original signature must appear on the Proposal Form (Division 00, Section 004100).
- 4.2 You must submit your response and HSP electronically through the UNTS Jaggaer website link as follows:

https://bids.sciquest.com/apps/Router/PublicEvent?CustomerOrg=UNTS

In order to submit proposals electronically, Proposer must have a working, registered vendor username and password to login. If this is the first time Proposer has attempted to submit a response electronically, please register at:

https://bids.sciquest.com/apps/Router/PublicEvent?CustomerOrg=UNTS

Proposers are highly encouraged to ensure you have a working login in advance of the submission deadline.

Proposer is responsible for ensuring it has the technical capability to submit its proposal via electronic submission.

Browser requirements: Chrome

Proposer shall be solely responsible for ensuring timely submission of the Proposal.

UNTS is not responsible for equipment or software failure, internet or website downtime, corrupt or unreadable data, or other technical issues that may cause delay or non-delivery of a Proposal of inaccessibility of the submitted data. Proposers are highly encouraged to prepare and allow for sufficient time to familiarize themselves with the electronic submission requirements and to address any technical or data issues Prior to the Proposal due date and time.

- A. Late proposals will not be considered under any circumstances.
- B. The Owner reserves the right to accept late proposals; however, proposals received after opening time will not be accepted.
- C. Facsimile ("FAX") or emailed proposals are not acceptable.
- D. The Proposal must be submitted no later than 2:00p.m. CST on February 1, 2023. Proposals received after the date and hour previously stated will not receive consideration. The HUB Sub-Contracting Plan must be submitted no later than 2:00p.m. CST on February 2, 2023. Failure to submit the HUB Sub-contracting plan will disqualify your proposal.

Your Proposal and HUB Plan must be submitted electronically thru the UNT System Jaggaer site at: <u>https://bids.sciguest.com/apps/Router/PublicEvent?CustomerOrg=UNTS</u>

TO: Elaine Robbins Construction Contract Coordinator II University of North Texas System

Proposals will be received until the date and time established for receipt, then opened. The names of the respondents who submitted proposals will be made public. A public opening shall be held virtually on February 7, 2023, promptly at 2:00p.m. CST. Public bid opening will be held virtually via Microsoft Teams meeting:

Microsoft Teams meeting Join on your computer, mobile app or room device Click here to join the meeting Meeting ID: 217 376 620 340 Passcode: Rmoi6K Download Teams | Join on the web Or call in (audio only) +1 940-304-2772,,537132385# United States, Denton Phone Conference ID: 537 132 385# Find a local number | Reset PIN Learn More | Meeting options 4.3 After proposals are received in response hereto and notice of intent to award a contract is made, the successful Contractor will be required to enter into a contract in the form of the Owner's standard General Construction Agreement. The Contractor should review the contract (Division 00, Section 005200, *Agreement Forms*). No changes to the standard contract will be accepted.

Any questions or concerns regarding this Request for Proposals shall be directed to:

Elaine Robbins –Construction Contract Coordinator II University of North Texas System Office of Strategic Infrastructure, Planning & Construction

Please submit solicitation questions to: <u>elaine.robbins@untsystem.edu</u>

All questions must be received no later than January 23, 2023, at 2:00p.m. CST. All questions and answers will be posted to the website by 5:00p.m. CST, January 25, 2023.

The Owner specifically requests that Respondents restrict all contact and questions regarding this RFCSP to the above-named individual except as provided in 4.2 above.

Responses to inquiries which directly affect an interpretation or change to this RFCSP will be issued in electronically by addendum (amendment) and posted at: https://finance.untsystem.edu/vendor-resources/bid-inquiry/bid-opportunities.php, https://finance.untsystem.edu/vendor-resources/bid-inquiry/bid-opportunities.php, https://finance.untsystem.edu/vendor-resources/bid-inquiry/bid-opportunities.php, https://doi.org/10.1111/journation.php, and https://www.tssmartbuy.com/sp

All such addenda issued by the Owner prior to the time that proposals are received shall be considered part of the RFCSP, and the Respondent shall be required to consider and acknowledge receipt of such on the proposal form. Contractors are responsible for obtaining any addenda posted on the websites listed above.

Only those inquiries the Owner replies to which are made by formal written addenda shall be binding. Oral and other interpretations or clarifications will be without legal effect. The Respondent must acknowledge all addenda in Division 00, Section 004100, *Proposal Form*.

4.4 Compliance with Law

Contractor is aware of, is fully informed about, and in full compliance with its obligations under existing applicable law and regulations, including Title VI of the Civil Rights Act of 1964, as amended (42 USC 2000(D)), Executive Order 11246, as amended (41 CFR 60-1 and 60-2), Vietnam Era Veterans Readjustment Act of 1974, as amended (41 CFR 60-250), Rehabilitation Act of 1973, as amended (41 CFR 60-741), Age Discrimination Act of 1975 (42 USC 6101 et seq.), Non-segregated Facilities (41 CFR 60-1), Omnibus Budget Reconciliation Provision, Section 952, Fair Labor Standards Act of 1938, Sections 6, 7, and 12, as amended, Immigration Reform and Control Act of 1986, and Utilization of Small Business Concerns and Small Business Concerns Owned and Controlled by Socially and Economically Disadvantaged Individuals (PL 96-507), the Americans with Disabilities Act of 1990 (42 USC 12101 et seq.), the Civil Rights Act of 1991, and all other laws and regulations and executive orders as are applicable.

4.5 University's Right to Audit

At any time during the term of any Contract resulting from this solicitation and for a period of seven (7) years thereafter, the Owner or a duly-authorized audit representative of the Owner or the State of Texas, at its expense and at reasonable times, reserves the right to audit Contractor's records and books relevant to all services provided under this Contract. In the event such an audit by the Owner reveals any errors/overpayments by the Owner, Contractor shall refund the Owner the full amount of such overpayments within thirty (30) days of such audit findings, or the Owner, at its option, reserves the right to deduct such amounts owing the Owner from any payments due Contractor.

4.6 Access to Documents

To the extent applicable to this procurement, in accordance with Public Law 99-499 under TEFRA, Contractor agrees to allow, during and for a period of not less than seven (7) years after the Contract term, access to this Contract and its books, documents, and records; and contracts between Contractor actice Jazz Lab 002100 - 4 and its subcontractors or related organizations, including books, documents and records relating to same, by the Comptroller General of the United States, the U.S. Department of Health and Human Services, and their duly authorized representatives.

4.7 Insurance and Bonds

The Contractor shall provide and maintain insurance, performance bond, and payment bond as required. The minimum insurance coverage and bonding requirements are stated in Division 00, Section 007000, *UGC*.

4.8 Other Benefits

It is understood and agreed that no benefits, payments or considerations received by Contractor for the performance of services associated with and pertinent to the resultant Agreement shall accrue, directly, or indirectly, to any employees, elected or appointed officers or representatives, or any other person identified as agents of, or who are, by definition, an employee of the State.

4.9 Non-Disclosure

Contractor and Owner acknowledge that they or their employees may, in the performance of the resultant Contract, come into the possession of proprietary or confidential information owned by or in the possession of the other. Neither party shall use any such information for its own benefit or make such information available to any person, firm, corporation, or other organization, regardless of whether directly or indirectly affiliated with Contractor or Owner, unless (i) required by law, (ii) required by order of any court or tribunal, (iii) such disclosure is necessary for the assertion of a right, or defense of an assertion of a right, by one party against the other party hereto, or (iv) such information has been acquired from other sources.

4.10 Publicity

Contractor agrees that it shall not publicize this potential Contract or disclose, confirm or deny any details thereof to third parties or use any photographs or video recordings of the Owner's employees or use the Owner's name in connection with any sales promotion or publicity event without prior written approval.

4.11 Assignment

The potential agreement with Contractor resulting from this RFCSP is a personal service contract for the services of Contractor, and Contractor's interest in such agreement, duties thereunder and/or fees due thereunder may not be assigned or delegated to a third party without the Owner's prior written consent. The benefits and burdens of such agreement are, however, assignable by the Owner.

4.12 Assignment of Overcharge Claims

Contractor hereby assigns to the Owner any and all claims for overcharges associated with the Contract arising under the antitrust laws of the United States, 15 U.S.C.A., Sec. 1 et seq. (1973), or arising under the antitrust laws of the State of Texas, Texas Business and Commerce Code Annotated, Sec. 15.01, et seq. (1967).

4.13 Patent and Copyright

Contractor shall pay for any royalties, license fees, copyrights or trade and service marks required to perform the services required by any resulting Contract.

4.14 Texas Public Information Act

The Owner considers all information, documentation and other materials requested to be submitted in response to this solicitation to be of a non-confidential and/or non-proprietary nature and therefore shall be subject to public disclosure under the Texas Public Information Act (Texas Government Code, Chapter 552.001, et seq.) after a contract is awarded.

Respondents are hereby notified that the Owner strictly adheres to all statutes, court decisions, and opinions of the Texas Attorney General regarding the disclosure of RFCSP information.

4.15 Freedom of Access and Use of Facilities

Contractor's employees shall have reasonable and free access to use only those facilities of the Owner that are necessary to perform services under a resulting Contract and shall have no right of access to any other facilities of the Owner.

4.16 Observance of University Rules and Regulations

Contractor agrees that at all times its employees will observe and comply with all regulations of the facilities, including but not limited to, no smoking, parking and security regulations.

4.17 Section Headings

All section headings are for convenience of reference only and are not intended to define or limit the scope of any provisions of this RFCSP.

- 4.18 Governing Law
 - A. This RFCSP, and any resulting Contract, agreement or purchase order shall be construed and governed by the laws of the State of Texas.
 - B. The parties understand and agree that any purchase order/contract may be subject to the Health Insurance Portability and Accountability Act of 1996 (HIPAA), the administrative regulations and/or guidance which have been issued or may in the future be issued pursuant to HIPAA, including, but not limited to, the Department of Health and Human Services regulations on privacy and security, and Texas state laws pertaining to medical privacy (collectively, "Privacy Laws"). Vendor agrees to comply with all Privacy Laws that are applicable to this purchase order/contract and to negotiate in good faith to execute any amendment to this purchase order/contract that is required for the terms of this purchase order/contract to comply with applicable Privacy Laws. In the event the parties are unable to agree on the terms of an amendment pursuant to this paragraph within thirty (30) days of the date the amendment request is delivered by one party to the other, this order may be terminated by either party upon written notice to the other party.
 - C. **Important Notice:** Any purchase order may be funded wholly or partially with federal funds subject to the American Recovery and Reinvestment Act of 2009 (ARRA). The vendor shall comply with all applicable provisions of ARRA, which may include, but are not limited to, the provision of Division A, Titles XV and XVI (e.g., audit provisions, whistleblower protection, and preferences for American products).
 - D. Federal Funds: All procurements of supplies equipment, and services utilizing Federal Funds (e.g. Federal Grant or Contract) shall be made in accordance with all applicable federal rules and regulations: Federal Acquisition Regulations (FAR), Federal Office of Management and Budget (OMB) Educational Institutions, even if part of a State or local government follow: OMB A-21 for cost principles, A-110 for administrative requirements, and A-133 for audit requirements. All procurement requirements contained in the above referenced circulars are incorporated herein by reference. By signing this solicitation document, vendor certifies that vendor is in compliance with OMB A-110 and that vendor is not on the Debarred Bidders List.
- 4.19 Owner's Special Conditions

The Owner requires full compliance with Division 00 and Division 01 Specifications, Contract and General Requirements. The documents shall be a part of this RFCSP and the Contract.

4.20 Prevailing Wage Schedule, University of North Texas System

Prevailing wage schedule shall in accordance with Texas Government Code, Chapter 2258. The hourly wage rate for work over forty (40) hours a week and work on legal holidays shall be not less than one and one-half (1.5) times the hourly rates.

Respondents shall base their proposals on rates they expect to pay. The Owner will not consider claims for extra payment to the Contractor on account of payment of wages higher than those required by Texas Government Code, Chapter 2258.

- 4.21 Pursuant to Section 231.006 of the Family Code, response must include names and social security numbers of each person with at least twenty-five (25) percent ownership of the business entity submitting the response. Vendors that have pre-registered this information on the Texas Comptroller of Public Accounts Centralized Master Bidders List (CMBL) have satisfied this requirement. If not pre-registered, list the name and social security numbers for each person. Otherwise, this information must be provided prior to contract award.
- 4.22 Note to Vendors: Any terms and conditions attached to any response will not be considered unless specifically referred to on the Solicitation and may result in disqualification of the response.
 - A. **Dispute Resolution:** Chapter 2260 of the Texas Government Code establishes a dispute resolution process for contracts involving goods, services, and certain types of projects. If Chapter 2260 applies to this Purchase Order, then the statutory dispute resolution process must be used by the vendor to attempt to resolve all of its disputes arising under this Purchase Order.
 - B. **Excess Obligations Prohibited**: The Texas Constitution (Article XVI, Section 10) prohibits obligators beyond the current appropriations, which the Owner applies annually. Any purchase order may be canceled at any time without penalty if legislative and/or Owner funds are not appropriated for goods or services obligated on any purchase order beyond the current fiscal year (September 1 through August 31 of any given year.)
 - C. **Cancellation**: Items or orders may be canceled without the consent of the vendor due to failure to fulfill their contractual obligations. If cancellation is requested by the Owner for some other reason through no fault of the vendor, the vendor will be contacted. The Owner reserves the right to cancel this contract upon thirty (30) days written notice to the Contractor. The Contractor must request and secure in writing the approval of the Purchasing Department to be released from this contract or any portion thereof should unforeseeable conditions occur.
 - D. Miscellaneous: The laws of the State of Texas shall prevail, including the Public Information Act. Any Order is not confidential. All transactions associated with this Order may be subject to audit. Vendor, by accepting this Order agrees to allow access to all records regarding this transaction upon written request by UNTS Internal Auditors and/or UNTS Business Support Services Procurement department.

5. EVALUATION

5.1 The successful offer will be the offer that is submitted in response to this Proposal by the Submittal Deadline and provides the Best Value to the Owner in the Owner's sole discretion. Offers will be evaluated by an evaluation committee that will include employees of the Owner and other persons invited by the Owner to participate. The evaluation of offers and the selection of the Successful Offer will be based on the information provided to the Owner by the respondent in response to the Specifications section of this Proposal. Consideration may also be given to any additional information and comments if such information or comments increase the benefits to the Owner. The successful respondent will be required to enter into a contract acceptable to the Owner.

The evaluation committee will determine if Best and Final Offers are necessary. Award of a contract may be made without Best and Final Offers. The Owner may, at its discretion, elect to have Respondents provide oral presentations and respond to inquiries from the evaluation committee related to their Proposals. A request for a Best and Final Offer is at the sole discretion of the Owner and will be extended in writing

In evaluating Proposals to determine the best value for the State, the Owner may consider information related to past contract performance of a Respondent including, but not limited to, Texas Comptroller of Public Account's Vendor Performance Tracking System.

5.2 Evaluation Criteria

Proposals will be opened publicly to identify the names of the proposers and their respective proposed agreement amounts. Other contents of the Proposals will be afforded security sufficient to preclude disclosure of the contents prior to award. Proposals will be evaluated by the Owner. The criteria for evaluation, Best Value determination using Education Code 51.783 and selection of the successful proposer for this award, will be based upon the equally weighted factors listed below:

- A. Proposed agreement amount listed on Proposal form. Please provide a breakdown of costs for abatement, demolition and build back.
- B. Proposed number of calendar days indicated on Proposal form.
- C. The qualifications and experience of the proposer's key personnel and subcontractors committed to the project. Project leader with minimum three (3) years experience with similar scale projects, resumes of key team members working on project, experience with construction in an occupied building, complexity and schedule along with previous experience with construction on a University campus with heavy foot and vehicular traffic.
- D. Proposer's current workload and availability of personnel and equipment. Please include a list of proposed subcontractors and their qualifications and any licenses as required.
- E. The quality of references from owners and architects for similar projects completed by the proposer within the last five (5) years.
- F. The proposer's proposed project schedule and the demonstrated ability to have met expedited schedules on similar projects. Please provide a detailed schedule of work and timeline for the project from start to final completion.
- G. The responsibility and reputation of the proposer, including claims and litigation experiences.H. The proposer's safety record.
- The sufficiency of the proposer's financial resources. L

6. AWARD PROCESS

6.1 After the opening of the offers and upon completion of the initial review and evaluation of the offers submitted, selected respondents may be invited to participate in oral presentations. The selection of the Successful Offer may be made by the Owner on the basis of the offers initially submitted, without discussion, clarification or modification. In the alternative, selection of the Successful Offer may be made by the Owner on the basis of negotiation with any of the respondents. At the Owner's sole option and discretion, it may discuss and negotiate all elements of the offers submitted by selected respondents within a specified competitive range. For purposes of negotiation, a competitive range of acceptable or potentially acceptable offers may be established comprising the highest-rated offers. The Owner will provide each respondent within the competitive range with an equal opportunity for discussion and revision of its offer. The Owner will not disclose any information derived from the offers submitted by competing respondents in conducting such discussions. Further action on offers not included within the competitive range will be deferred pending the selection of the Successful Offer; however, the Owner reserves the right to include additional offers in the competitive range if deemed to be in its best interest.

After the submission of offers but before final selection of the Successful Offer is made, the Owner may permit a respondent to revise its offer in order to obtain the respondent's best final offer. The Owner is not bound to accept the lowest-priced offer if that offer is not in its best interest, as determined by the Owner.

The Owner reserves the right to: (a) enter into agreements or other contractual arrangements for all or any portion of the Scope of Work set forth in this Proposal with one or more respondents; (b) reject any and all offers and re-solicit offers; or (c) reject any and all offers and temporarily or permanently abandon this procurement, if deemed to be in the best interest of the Owner.

6.2 Respondent's Acceptance of Evaluation Methodology

> Submission of an offer by a respondent indicates: (1) the respondent's acceptance of the Selection Process, the Evaluation of Criteria for selection, and all other requirements and specifications set forth in this Proposal; and (2) the respondent's recognition that some subjective judgments must be made by the Owner during this Proposal process.

- 6.3 Contract
 - A. A response to this Solicitation is an offer to contract based upon the terms, conditions and specifications contained herein. Responses do not become contracts until a UNTS Agreement is issued and accepted. The contract shall be governed, construed, and interpreted under the laws of the State of Texas as the same may be amended from time to time. The Education Code 51.9335 shall be considered in making an award when specified. Venue for any suit filed against UNTS shall be subject to the mandatory venue statute set forth in §105.151 of the Texas Education Code.

- i. An award is made to the Vendor submitting the lowest and/or best value response conforming to this specification. To determine the lowest and/or best value response, in addition to price, <u>BEST VALUE</u> may be considered.
- ii. DEBTS TO THE STATE: Any party indebted to the State of Texas or any party who is more than thirty (30) days delinquent for Child Support is not entitled to payment on this purchase order or any accompanying contract.
- iii. If a "best offer" vendor shows not to be in "good standing," this agency may reject the response and award to the next best response.
- iv. The Owner reserves the right to award the entire contract to a single Vendor or to award different components to different Vendors, whichever the Owner, at its sole discretion, determines to be in its overall best interest, as solely determined by the responsible parties of the Owner.
- B. Respondent understands that acceptance of funds under this contract acts as acceptance of the authority of the State Auditor's Office, or any successor agency, to conduct an audit or investigation in connection with those funds. Respondent further agrees to cooperate fully with the State Auditor's Office or its successor in the conduct of the audit or investigation, including providing all records requested. Respondent will ensure that this clause concerning the authority to audit funds received indirectly by subcontractors through proposer and the requirement to cooperate is included in any subcontract it awards
- 6.4 Response Results: It is not the policy of the Owner to furnish results over the telephone. Bid tabulations may be requested by email to elaine.robbins@untsystem.edu.
- 6.5 Historically Underutilized Businesses (HUB)
 - A. If Owner elects to award the future Construction Phase Services to the Construction Manager, the proposed contract is expected to exceed \$100,000.00. A Good Faith Effort Program in the form of a HUB Subcontracting Plan (HSP) is a mandatory condition precedent to the award of any such extension of the contract. The HSP will become a part of the General Construction Agreement Refer to Division 00, Section 006000, *Project Forms* herein for HSP Forms.
 - B. Centralized Master Bidders List (CBML): The Owner utilizes the Texas Comptroller of Public Accounts CMBL to locate potential HUB vendors. The CMBL is located at: <u>http://comptroller.texas.gov/purchasing/vendor/cmbl/</u>. Non-HUB respondents are identified from various sources including the CBML.
 - C. Questions regarding completing the HSP should be directed to Lisa Martinez-Tovar or Ashley Salazar-Hernandez, Assistant HUB Coordinator at 940-369-5500 or <u>hub@untsystem.edu</u>. Additional information can also be found at the Texas Comptroller for the Public Accounts website at:

http://www.window.state.tx.us/procurement/prog/hub/hub-forms/ .

FAILURE TO MEET HUB REQUIREMENTS MAY RESULT IN THE TERMINATION OF THE CONTRACT.

END OF SECTION

DOCUMENT 004100 RFCSP752-23-262094ER UNT Music Practice Jazz Lab

PROPOSAL FORM

Proposal of:

(Company Name)

In accordance with Education Code 51.783, the University of North (UNT), subsequently referred to as the Owner, is accepting proposals and intends to enter into an agreement with a General Construction contractor in accordance with the terms, conditions and requirements set forth in this Request for Competitive Sealed Proposal (RFCSP).

UNTS is accepting sealed bids no later than 2:00 p.m. CST on February 1, 2023. Bids received after the date and hour previously stated will not receive consideration. The HUB Sub-Contracting Plan is due no later than 2:00 p.m. CST on February 2, 2023. Failure to submit the HUB plan will disqualify your proposal.

The scope of work of this RFCSP is General Construction for the UNT Music Practice Jazz Lab project. A set of the one hundred percent (100%) Construction Documents and Specifications have been included for use in preparation of the proposal. A sample copy of the agreement has been included (Division 00, Section 005200, *Agreement Forms*) for review.

PROPOSERS ARE CAUTIONED TO READ THE INFORMATION CONTAINED OR REFERRED TO IN THIS RFCSP CAREFULLY AND TO SUBMIT A COMPLETE RESPONSE TO ALL REQUIREMENTS AS DIRECTED.

TO: Elaine Robbins Construction Contract Coordinator II University of North Texas System Business Service Center Woodhill Square 1112 Dallas Drive, Suite 4000 Denton, Texas 76205

Via Electronic Delivery through Jaegger Website Link below:

https://bids.sciquest.com/apps/Router/PublicEvent?CustomerOrg=UNTS

BASE BID

Pursuant to and in compliance with the Contract Documents and any attachments thereto, including the Advertisement for Competitive Sealed Proposal and Instruction for Proposals, the Proposer hereby certifies that it has, carefully examined the Contract Documents entitled:

UNT Music Practice Jazz Lab

Prepared by: SmithGroup & Walter P. Moore

Base Bid: The conditions affecting the Work, and being familiar with the site; and having made the necessary examinations, proposes to furnish all labor, materials, equipment, and services necessary to complete the Work in strict accordance with the Contract Documents for the above referenced project for the following sum (**Not including bond cost**):

\$			
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*Please provide a breakdown of your cost for Abatement, Demolition and BuildBack as included in your Base Bid.

ALTERNATE BIDS

Number	Description of Alternate Bid:	Additive/Deductive	Bid Amount:
1	<u>Alternate 1</u> - Option 1 – one toilet room – see A7.1.1 of CD's	Additive Deductive	\$
2	Alternate 1 – Option 2 – Toilet room divided into 2 rooms – see A7.1.1 of CD's	 Additive Deductive 	\$

PAYMENT TERMS

The Owner shall be billed in accordance with Chapter 2251 of the Texas Government Code and payment shall be made no later than thirty (30) days following the later of (i) delivery of the goods or completion of the services and (ii) delivery of an invoice to Customer; and (c) interest, if any, on past due payments shall accrue and be paid in accordance with Chapter 2251 of the Texas Government Code. Payee must be in good standing, not indebted to the State of Texas, and current on all taxes owed to the State of Texas for payment to occur. Payment Applications and any required supporting documents must be presented to: University of North Texas System Facilities; 1155 Union Circle #311040, Denton, Texas 76203-5017.

- a. Payment on any contract will be withheld from Proposer if Proposer is determined to be more than thirty (30) days delinquent for Child Support.
- b. Successful Proposer shall be responsible for referencing the purchase order number(s) resulting from this proposal on any invoice(s), packing list(s), correspondence, etc. Invoicing must correlate to prices quoted either on a unit, hourly, etc. basis.
- c. DISQUALIFICATION: Response is subject to disqualification if Proposer provides revisions and/or exclusions to the terms and conditions listed in this solicitation that the Owner is limited by law from accepting (i.e. offers with the laws of a State other than Texas), requirements for prepayment not defined in or allowed for in this Solicitation, limitations on remedies, any revision to stated terms and conditions of the Solicitation, etc.
- d. Proposer agrees that any payments due under this contract may be applied towards any debt, including but not limited to delinguent taxes and child support that is owed to the State of Texas.

SALES TAX

Purchases made for the Owner's use are exempt from the State Sales tax and Federal Excise tax. Do not include tax in response. Excise Tax Exemption Certificates are available upon request.

INSURANCE

The Proposer shall provide and maintain, until the work covered in this Contract is completed and accepted by the Owner, the minimum insurance coverage as stated in Division 00, Section 007000, *UGC*.

TIME OF COMPLETION

Consecutive Calendar Days needed to complete the project: ______ calendar days

LIQUIDATED DAMAGES

Liquidated damages will be in accordance with Division 00, Section 007000 "UGC".

BOND

In accordance with Texas Government Code 2253, a Payment Bond is required for all public works agreements over \$25,000.00 and a Performance Bond for all public works agreements over \$100,000.00. It is estimated that this agreement will be over \$100,000.00 so a Payment and Performance Bond is required. Please provide the amount as a total bond cost. The Owner will pay bonding costs to the awarded vendor as a pass-through amount with proper documentation provided along with an invoice.

Payment and Performance Bond cost:	\$
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ADDENDA

Receipt is hereby acknowledged of the following addenda to this RFCSP. (Initial, if applicable)

No. 1:	No. 2:	No. 3:	No. 4:	No. 5:	No. 6:
Dated:	Dated:	Dated:	Dated:	Dated:	Dated:

QUALIFICATIONS

Refer to Attachment A of this document. Qualifications must be submitted on the enclosed form and no other document will be accepted. Not providing qualifications on the provided form will be cause for disqualification.

An incomplete proposal or one having additional information or other modifications inscribed thereon, may be cause for rejections of the entire proposal. This proposal is valid and will be honored for a period of one hundred eighty (180) days following the proposal opening.

THIS SECTION MUST BE COMPLETED, SIGNED, AND RETURNED WITH RESPONDENT'S PROPOSAL. FAILURE TO SIGN AND RETURN THIS SECTION WILL RESULT IN DISQUALIFICATION OF YOUR FIRM.

- 1. By signature hereon, Respondent offers and agrees to furnish the products and/or services in compliance with all terms, conditions, requirements set forth per the RFP documents and contained herein.
- 2. By signature hereon, Respondent affirms that it has not given, nor intends to give at any time hereafter, any economic opportunity, future employment, gift, loan, gratuity, special discount, trip, favor or service to a public servant in connection with the submitted proposal. Failure to sign hereon, or signing with a false statement, shall void the submitted proposal or any resulting contracts, and the Respondent shall be removed from all proposal lists at this Agency.
- 3. By signature hereon, a corporate Respondent certifies that it is not currently delinquent in the payment of any Franchise Taxes due under Chapter 171, Texas Tax Code, or that the corporation is exempt from the payment of such taxes, or that the corporation is an out-of-state corporation that is not subject to the Texas Franchise Tax, whichever is applicable. A false certification shall be deemed a material breach of contract and, at UNTS's option, may result in cancellation of any resulting contract or purchase order.
- 4. By signature hereon, the Respondent hereby certifies that neither the Respondent nor the firm, corporation, partnership or institution represented by the Respondent, or anyone acting for such firm, corporation, or institution has violated the antitrust laws of this state, codified in Section 15.01, et. seq., Texas Business and Commerce Code, or the Federal antitrust laws, nor communicated directly or indirectly the proposal made to any competitor or any other person engaged in such line of business.
- 5. By signature hereon, Respondent certifies that all statements and information prepared and submitted in response to this solicitation are current, complete and accurate.
- 6. By signature hereon, Respondent certifies that the individual signing this document and the documents made part of the RFP is authorized to sign such documents on behalf of the company and to bind the company under any contract which may result from the submission of this proposal. Unsigned responses will not be considered under any circumstances.
- 7. By signature hereon, Respondent certifies that if a Texas address is shown as the address of the Respondent, Respondent qualifies as a Texas Resident Respondent as defined in Texas Administrative Code (TAC) Title 34. In the case of a tie, the award will be made in accordance with TAC, Title 34, amended. Check below preference claimed under TAC, Title 34, amended:

Supplies, materials, or equipment produced in Texas/offered by Texas bidders Agricultural products produced or grown in Texas Agricultural products and services offered by Texas bidders USA produced supplies, materials, or equipment

- Products of persons with mental or physical disabilities
- Recycled, remanufactured, or environmentally sensitive products, including recycled steel products Energy efficient products
- Rubberized asphalt paving material
- Recycled motor oil and lubricants
- Products produced at facilities located on formerly contaminated property
- Products and services from economically depressed or blighted areas
- Vendors that meet or exceed air quality standards

Consistent and continued tie Responses could cause rejection of offers by UNTS and/or investigation for antitrust violations.

By signature hereon, Respondent certifies it is a small business and/or minority/female owned business as defined 8. by the State of Texas. Check status below:



Historically Underutilized Business Small Business (House Bill 366, 64th Legislature)

- Minority/Female Owned Business (House Bill 2626, 73rd Legislature)
- Certified by Texas Department of Commerce Status not claimed
- By signature hereon, Respondent certifies as follows: 9.

"Under Section 231.006, Texas Family Code, the vendor or applicant certifies that the individual or business entity named in this contract, bid, or application is not ineligible to receive the specified grant, loan, or payment and acknowledges that this contract may be terminated and payment may be withheld if this certification is inaccurate."

"Under Section 2155.004, Texas Government Code, the vendor or applicant certifies that the individual or business entity named in this bid or contract is not ineligible to receive the specified contract and acknowledges that this contract may be terminated and payment withheld if this certification is inaccurate."

- 10. By signature hereon, Respondent certifies that no relationship, whether by relative, business associate, capital funding agreement or by any other such kinship, exist between Respondent and an employee of any UNTS component, or Respondent has not been an employee of any UNTS component within the immediate twelve (12) months prior to RFP response. All such disclosures will be subject to administrative review and approval prior to UNTS entering into any contract with Respondent.
- 11. Respondent certifies that they are in compliance with Section 669.003 of the Texas Government Code, relating to contracting with the executive head of a State agency. If Section 669.003 applies, respondent will complete the following information in order for the response to be evaluated:

Name of former Executive:	
Name of State Agency:	
Date of separation from State agency:	
Position with Respondent:	Date of employment with Respondent:

- 12. By signature hereon, Respondent affirms that no compensation has been received for participation in the preparation of the specifications for this RFP. (ref. Section 2155.004. Texas Government Code).
- 13. Respondent represents and warrants that all articles and services quoted in response to this RFP meet or exceed the safety standards established and promulgated under the Federal Occupational Safety and Health Law (Public Law 91-596) and its regulations in effect or proposed as of the date of this solicitation.

- 14. **Suspension, Debarment, and Terrorism:** Respondent further certifies that the Respondent and its principals are eligible to participate in this transaction and have not been subjected to suspension, debarment, or similar ineligibility determined by any federal, state or local governmental entity and that Respondent is in compliance with the State of Texas statutes and rules relating to procurement and that Respondent is not listed on the federal government's terrorism watch list as described in Executive Order 13224. Entities ineligible for federal procurement are listed at http://www.epls.gov.
- 15. By signature hereon, Respondent signifies his compliance with all federal laws and regulations pertaining to Equal Employment Opportunities and Affirmative Action.
- 16. By signature hereon, Respondent will comply with and agree to use E-Verify System in accordance with State of Texas Executive Order RP-80 throughout this project as appropriate.
- 17. Respondent affirmatively states that it does not boycott Israel, pursuant to Texas Gov't Code, Section 2270.002. Additionally, Respondent shall not engage in a boycott of Israel during the term of this agreement.
- 18. Respondent hereby represents, verifies, and warrants, pursuant to Texas Gov't Code 2272.02, that it does not have a practive, policy, guidance, or directive that discriminates against a firearm entity or firearm trade association and willnot discriminate against a firearm entity or firearm trade association during the term of this agreement.
- 19. Respondent hereby represents, verifies, and warrants, pursuant to Texas Gov't Code 2274.02, that it does not boycott energy companies and will not boycott energy companies during the term of this agreement.
- 20. Respondents should give Payee ID Number, full firm name, and address of Respondent below in the space provided. The Payee ID Number is the taxpayer number assigned and used by the Texas Comptroller of Public Accounts. If this number is not known, complete the Federal Employer's Identification Number.

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Payee ID No.	_ If a Corporation State of Incorporation:
FEI No	Charter No:
Company Information:	Submitted by:
(Company Name)	(Authorized Signature)
(Street Address Line 1)	(Printed Name/Title)
(Street Address Line 2)	(Date)
(City, State, Zip Code)	(Telephone Number)
	(Facsimile Number)
	(Email Address)

Complete the following:

ATTACHMENT A

QUALIFICATIONS RFCSP752-23-262094ER UNT Music Practice Jazz Lab

ITEMS 1 THROUGH 5 TO BE SUBMITTED WITH PROPOSAL

Proposer's Name:	
Point of Contact:	
Address:	
City, State, Zip:	
Telephone No.:	
Email:	
State Comptroller Vendor Identification Number:	

1. GENERAL

- A. Qualification information submitted shall be applicable only to the company entity or branch that will perform this Work.
- B. Attach your Project Organization Chart and resumes of individuals who would be assigned to this project.
- C. Proposed demolition schedule (Bar chart acceptable).

2. HISTORY

A.	Corporation Partnership Sole Proprieto	rship Joint Venture
	State of Incorporation:	
В.	In continuous business since:	
	Remarks (if required):	
C.	Corporate Officers, Partners or Owners of Organi	zation:
	Name Branch Manager	Telephone Number
D.	Check box(es) corresponding to the nature of you	r business:
	Large Business (100 or more employees)
	Small Business (fewer than 100 employed	ees)
	HUB Business	
	Other (Define)	
E.	Has your organization ever defaulted or failed to o	complete any work awarded?
	Yes No	
	If yes, stipulate where and why:	
F.	Has your organization ever paid liquidated damage	es or a penalty for failure to complete a contract on time?
	Yes No	
	If yes, stipulate where and why:	

3. EXPERIENCE

A.	Normall	y performs% of the work with own forces. List trades below:
B.	Propose	e to perform% of the work for project with own forces. List trades below:
C.	form us	najor projects of your organization has in-progress. If more space is needed attach pages to this ing format below identified by item and sub-item:
	i.	Name, Location and Description of Project:
		Contract Amount:
		Percent Complete:
		Project Completion Date:
		Owner Reference Contact and Telephone Number:
		Architect Reference Contact and Telephone Number:
	ii.	Name, Location and Description of Project:
		Contract Amount:
		Percent Complete:
		Project Completion Date:

		Owner Refer	ence Contact	and Telepho	ne Number:			
		Architect Re	ference Conta	ct and Telep	hone Number:			
	iii.	Name, Loca	tion and Desc	ription of Pro	ject:			
		Cor	ntract Amount:					
		Per	cent Complete	e:				
		Pro	ject Completic	on Date:				
		Owner Refer	ence Contact	and Telepho	one Number:			
		Architect Re	ference Conta	ct and Telep	hone Number:			
D.	Total nu	mber and dol	ar amount of	contracts cur	rently in progres	s:		
		Number		\$				
E.	Largest	contract curre	ently in-proces	s:				
		Anticipated o	late of comple	tion:				
F.	Volume	of work comp	leted over last	t five (5) year	s: (Through 12/3	31)		
		Year		\$				
				\$				
				\$				

G. List five (5) major projects of similar scope your organization has completed in the last five (5) years with completion date, photos and references. Other projects of particular significance may also be listed.

Contract Amount:	
Percent Complete:	
Project Completion Date:	
Owner Reference Contact and Telephone Number:	
Name	Telephone Number
Architect Reference Contract and Telephone Number:	
Name Name. Location and Description of Project:	Telephone Number
Name Name, Location and Description of Project:	
Name, Location and Description of Project:	
Name, Location and Description of Project:	
Name, Location and Description of Project:	
Name, Location and Description of Project:	
Name, Location and Description of Project:	

Name, Location and Description of Project:		
Contract Amount:		
Percent Complete:		
Project Completion Date:		
Owner Reference Contact and Telephone Number:		
Name	Telephone Number	
Architect Reference Contract and Telephone Number:		
Name	Telephone Number	
lame, Location and Description of Project:		
Contract Amount:		
Percent Complete:		
Project Completion Date:		
Owner Reference Contact and Telephone Number:		
lame	Telephone Number	
Architect Reference Contract and Telephone Number:		
Vame	Telephone Number	

Name, Location and Description of Project:		
Contract Amount:		
Percent Complete: Project Completion Date:		
Owner Reference Contact and Telephone Number:		
Name	Talanhana Numhar	
Name	Telephone Number	
Architect Reference Contract and Telephone Number:		
Name	Telephone Number	

H. Has your organization had any claims and/or litigations in the last five (5) years?

If yes, attach a list with project name, date or project, owner, owner's contact person with telephone number and summary explanation.

4. SAFETY PROGRAM

A. List your organization's Workers Compensation Experience Modification Rate (EMR) for the last three (3) years, as obtained from your insurance agent.

YEAR		
EMR		

B. Complete matrix for the three (3) past years, as obtained from OSHA N. 200 Log:

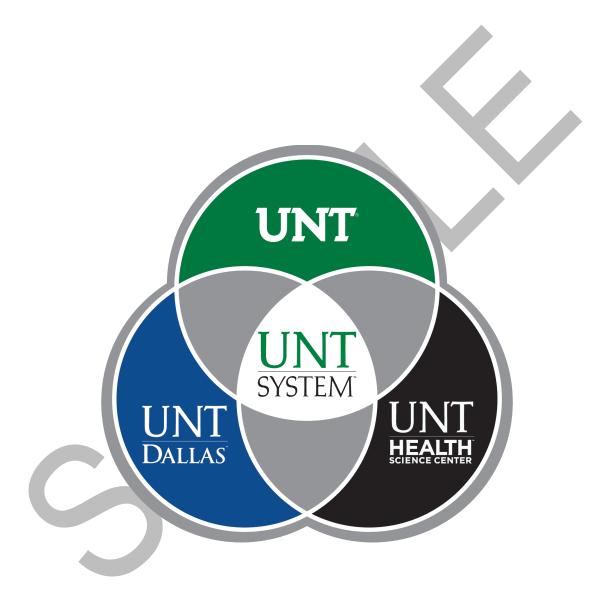
	Year	
	Number of injuries and illness	
	Number of lost time accidents	
	Number of recordable cases	
	Number of fatalities	
	Total Injury & illness rate from OSHA 300 log	
	Please provide your SIC Code	
C.	Are regular project safety meetings held for Field Supervisor(s)?	
	Yes No	
	If yes, frequency:	
	Weekly Bi-monthly Monthly As Needed	
D.	Are project safety inspections conducted? Yes No	
	If yes, who performs inspection? How often?	
E.	Does organization have a written safety program? Yes No	
	If yes, provide a copy. It will become a compliance document upon contract award.	
F.	Does your organization have a safety orientation program for new employees? Yes	No
	For employees promoted to Field Supervisors?	
	If yes, does your Supervisor Safety Program include instructions on the following:	
	YesNoSafety work practicesTool box safety meetingsFirst aid proceduresAccident investigationFire protectionNew worker's orientation	

5. FINANCIAL

A. Attach an audited Financial Statement, including a profit and loss statement and other supporting schedules. If the last audited statement is over twelve (12) months old, include the most current unaudited statement.

В.	B. Surety Company:			
	Age	ent:		
	Nar	me of Contact:	Telephone No	
C.	Bor	nding Capacity:		
	Lim	it per project:		
	Une	encumbered bonding capacity:		
D.	D. Trade References (Additional references may be included as attached sheets.)			
	i.	Organization:		
		Agent:		
		Name of Contract:	Telephone No	
	ii.	Organization:		
		Agent:		
		Name of Contract:	Telephone No	
	iii.	Organization:		
		Agent:		
		Name of Contract:	Tolophono No	

GENERAL CONSTRUCTION AGREEMENT



GENERAL CONSTRUCTION AGREEMENT

(For Use with Competitive Sealed Proposals)

This Agreement is made and entered into by and between **University of North Texas {System or Institution Name}** ("Owner"), and by **{Firm Name}** ("Contractor"), duly authorized by the laws of the State of Texas to act as contractor for construction, rehabilitation, alteration, or repair services. The capitalized term "Party" refers to either Owner or Contractor individually and the term "Parties" refers to Owner and Contractor collectively. The effective date ("Effective Date") of this Agreement shall be the date of last signature by the parties hereto.

ARTICLE 1 PROJECT

1.1 Owner does hereby engage Contractor and Contractor does hereby agree to provide all labor, materials, equipment, and services necessary to complete the Work, all of which shall be provided in full accord with the Contract Documents to construct the {Project Name} ("Project"), on the {Campus}, to be completed in accordance with the requirements herein, and generally described as follows:

{General Description of the Project}

1.2 Contractor has overall responsibility for and shall furnish all materials, equipment, tools, and labor as necessary or reasonably inferable to complete the Work, or any phase of the Work, in accordance with Owner's requirements and the terms of the Contract Documents.

ARTICLE 2 CONTRACT DOCUMENTS

- 2.1 Owner, through its Design Professional, shall provide all architectural and engineering design services necessary for the completion of the Work. The Drawings, Specifications, and addenda have been prepared for Owner by {Architect/Engineer} ("Design Professional").
- 2.2 The Contract Documents consist of:
 - 2.2.1 This Agreement and all exhibits and attachments listed, contained or referenced in this Agreement;
 - 2.2.2 The Uniform General Conditions for Construction and Design Contracts for the University of North Texas System ("Uniform General Conditions" or "UGC");
 - 2.2.3 Supplementary General Conditions or Special Conditions, if any;
 - 2.2.4 Owner's Specifications;
 - 2.2.5 All Addenda issued prior to the Effective Date of this Agreement;
 - 2.2.6 All Change Orders issued after the Effective Date of this Agreement;
 - 2.2.7 The Drawings, Specifications, details and other documents developed by Design Professional to describe the Project and accepted by Owner;
 - 2.2.8 The Drawings and Specifications developed or prepared by Owner's other consultants, if any, and accepted by Owner; and

- 2.2.9 The Historically Underutilized Business (HUB) subcontracting plan submitted or amended by Contractor and approved by Owner for this Project.
- 2.3 The Contract Documents form the entire and integrated agreement between Owner and Contractor and supersede all prior negotiations, representations or agreements, written or oral.
- 2.4 To the extent the terms of this Agreement conflict with the Uniform General Conditions and/or the Supplemental Conditions, the terms of this Agreement will control.
- 2.5 If there is an irreconcilable conflict between or among the various documents that make up the Contract Documents, the interpretation that provides for the higher quality of material and/or workmanship will prevail over all other interpretations.

ARTICLE 3 DEFINITIONS

- 3.1 Terms, words, and phrases used in the Contract Documents shall have the meanings given in the Uniform General Conditions.
- 3.2 The following terms, words, and phrases used in the Contract Documents shall have the following meanings, and if more specific than the definition given in the Uniform General Condition, the more specific given in this Agreement shall control.
 - 3.2.1 "Baseline Schedule" means the initial time schedule prepared by Contractor for Owner's information and acceptance that conveys Contractor's and Subcontractors' activities (including coordination and review activities required in the Contract Documents to be performed by the Design Professional and Owner), durations, and sequence of work related to the entire Project to the extent required by the Contract Documents. The schedule shall clearly demonstrate the longest path of activities, critical activities durations, and necessary predecessor conditions that drive the end date of the schedule. The accepted Construction Baseline Schedule shall not change.
 - 3.2.2 "Design Professional" means licensed professionals, or firms employing such licensed professionals, engaged by Owner as independent architects or engineers for design of all or a portion of the Project and to prepare Drawings and Specifications for the construction of the Project. More than one such professional or firm may be employed by Owner, and all such professionals or firms, regardless of number, are referred to in the singular herein.
 - 3.2.3 "Longest Path" means the sequence of directly related activities that comprise the longest continuous chain of activities from the start of the first activity to the finish of the last activity. Each activity in the Longest Path is critical and directly related in that it prevents its successor from being scheduled earlier than it is. For this Project, "Longest Path" shall also include ten percent (10%) Total Float and Weather Days.
 - 3.2.4 "Subcontractor" means a person or entity who has an agreement with Contractor to perform any portion of the Work. The term Subcontractor does not include the Design Professional or any person or entity hired directly by Owner.
 - 3.2.5 "Work" means the provision of all services, labor, materials, supplies, and equipment that are required of Contractor to complete the Project in strict accordance with the requirements of the Agreement and the Construction Documents. Work includes, but is not limited to, the construction services, additional work required by Change Orders, and any other work reasonably inferable from the Construction Documents. The term "reasonably inferable" takes into consideration the understanding of the parties that some details necessary for completion of the Work may not be shown on the Drawings or included in the Specifications, but they are a requirement of the Work if they are a

usual and customary component of the Work or otherwise necessary for complete installation and operation of the Work.

ARTICLE 4 CONTRACTOR'S RESPONSIBILITIES

- 4.1 Contractor's responsibilities include but are not limited to supervision, furnishing labor, materials, equipment, employment of and responsibility for subcontractors, payment of taxes where applicable, patent fees, royalties, approval fees, license fees, permit fees, filing fees, registration fees, and other governmental charges.
- 4.2 Contractor represents that it is an independent contractor and that it is familiar with the type of Work it is undertaking. Contractor shall furnish construction administration and management services and use Contractor's diligent efforts to perform the Work in an expeditious manner consistent with the Contract Documents. Contractor will cause all persons connected with Contractor directly in charge of the Work to be duly registered and/or licensed under all applicable laws.
- 4.3 Neither Contractor nor any of its agents or employees shall act on behalf of or in the name of Owner except as provided in this Agreement or unless authorized in writing by Owner's Representative.
- 4.4 Contractor shall be responsible for the supervision and coordination of the Work, including the construction means, methods, techniques, sequences, procedures, safety provisions, precautions, and programs utilized, unless the Contract Documents give other specific instructions. In such case, Contractor shall not be liable to Owner for damages resulting from compliance with such instructions unless Contractor recognized and failed to timely report to Owner any error, inconsistency, omission, or unsafe practice that it discovered in the specified construction means, methods, techniques, sequences, procedures, safety provisions, precautions, or programs.
- 4.5 Contractor shall perform Work only within locations allowed by the Contract Documents, applicable laws and regulations, and applicable permits. Laws and regulations include federal, state, and local laws, ordinances, codes, rules, and regulations applicable to the Work that are enacted as of the Agreement date, with which the Constructor must comply.
- 4.6 Contractor shall: (a) proceed with the Work in a manner that does not hinder, delay, or interfere with the work of Owner or others or cause the work of Owner or others to become defective; (b) afford Owner or others reasonable access for introduction and storage of their materials and equipment and performance of their activities; and (c) coordinate Contractor's Work with the work of Owner and others.
- 4.7 Before proceeding with any portion of the Work affected by the construction or operations of Owner or others, Contractor shall give Owner written notification within forty-eight (48) hours of any defects Contractor discovers in Owner's or other's performance or work, which will prevent the proper execution of the Work. Contractor's obligations in this subsection do not create a responsibility for the performance or work of Owner or others, but are for the purpose of facilitating the Work. If Contractor does not notify Owner of defects interfering with the performance of the Work, Contractor acknowledges that the performance or work of Owner or others is not defective and is acceptable for the proper execution of the Work. Following receipt of written notice from Contractor of defects, Owner shall promptly inform Contractor what action, if any, Contractor shall take with regard to the defects.
- 4.8 Prior to commencing the Work, Contractor shall examine and compare the Drawings and Specifications with information furnished by Owner, relevant field measurements made by Contractor, and any visible conditions at the site affecting the Work. During the visit to the site, Contractor shall inspect the existing facilities, systems and conditions to ensure an accurate understanding of the existing conditions as required.

- 4.9 Should Contractor discover any discrepancies, errors, omissions, or inconsistencies in the Contract Documents, Contractor shall report them to Owner within forty-eight (48) hours of discovery. It is recognized, however, that Contractor is not acting in the capacity of a licensed design professional, and that Contractor's examination is to facilitate construction and does not create an affirmative responsibility to detect discrepancies, errors, omissions, or inconsistencies or to ascertain compliance with applicable laws and regulations, including building codes. Following receipt of written notice from Contractor of defects, Owner shall promptly inform Contractor what action, if any, Contractor shall take with regard to the defects.
 - 4.9.1 Contractor shall have no liability for discrepancies, errors, omissions, or inconsistencies discovered under this section unless Contractor fails to promptly report a discovered or apparent discrepancy, error, omission, or inconsistency to Owner. This does not relieve Contractor of responsibility for its own discrepancies, errors, inconsistencies, or omissions.
- 4.10 Contractor shall provide competent supervision for the performance of the Work. Before commencing the Work, Contractor shall notify Owner in writing of the name and qualifications of its proposed superintendent(s) and project manager, so Owner may review the individual's qualifications. If, for reasonable cause, Owner refuses to approve the individual, or withdraws its approval after giving it, Contractor shall name a different superintendent or project manager for Owner's review. Any disapproved superintendent shall not perform in that capacity thereafter at the site. Contractor's superintendent(s) and project manager shall possess full authority to receive instructions from Owner and to act on those instructions. If Contractor changes its superintendent(s) or project manager or their authority, Contractor shall immediately notify Owner in writing.
- 4.11 Contractor shall be responsible to Owner for acts or omissions of parties or entities performing portions of the Work for or on behalf of Contractor or any of its Subcontractors.
- 4.12 Contractor shall permit only qualified persons to perform the Work. Contractor shall enforce safety procedures, strict discipline, and good order among persons performing the Work.
- 4.13 Contractor shall submit to Owner and the Design Professional all shop drawings, samples, product data, and similar submittals required by the Contract Documents for review and approval. Submittals shall be submitted in accordance with the Uniform General Conditions. Contractor shall be responsible for the accuracy and conformity of its submittals to the Contract Documents requirements.
- 4.14 Contractor acknowledges that it has visited, or has had the opportunity to visit, the site to visually inspect the general and local conditions of the facilities, systems and conditions to ensure an accurate understanding of the existing conditions which could affect the Work.
- 4.15 The Work shall be executed in accordance with the Contract Documents and Contractor agrees that (a) it will use its best efforts to perform the Work in a good and workmanlike manner and in accordance with the highest standards of Contractor's profession or business, and (b) all the Work to be performed will be of the quality that prevails among similar businesses of superior knowledge and skill engaged in providing similar services. All materials used in the Work shall be furnished in sufficient quantities to facilitate the proper and expeditious execution of the Work.
- 4.16 If the Work includes installation of materials or equipment furnished by Owner or others, it shall be the responsibility of Contractor to examine the items so provided and thereupon handle, store, and install the items, unless otherwise provided in the Contract Documents, with such skill as to provide a satisfactory and proper installation. Loss or damage due to acts or omissions of Contractor shall be the responsibility of Contractor and may be deducted from any amounts due or to become due to Contractor. Any defects discovered in such materials or equipment shall be reported at once to Owner. Following receipt of written notice from Contractor of defects, Owner shall promptly inform Contractor what action, if any, Contractor shall take with regard to the defects.

- 4.17 Contractor shall have overall responsibility for safety precautions and programs in the performance of the Work. However, such obligation does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work or for compliance with applicable laws and regulations.
 - 4.17.1 Contractor shall seek to avoid injury, loss, or damage to persons or property by taking reasonable steps to protect: (a) its employees and other persons at the site; (b) materials and equipment stored at onsite or offsite locations for use in the Work; and (c) property located at the site and adjacent to Work areas, whether or not the property is part of the site.
 - 4.17.2 Contractor's site safety representative shall have a duty to prevent accidents. The safety representative shall perform their duty in accordance with the Uniform General Conditions.
 - 4.17.3 If Owner deems any part of the Work or site unsafe, Owner, without assuming responsibility for Contractor's safety program, may require Contractor to stop performance of the Work or take corrective measures satisfactory to Owner, or both. If Contractor does not adopt corrective measures, Owner may perform them and deduct their cost from the Contract Sum. If Owner determines that a particular person does not follow safety procedures, or is unfit or unskilled for the assigned Work, Contractor shall immediately reassign the person upon receipt of Owner's written notice to do so. Contractor agrees to make no claim for damages, for an increase in the Contract Sum or for a change in the Contract Time based on Contractor's compliance with Owner's reasonable request.
- 4.18 If the conditions encountered at the site are: (a) subsurface or other physical conditions materially different from those indicated in the Contract Documents; or (b) unusual and unknown physical conditions materially different from conditions ordinarily encountered and generally recognized as inherent in Work provided for in the Contract Documents, then Contractor shall stop affected Work after the condition is first observed and give written notice of the condition to Owner and the Design Professional within forty-eight (48) hours.
- 4.19 Contractor shall regularly remove debris and waste materials at the site resulting from the Work. Prior to discontinuing Work in an area, Contractor shall clean the area and remove all rubbish and its construction equipment, tools, machinery, waste, and surplus materials. Contractor shall minimize and confine dust and debris resulting from construction activities. At the completion of the Work, Contractor shall remove from the site all construction equipment, tools, surplus materials, waste materials, and debris.
 - 4.19.1 If Contractor fails to commence compliance with cleanup duties within two (2) business days after written notification from Owner of non-compliance, Owner may implement appropriate cleanup measures without further notice and shall deduct the reasonable costs from any amounts due or to become due Contractor in the next payment period.
- 4.20 Contractor shall facilitate the access of Owner, Design Professional, and others to Work in progress.
- 4.21 Contractor shall comply with all applicable laws and regulations at its own costs. Contractor shall be liable to Owner for all loss, cost, or expense attributable to any acts or omissions by Contractor, its employees, subcontractors, and agents for failure to comply with applicable laws and regulations, including fines, penalties, or corrective measures.
- 4.22 Contractor warrants that all materials and equipment shall be new unless otherwise specified, of good quality, in conformance with the Contract Documents, and free from defective workmanship and materials. Contractor shall furnish satisfactory evidence of the quality and type of materials and equipment furnished. Contractor further warrants that the Work shall be free from material

defects not intrinsic in the design or materials required in the Contract Documents. Contractor's warranty shall commence on the Date of Substantial Completion of the Work.

- 4.22.1 Contractor shall obtain from its Subcontractors and Material Suppliers any special or extended warranties required by the Contract Documents. Contractor's liability for such warranties shall be limited to a one-year period. After that period, Contractor shall provide reasonable assistance to Owner in enforcing the obligations of Subcontractors or Material Suppliers for such extended warranties.
- 4.22.2 If, prior to Substantial Completion and within one year after the date of Substantial Completion of the Work, any Work not complying with the contract requirements ("Defective Work") is found, Owner shall promptly notify Contractor in writing. Unless Owner provides written acceptance of the condition, Contractor shall promptly correct the Defective Work at its own cost and time and bear the expense of additional Work required for correction of any Defective Work for which it is responsible.
- 4.22.3 With respect to any portion of Work first performed after Substantial Completion, the one-year period shall be extended by the period between Substantial Completion and the actual performance of the later Work. Correction periods shall not be extended by corrective work performed by Contractor.
- 4.22.4 If Contractor fails to correct Defective Work within a reasonable time after receipt of written notice from Owner prior to final payment, Owner may correct it in accordance with Owner's right to carry out the Work. In such case, an appropriate Change Order shall be issued deducting the cost of correcting the Defective Work from payments then or thereafter due Contractor. If payments then or thereafter due Contractor are not sufficient to cover such amounts, Contractor shall pay the difference to Owner.
- 4.22.5 If Contractor's correction or removal of Defective Work causes damage to or destroys other completed or partially completed Work or existing buildings, Contractor shall be responsible for the cost of correcting the destroyed or damaged property.

ARTICLE 5 SUBCONTRACTS

- 5.1 With the prior written approval of Owner, Contractor may subcontract such services as Contractor deems necessary to meet its obligations under this Agreement. Subcontractors shall be qualified and experienced in the type of work they will be performing. Owner shall have the right to reject any subcontractor but such right shall not relieve the responsibility of Contractor for his work and the work of the subcontractors. Contractor expressly assumes such responsibility and liability.
- 5.2 Contractor shall be responsible for the management of the Subcontractors in the performance of the Work.
- 5.3 If this Agreement is terminated, each subcontract agreement shall be assigned by Contractor to Owner, subject to the prior rights of any surety, provided that: (a) this Agreement is terminated by Owner pursuant to Section 11.1; and (b) Owner accepts such assignment, after termination by notifying the Subcontractor and Contractor in writing, and assumes all rights and obligations of Contractor pursuant to each subcontract agreement.
- 5.4 Contractor agrees to bind every Subcontractor and material supplier (and require every Subcontractor to so bind its sub-subcontractors and material suppliers) to all provisions of this Agreement as they apply to the Subcontractors' or material Suppliers' portions of the Work.
- 5.5 Contractor shall comply with the HUB Program as defined by Tex. Gov't Code, Chapter 2161. Failure to comply with the HUB Program may constitute a material breach of this Contract as determined by Owner's sole discretion.

5.6 Contractor agrees to comply with the established HUB Subcontracting Approach and shall make no changes to the HUB Subcontracting Approach without the prior written approval of Owner. Contractor will work with the Business Support Services HUB Coordinator to develop the HUB Subcontracting Plan (HSP). Further details concerning the HSP are located within the Uniform General Conditions.

ARTICLE 6 OWNER'S RESPONSIBILITIES

- 6.1 Owner shall provide Contractor with reasonable access to the site to assist Contractor in its performance of all tasks reasonably necessary for the completion of Work.
- 6.2 Owner hereby expressly reserves the right from time to time to designate by notice to Contractor one or more representatives to act partially or wholly for Owner in connection with the performance of Owner's obligations hereunder. Contractor shall act only upon instructions from such representatives unless otherwise specifically notified to the contrary.
- 6.3 Owner's Designated Representative shall: (a) be fully acquainted with the Project, Work, and site; (b) agree to furnish the information and Work required of Owner in a timely manner; and (c) have the authority to bind Owner (to the extent of their authority) in all matters requiring Owner's approval or authorization. If Owner changes its representative, Owner shall promptly notify Contractor in writing.
- 6.4 Owner will furnish the site plan to document existing conditions to the extent requested by Contractor and as reasonably necessary for the completion of Contractor's Work.
- 6.5 Owner shall examine, or cause its representative(s) to examine documents submitted by Contractor and render decisions pertaining thereto promptly or within a reasonable time to avoid unreasonable delay in the progress of Contractor's Work. Review and approval of a document by Owner shall not waive the contractual responsibility or liability of Contractor.
- 6.6 Owner shall furnish information required as expeditiously as necessary for the orderly progress of Contractor's Work.
- 6.7 Except for those permits and fees related to the Work which are the responsibility of Contractor, Owner shall secure and pay for all other permits, approvals, easements, assessments, and fees required for the development, construction, use or occupancy of permanent structures or for permanent changes in existing facilities, including the building permit.
- 6.8 Owner may perform work at the site directly or by others. Contractor and Owner shall coordinate the activities of all forces at the site and agree upon fair and reasonable schedules and operational procedures for site activities.

ARTICLE 7 SCHEDULE, COMMENCEMENT, AND COMPLETION

- 7.1 Owner shall provide a Notice to Proceed in which a date for commencement of the Work to be performed shall be stated. Contractor shall achieve Substantial Completion of the work no later than {Written Number} ({#}) calendar days from the date of the Notice to Proceed, subject to extension only by approved Change Orders. Final Completion, including correction of deficiencies, shall be achieved no later than thirty (30) calendar days from the date of the Substantial Completion. Contractor understands that the Substantial Completion and Final Completion dates shall not be extended regardless of weather, strikes, or for any other reason unless Change Orders so approve.
 - 7.1.1 Time is of the essence for this Agreement and the Contract Documents.

- 7.1.2 Unless instructed by Owner in writing, Contractor shall not knowingly commence the Work before the effective date of insurance to be provided by Contractor.
- 7.2 Schedule.
 - 7.2.1 Contractor shall submit for review and approval a Baseline Schedule to Owner and Design Professional when submitting the response to request for competitive sealed proposal. The Baseline Schedule shall indicate the dates for starting and completing the various aspects required to complete the work and shall utilize the Longest Path method with fully editable logic. The schedule shall include mobilization, procurement, installation, testing, inspection, delivery of Close-out Documents, and acceptance of all Work. This Baseline Schedule shall become the comparison to the actual conditions throughout the Contract duration and become a part of the Work Progress Schedule (WPS).
 - 7.2.1.1 A Baseline Schedule that does not have at least the minimum amount of Total Float at submission will result in the Contractor forfeiting all claims to WPS extensions and/or delays as a result of contract changes and/or excusable delays as described in the UGCs.
 - 7.2.1.2 In accordance with the UGCs, the WPS shall include at least ten percent (10%) Total Float and Weather Days from the effective date of Notice to Proceed for construction services to Substantial Completion Date.
 - 7.2.1.3 Total Float shall not be shown as a single activity, but rather the results of the relationship between the early and late finish dates or early and late start dates of each activity. The allocation of project float shall be determined by the Project Team as conditions warrant.
 - 7.2.2 As construction proceeds, Contractor shall update and submit the WPS with the Owner, Architect, and Contractor (OAC) meeting minutes. The WPS is to indicate detailed listing for all activity sequences, durations, or milestone dates for activities of the Project, including, without limitation:
 - 7.2.2.1 commencement, milestones, and completion dates for bidding/proposals phase, construction phase, and project stages;
 - 7.2.2.2 times of commencement and completion, duration, and allocation of labor and materials for each Subcontractor;
 - 7.2.2.3 other detailed schedule activities as directed by Owner including, but not limited to, Owner-managed work under separate contracts such as equipment, furniture and furnishings, telephones, project security, property protection, life-safety systems, integration with central campus monitoring systems, information and instructional technology, data-transmission systems, and computer technology systems;
 - 7.2.2.4 a recommended schedule for Owner's purchase of materials and equipment requiring long lead-time procurement, delivery dates of products requiring long lead time procurement, and methods to expedite and coordinate delivery of long lead-time procurements including coordination of the schedule;
 - 7.2.2.5 Owner's occupancy requirements and estimated date of Substantial Completion of the Project;

- 7.2.2.6 potential and actual variances between scheduled and probable completion dates;
- 7.2.2.7 review of schedules for Work not started or incomplete and recommendation to Owner of adjustments in the schedules to conform to the probable completion dates;
- 7.2.2.8 summary reports to Owner of each schedule update and documentation of all changes in construction schedules; and
- 7.2.2.9 evaluation of Subcontractor's personnel, equipment, and availability of supplies and materials, with respect to each Subcontractor's ability to meet the schedule and recommendation to Owner when any subcontract requirements are not met, or appear unlikely to be met.
- 7.2.3 During OAC meeting, Contractor shall: review progress since last meeting with the Owner and Design Professional; determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's WPS; determine how construction behind schedule will be expedited; secure commitments from parties involved to do so; discuss whether schedule revisions are required to ensure the current and subsequent activities will be completed within the Contract Time; and review WPS for next period.
- 7.2.4 In addition to attending regularly scheduled OAC Project progress meetings, Contractor shall schedule, direct and attend interim progress meetings (i.e., commissioning meetings, coordination meetings, pre-installation meetings) with other members of the Project Team as required to maintain Project progress. Contractor shall record and distribute the minutes of each meeting to each Project Team member. The minutes shall identify critical activities that require action and the dates by which each activity must be completed.
- 7.2.5 If WPS updates indicate the Longest Path contained in prior WPS will not be met, Contractor shall notify the Owner in writing within forty-eight (48) hours and make recommendations to Owner. Should the item be critical in nature, Contractor shall have a follow-up discussion with Owner.
- 7.2.6 Contractor, concurrently with revising the schedule, shall prepare tabulated reports showing the following:
 - 7.2.6.1 Identification of activities that have changed
 - 7.2.6.2 Changes in early and late start dates
 - 7.2.6.3 Changes in early and late finish dates
 - 7.2.6.4 Changes in activity durations in workdays
 - 7.2.6.5 Changes in the Longest Path
 - 7.2.6.6 Changes in Contract Time
 - 7.2.6.7 Show relationship between activities on initial and updated schedule.
- 7.2.7 Contractor shall provide the necessary Longest Path schedule control with a goal to attain the Substantial Completion Date of the Project, so that Owner can occupy and utilize the entire Project facilities on such date as well as a Punch List and Final Completion date;

- 7.2.7.1 Punch List and Final Completion: The Longest Path schedule control shall include not more than thirty (30) days or an agreed to timeframe approved by Owner for punch list and final completion.
- 7.2.8 Contractor shall coordinate preparation of the Schedule of Values with preparation of WPS.
- 7.2.9 Contractor shall create and maintain the WPS in a format acceptable to Owner (the license and training for which shall be at Contractor's sole expense).
- 7.2.10 Contractor shall notify Owner within forty-eight (48) hours should a periodic update to the WPS indicates the Work is fourteen (14) or more calendar days behind the current approved WPS. Contractor shall submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the WPS and indicate changes to working hours, working days, crew sizes, and equipment required for compliance, and date by which recovery will be accomplished.
 - 7.2.10.1 Owner's Notice Not to Accelerate to Contractor shall not be considered acceleration by Owner and Owner shall not be responsible for any increased costs incurred by Contractor.
- 7.2.11 Contractor shall refer to the Uniform General Conditions for schedule extension and delay processes.
- 7.2.12 Owner may determine the sequence in which the Work shall be performed, provided it does not unreasonably interfere with the WPS. Owner may require Contractor to make reasonable changes in the sequence at any time during the performance of the Work in order to facilitate the performance of work by Owner or others. To the extent such changes increase Contractor's costs or time, the Contract Sum and Contract Time shall be equitably adjusted.

ARTICLE 8 COMPENSATION AND PAYMENT

8.1 In full consideration of Contractor's performance of the Work and services under this Agreement, Owner shall pay to Contractor, subject to additions and deductions provided herein, the sum of {Amount} and No/100 Dollars ({#.00), in periodic progress payments as hereinafter provided.

The Contract Sum is the total of the following:

Base Bid	\${Amount}
Alternate 1 -	\${Amount}
Alternate 2 -	\${Amount}
Alternate 3 -	\${Amount}
Payments and Performance Bonds	\${Amount}

TOTAL

\${Amount}

8.1 On a monthly basis and subject to procedures set forth in the Uniform General Conditions, Contractor shall submit an Application for Payment, in accordance with Division 01 Specifications. Supporting documentation should include, without limitation: a certified statement as to the Work completed and current schedule of values; a project-to-date job cost report and a current period job cost report; a breakdown of materials and labor; supporting subcontractor invoices and sworn statements and waivers of lien for all amounts paid to Contractor for materials, labor, equipment, and other costs; and copies of third-party invoices, receipts, and other third-party supporting documentation.

- 8.2 Based on the Application for Payment, Owner shall make a periodic progress payment to Contractor for the cost of labor, materials, and equipment incurred by Contractor in relation to the Work during the previous month, except that the percentage of the total amount paid shall not exceed the percentage amount of the Work that has been completed as determined in the reasonable judgment of Owner. Upon verification of costs incurred and percentage of Work completed, Owner will make payment to Contractor within thirty (30) working days or will notify Contractor of any objection to the invoiced amount.
- 8.3 Owner shall have the right to withhold from payments due Contractor such sums as are necessary to protect Owner against any loss or damage which may result from negligence by Contractor or failure of Contractor to perform Contractor's obligations under this Agreement and as set forth in the Uniform General Conditions.
- 8.4 The final request for payment shall not be made until Contractor delivers to Owner a complete release of all liens arising out of this Agreement and an affidavit that so far as Contractor has knowledge or information, the release includes and covers all materials and Work over which Contractor has control for which a lien could be filed, but Contractor may, if any agent or consultant refuses to furnish a release in full, furnish a bond satisfactory to Owner to indemnify Owner against any lien. If any lien remains unsatisfied after all payments are made, Contractor shall refund to Owner all moneys Owner may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees, and Owner shall have all remedies at law and in equity.
- 8.5 In addition to the procedures contained in the Uniform General Conditions, Owner shall have no obligation to make Final Payment until a final accounting of the Work has been submitted by Contractor and has been verified by Owner or Owner's representatives. The aggregate total of payments to Contractor shall not exceed the total of the actual Work as verified by Owner or Owner's representative from Contractor's final accounting, as certified for payment in accordance with the Agreement. If payments made to Contractor exceed that which is due and owing pursuant to this Article, then Contractor shall promptly refund such excess to Owner.
- 8.6 Nothing contained herein shall require Owner to pay Contractor an aggregate amount exceeding the Contract Sum or to make payment if in Owner's belief the cost to complete the Work would exceed the Contract Sum less previous payments to Contractor. Any provision to the contrary notwithstanding, Owner shall not be obligated to make any payment (whether a periodic progress payment or Final Payment) to Contractor hereunder if any one or more of the following conditions precedent exist:
 - 8.6.1 Contractor is in breach or default under this Agreement;
 - 8.6.2 Any part of such payment is attributable to services which are not performed in accordance with this Agreement; provided, however, such payment shall be made as to the part thereof attributable to services which were performed in accordance with this Agreement;
 - 8.6.3 Contractor has failed to make payments promptly to consultants or other third parties used in connection with the services for which Owner has made payment to Contractor;
 - 8.6.4 If Owner, in its good faith judgment, determines that the portion of the compensation then remaining unpaid will not be sufficient to complete the services in accordance with this Agreement, no additional payments will be due Contractor hereunder unless and until Contractor, at Contractor's sole cost, performs a sufficient portion of the remaining services so that such portion of the compensation then remaining unpaid is determined by Owner to be sufficient to so complete the then remaining services; or

- 8.6.5 To the extent Liquidated Damages or actual damages are imposed by Owner for failure of Contractor to complete the Work within the Contract Time.
- 8.7 No partial payment made hereunder shall be, or shall be construed to be, final acceptance or approval of that part of the services to which such partial payment relates, or a release of Contractor of any Contractor's obligations hereunder or liabilities with respect to such services.
- 8.8 Contractor shall promptly pay all bills validly due and owing for labor and material performed and furnished by others in connection with the performance of the construction of the Work.
- 8.9 The acceptance by Contractor or Contractor's successors of Final Payment under this Agreement, shall constitute a full and complete release of Owner from any and all claims, demands, and causes of action whatsoever which Contractor or Contractor's successors have or may have against Owner under the provisions of this Agreement except those previously made in writing and identified by Contractor as unsettled at the time of the final request for payment.

ARTICLE 9 BONDS

- 9.1 Prior to commencing work, Contractor shall provide performance and payment bonds in accordance with the requirements set forth in the Uniform General Conditions. The penal sum of the payment and performance bonds shall be for 100% of the Contract Sum. Any increase in the Contract Sum shall require a rider to the Bonds increasing penal sums accordingly. Contractor shall endeavor to keep its surety advised of changes potentially impacting the Contract Time and Contract Sum. Owner will pay Contractor the bonding costs as a pass through amount not to exceed {Amount} (\${#}.00) with proper documentation provided along with an Application for Payment. No retainage is to be withheld with respect to the cost of the required bonds.
- 9.2 Contractor shall not cause or allow any of its bonds to be canceled nor permit any lapse during the term of this Agreement.

ARTICLE 10 INDEMNITY AND INSURANCE

10.1 Contractor covenants and agrees to FULLY INDEMNIFY and HOLD HARMLESS Owner and its component institutions, the UNTS Board of Regents, elected and appointed officials, directors, officers, employees, agents, representatives, and volunteers, individually or collectively, from and against any and all costs, claims, liens, damages, losses, expenses, fees, fines, penalties, proceedings, actions, demands, causes of action, liability, and suits of any kind and nature, including but not limited to, personal or bodily injury, death, or property damage, made upon Owner directly or indirectly arising out of, resulting from, or related to Contractor's activities under the Contract, including any acts or omissions of Contractor, or any director, officer, employee, agent, representative, consultant, or Subcontractor of Contractor, and their respective directors, officers, employees, agents, and representatives while in the exercise of performance of the rights or duties under the Contract. The indemnity provided for in this paragraph does not apply to any liability resulting from the negligence of Owner or separate contractors in instances where such negligence causes personal injury, death, or property damage. IN THE EVENT CONTRACTOR AND OWNER ARE FOUND JOINTLY LIABLE BY A COURT OF COMPETENT JURISDICTION, LIABILITY WILL BE APPORTIONED COMPARATIVELY IN ACCORDANCE WITH THE LAWS OF THE STATE OF TEXAS, WITHOUT WAIVING ANY GOVERNMENTAL IMMUNITY AVAILABLE TO THE STATE UNDER TEXAS LAW AND WITHOUT WAIVING ANY DEFENSES OF THE PARTIES UNDER TEXAS LAW.

- 10.1.1 The provisions of this indemnification are solely for the benefit of the parties hereto and not intended to create or grant any rights, contractual or otherwise, to any other person or entity.
- 10.1.2 Contractor shall promptly advise Owner in writing of any claim or demand against Owner or against Contractor known to Contractor related to or arising out of Contractor's activities under this Contract.
- 10.2 Insurance.
 - 10.2.1 Contractor shall not commence work under the Agreement until it has obtained all insurance required in accordance with this Agreement and the Uniform General Conditions and until such insurance has been reviewed and approved in writing by Owner. Approval of the insurance by Owner shall not relieve nor decrease the liability of Contractor hereunder. Prior to commencing of the Work Contractor shall provide evidence as required by this Article that demonstrates coverage for Employer's Liability, Workers' Compensation, Commercial General Liability, and Automobile Liability as set forth in the Uniform General Conditions are in full force and effect. Prior to commencing any construction work, Builder's Risk as set forth in the Uniform General Conditions prior to the commencement of construction for that package, phase, or stage. No retainage is to be withheld with respect to the cost of the required insurance.

Owner shall obtain builder's risk insurance coverage for the Project. In the event of an insured loss caused by the action or inaction of Contractor, or by any subcontractor or sub-subcontractor, or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable, Contractor shall be responsible for, and reimburse to Owner, any applicable deductible under the builder's risk insurance policy, which may be up to \$25,000. Any costs associated with Contractor's responsibility for the applicable deductible shall not be considered cost of Work.

- 10.2.2 Contractor shall include Owner, {Campus if different from Owner} and the Board of Regents of the University of North Texas System as loss payees and Additional Insured's on General Liability and Business Automobile Liability. The Commercial General Liability, Business Automobile Liability, and Worker's Compensation policies shall include a waiver of subrogation in favor of Owner.
- 10.2.3 Insurance policies required under this Article shall contain a provision that the insurance company must give Owner written notice transmitted in writing: (a) thirty (30) calendar days before coverage is non-renewed by the insurance company and (b) within ten (10) business days after cancellation of coverage by the insurance company. Prior to start of Services and upon renewal or replacement of the insurance policies, Contractor shall furnish Owner with certificates of insurance until one year after acceptance of the Services. If any insurance policy required under this Article is not to be immediately replaced without lapse in coverage when it expires, exhausts it limits, or is to be cancelled, Contractor will give Owner written notice within forty-eight (48) hours upon actual or constructive knowledge of such condition.
- 10.2.4 Owner reserves the right to review the insurance requirements set forth in this Article during the effective period of the Agreement and to make reasonable adjustments to the insurance coverage and their limits when deemed necessary and prudent by Owner based upon changes in statutory law, court decisions, or the claims history of the industry as well as Contractor.
- 10.2.5 Owner shall be entitled, upon request, and without expense, to receive copies of the policies, all endorsements thereto and documentation to support costs and may make

any reasonable requests for deletion, or revision or modification of particular policy terms, conditions, limitations, exclusions and costs, except where policy provisions are established by law or regulation binding upon either of the Parties or the underwriter of any of such polices. Any price credits determined in the insurance review will be refundable to Owner. Actual losses not covered by insurance as required by this Article shall be paid by the Contractor.

10.2.6 Contractor shall not cause or allow any of its insurance to be canceled nor permit any lapse during the term of the Agreement or as required in the Agreement.

ARTICLE 11 TERMINATION AND SUSPENSION

- 11.1 With or without cause, Owner reserves and has the right to terminate this Agreement or to cancel, suspend or abandon execution of all or any Work in connection with this Agreement at any time upon written notice to Contractor. Contractor may terminate this Agreement upon seven (7) days written notice to Owner only if Owner substantially fails to perform its obligations under Article 6 of this Agreement or fails to timely pay Contractor as required under Article 8, and after adequate written notice is delivered to Owner and Owner has failed to take action within thirty (30) days in order to begin to correct the problem.
 - 11.1.1 In the event of termination, cancellation, suspension, or abandonment that is not the fault of Contractor, Owner shall pay to Contractor as full payment for all services performed and all expenses incurred under this Agreement, the appropriate portion of Contract Sum due under Article 8 as shall have become payable for Work actually rendered hereunder by Contractor.
 - 11.1.2 In ascertaining the services actually rendered hereunder up to the date of termination, cancellation, suspension, or abandonment of this Agreement, consideration shall be given to both completed work and work in progress, to complete and incomplete Drawings, and to other related documents, whether delivered to Owner or in possession of Contractor.
 - 11.1.3 For any said sum paid under this Article, Contractor agrees to accept same in full settlement of all claims for services rendered under this Agreement.
- 11.2 If, upon payment of the amount required to be paid under this Article following the termination of this Agreement, Owner thereafter should determine to complete the original project or, substantially, the same project without major change in scope; Owner, for such purposes, shall have the right of utilization of any and all original tracings, Drawings, calculations, design analysis, Specifications, estimates, related data, and other documents including Construction Documents, prepared under this Agreement by Contractor who shall make them available to Owner upon request, with compensation to Contractor limited to actual reproduction costs. Owner agrees to credit Contractor with such authorship as may be due but is not required to renew this Agreement.
- 11.3 Upon request at the termination, cancellation, suspension, or abandonment of this Agreement, Contractor agrees to furnish to Owner copies of the latest documents prepared by Contractor for the Project.
- 11.4 A termination, cancellation, suspension, or abandonment under this Article shall not relieve Contractor or any of its employees of liability for violations of this Agreement, or any willful, negligent or accidental act or omission of Contractor. In the event of a termination under this Article, Contractor hereby consents to employment by Owner of a substitute contractor to complete the services under this Agreement, with the substitute contractor having all rights and privileges of the original contractor of the Project.

ARTICLE 12 MISCELLANEOUS

- 12.1 <u>Assignment.</u> The terms and conditions of this Agreement shall be binding upon the Parties, their partners, successors, permitted assigns, and legal representatives. This Agreement is a service contract for the services of Contractor, and Contractor's interest in this Agreement, duties hereunder and/or fees due hereunder may not be assigned or delegated to a third party. The benefits and burdens of this Agreement are, however, assignable by Owner to a component or affiliate of Owner or a branch or agency of the State of Texas.
- 12.2 Death or Incapacity. If Contractor transacts business as an individual, his death or incapacity shall automatically terminate this Agreement as of the date of such event, and neither he nor his estate shall have any further right to perform hereunder; and Owner shall pay him or his estate the compensation payable under the Agreement for any services rendered prior to such termination. If Contractor is a firm comprised of more than one principal and any one of the members thereof dies or becomes incapacitated and the other members continue to render the services covered herein, Owner will make payments to those continuing as though there had been no such death or incapacity, and Owner will not be obliged to take any account of the person who died or became incapacitated or to make any payment to such person or his estate. This provision shall apply in the event of progressive or simultaneous occasions of death or incapacity among any group of persons named as Contractor; and if death or incapacity befalls the last one of such group before this Agreement is fully performed, then the rights shall be as if there had been only one Contractor. In any event, notice of the death or incapacity of any principal shall be given to Owner by any surviving principal within a reasonable time.
- 12.3 <u>Irreparable Injury.</u> It is acknowledged and agreed that Contractor's services to Owner are unique, which gives a peculiar value to Owner and for the loss of which Owner cannot be reasonably or adequately compensated in damages; accordingly, Contractor acknowledges and agrees that a breach by Contractor of the provisions hereof will cause Owner irreparable injury and damage. Contractor, therefore, expressly agrees that Owner shall be entitled to injunctive and/or other equitable relief in any court of competent jurisdiction to prevent or otherwise restrain a breach of this Agreement, but only if Owner is not in breach of this Agreement.
- 12.4 <u>Certifications.</u>
 - 12.4.1 Pursuant to Texas Family Code, Section 231.006, Contractor certifies that it is not ineligible to receive the award of or payments under this Agreement and acknowledges that this Agreement may be terminated and payment may be withheld if this certification is inaccurate.
 - 12.4.2 Pursuant to Texas Government Code, Section 2155.004, Contractor certifies that the business entity named in this Agreement is not ineligible to receive the award of or payments under this Agreement and acknowledges that this Agreement may be terminated and payment withheld if this certification is inaccurate.
 - 12.4.3 If a corporate or limited liability company, Contractor certifies that it is not currently delinquent in the payment of any Franchise Taxes due under Texas Tax Code, Chapter 171, or that the corporation or limited liability company is exempt from the payment of such taxes, or that the corporation or limited liability company is an out-of-state corporation or limited liability company that is not subject to the Texas Franchise Tax, whichever is applicable.
 - 12.4.4 Pursuant to Texas Government Code Sections 2107.008 and 2252.903, Contractor agrees that any payments owing to Contractor under this Agreement may be applied directly toward any debt or delinquency that Contractor owes the State of Texas or any

agency of the State of Texas regardless of when it arises, until such debt or delinquency is paid in full.

- 12.4.5 Pursuant to Texas Government Code Chapter 2252, Subchapter F, Contractor certifies that it is not engaged in business with Iran, Sudan, or a foreign terrorist organization. Contractor acknowledges this Agreement may be terminated if this certification is inaccurate.
- 12.4.6 Pursuant to Texas Government Code Sections 2252.201-2252.205, Contractor certifies that it is in compliance with the requirement that any iron or steel product produced through a manufacturing process and used in the Project is produced in the United States.
- 12.4.7 If the Agreement is subject to Texas Gov't Code Section 2271.002, Contractor hereby represents, verifies, and warrants that it does not boycott Israel and will not boycott Israel during the term of the Agreement. If the Agreement is subject to Texas Gov't Code Section 2274.002, Contractor hereby represents, verifies, and warrants that it does not have a practice, policy, guidance, or directive that discriminates against a firearm entity or firearm trade association and will not discriminate against a firearm entity or firearm trade association during the term of the Agreement. If the Agreement is subject to Texas Gov't Code Section 2274.002, Contractor hereby represents, verifies, and warrants that it does not boycott energy companies and will not boycott energy companies during the term of the Agreement.
- 12.4.8 Contractor certifies that no member of the Board of Regents of the University of North Texas System, or executive officers, including component institutions, has a financial interest, directly or indirectly, in the transaction that is the subject of this Agreement.
- 12.5 <u>Illegal Dumping.</u> Contractor shall ensure that it and all of its subcontractors and assigns prevent illegal dumping of litter in accordance with Title 5, Texas Health and Safety Code, Chapter 365.
- 12.6 Asbestos Containing Materials.
 - 12.6.1 Contractor shall provide a notarized certification to Owner that all equipment and materials used in fulfillment of its Contract responsibilities are non-Asbestos Containing Building Materials (ACBM) no later than Contractor's application for Final Payment as required by the Uniform General Conditions.
 - 12.6.2 All materials used in this Project shall be certified as non-ACBM. Contractor shall take whatever measures it deems necessary to insure that all employees, suppliers, fabricators, material men, subcontractors, or their assigns, comply with the following acts:
 - 12.6.2.1 Asbestos Hazard Emergency Response Act (AHERA—40 CFR 763, Subpart E)
 - 12.6.2.2 National Emission Standards for Hazardous Air Pollutants (NESHAP— EPA 40 CFR 61, Subpart M, National Emission Standard for Asbestos)
 - 12.6.2.3 Texas Asbestos Health Protection Rules (TAHRP—Tex. Admin. Code Title 25, Part 1, Ch. 295, Subchapter C, Asbestos Health Protection)
- 12.7 <u>State Auditor's Right to Audit.</u> Pursuant to Section 2262.154 of the Texas Government Code, the state auditor may conduct an audit or investigation of any entity receiving funds from the state directly under any contract or indirectly through a subcontract under the contract. The acceptance of funds by Contractor or any other entity or person directly under the Agreement or indirectly through a subcontract of the authority of the state auditor,

under the direction of the legislative audit committee, to conduct an audit or investigation in connection with those funds. Under the direction of the legislative audit committee, the Contractor or other entity that is the subject of an audit or investigation by the state auditor must provide the state auditor with access to any information the state auditor considers relevant to the investigation or audit. Contractor shall ensure that this paragraph concerning the authority to audit funds received indirectly by Subcontractors through the contract and the requirement to cooperate is included in any subcontract awards.

- 12.8 Records and Right to Audit. Owner shall have the right to verify and audit the details set forth in Contractor's billings, certificates, accountings, cost data, and statements, either before or after payment therefore, by: (a) inspecting the books and records of Contractor during normal business hours; (b) examining any reports with respect to this Project; (c) interviewing Contractor's business employees; (d) visiting the Project site; and (e) other reasonable action. Records of Contractor's costs, reimbursable expenses pertaining to the Project and payments shall be kept on a generally recognized accounting basis and shall be made available to Owner or its authorized representative during business hours for audit or other purposes as determined by Owner and in accordance with the requirements in the Uniform General Conditions.
- 12.9 <u>Notices.</u> All notices, consents, approvals, demands, requests or other communications provided for or permitted to be given under any of the provisions of this Agreement shall be in writing and shall be deemed to have been duly given or served when delivered by hand delivery or when deposited in the U.S. Mail by registered or certified mail, return receipt requested, postage prepaid, and addressed as follows:

If to Owner: {Name} {Title} University of North Texas {System or Institution Name} 1155 Union Circle #311040 Denton, Texas 76203-5017 If to Contractor: {Contact Name} {Firm Name} {Street Address} {City, State Zip}

or to such other person or address as may be given in writing by either party to the other in accordance with the aforesaid.

- 12.10 <u>Independent Contractor</u>. Contractor recognizes that it is engaged as an independent contractor and acknowledges that Owner will have no responsibility to provide transportation, insurance or other fringe benefits normally associated with employee status. Contractor, in accordance with its status as an independent contractor, covenants and agrees that it shall conduct itself consistent with such status, that it will neither hold itself out as nor claim to be an officer, partner, employee or agent of Owner by reason hereof, and that it will not by reason hereof make any claim, demand or application to or for any right or privilege applicable to an officer, partner, employee or agent of Owner, including, but not limited to, unemployment insurance benefits, social security coverage or retirement benefits. Contractor hereby agrees to make its own arrangements for any of such benefits as it may desire and agrees that it is responsible for all income taxes required by applicable law.
- 12.11 Loss of Funding. Performance by Owner under the Agreement may be dependent upon the appropriation and allotment of funds by the Texas State Legislature (the "Legislature") and/or allocation of funds by the Board of Regents of The University of North Texas System (the "Board"). If the Legislature fails to appropriate or allot the necessary funds, or the Board fails to allocate the necessary funds, then Owner shall issue written notice to Contractor and Owner may terminate the Agreement. Contractor acknowledges that appropriation, allotment, and allocation of funds are beyond the control of Owner.

- 12.12 Confidentiality. All information owned, possessed or used by Owner which is communicated to, learned, developed or otherwise acquired by Contractor in the performance of services for Owner. which is not generally known to the public, shall be confidential and Contractor shall not, beginning on the date of first association or communication between Owner and Contractor and continuing through the term of this Agreement and any time thereafter, disclose, communicate or divulge, or permit disclosure, communication or divulgence, to another or use for Contractor's own benefit or the benefit of another, any such confidential information, unless required by law. Except when defined as part of the Work. Contractor shall not make any press releases, public statements, or advertisement referring to the Project or the engagement of Contractor as an independent contractor of Owner in connection with the Project, or release any information relative to the Project for publications, advertisement or any other purpose without the prior written approval of Owner. Contractor shall obtain assurances similar to those contained in this subparagraph from persons, and subcontractors retained by Contractor. Contractor acknowledges and agrees that a breach by Contractor of the provisions hereof will cause Owner irreparable injury and damage. Contractor. therefore, expressly agrees that Owner shall be entitled to injunctive and/or other equitable relief in any court of competent jurisdiction to prevent or otherwise restrain a breach of this Agreement.
- 12.13 <u>Open Records.</u> Owner shall release information to the extent required by the Texas Public Information Act and other applicable law. If required, Contractor shall make public information available to Owner in an electronic format. The requirements of Subchapter J, Chapter 552, Government Code, may apply to this Agreement and Contractor agrees that the Agreement can be terminated if Contractor knowingly or intentionally fails to comply with a requirement of that subchapter.
- 12.14 <u>Governing Law and Venue.</u> This Agreement and all of the rights and obligations of the parties hereto and all of the terms and conditions hereof shall be construed, interpreted and applied in accordance with and governed by and enforced under the laws of the State of Texas and venue shall be as provided in Texas Education Code Section 105.151 for any legal proceeding pertaining to this Agreement.
- 12.15 <u>Waivers.</u> No delay or omission by either of the parties hereto in exercising any right or power accruing upon the non-compliance or failure of performance by the other party hereto of any of the provisions of this Agreement shall impair any such right or power or be construed to be a waiver thereof. A waiver by either of the parties hereto of any of the covenants, conditions or agreements hereof to be performed by the other party hereto shall not be construed to be a waiver of any subsequent breach thereof or of any other covenant, condition or agreement herein contained.
- 12.16 <u>Severability.</u> Should any term or provision of this Agreement be held invalid or unenforceable in any respect, the remaining terms and provisions shall not be affected and this Agreement shall be construed as if the invalid or unenforceable term or provision had never been included.

IN WITNESS WHEREOF the parties hereto have executed this Agreement in the day and year first above written.

OWNER: UNIVERSITY OF NORTH TEXAS {SYSTEM OR INSTITUTION NAME}

CONTRACTOR:

{FIRM NAME}

By:	By:
(signature)	(signature)
[Authorized Signatory Name]	
[Authorized Signatory Title]	(typed name and title)
Date:	Date:
	Street/PO Box
	City, State, ZIP
	Telephone
	State of TX Vendor ID Number

EXHIBIT A

SPECIFICATIONS, DRAWINGS, AND ADDENDA

SPECIFICATIONS

As listed in project manual titled [Title], prepared by [Professional], issued for construction on [Date].

DRAWINGS

Entitled [Title], as prepared by [Professional], issued for construction on [Date], consisting of the following pages:

Sheet Number	<u>Title</u>	
ADDENDA		•
Number	<u>Title</u>	

DOCUMENT 006000

PROJECT FORMS

PAYMENT BOND

Surety Bond No.

STATE OF TEXAS § COUNTY OF §

KNOW ALL MEN BY THESE PRESENT: That we, _____, as Principal, and _____, as Surety, are hereby held and firmly bound unto the University of North Texas System, as Obligee, in the sum of Dollars (\$______) for payment whereof the said Principal and Surety bind themselves, their heirs, executors, administrators, and successors, jointly and severally, by the terms and conditions herein.

The conditions of this obligation are such that whereas the Principal entered into a certain contract with the Obligee, as an entity of the State of Texas, dated the ____day of ___, 200_ ("Contract"), which is hereto attached and made a part hereof for all purposes, for the purpose of _____

NOW THEREFORE, the condition of this obligation is such that this Payment Bond shall remain in full force and effect unless and until 120 days after Principal has faithfully performed the Contract in accordance with the Contract documents and Principal has executed a copy of the attached Payment Affidavit and provided it to Obligee.

In the event that the Principal fails to promptly pay when due any amount owed to persons who have supplied labor, materials, or supplies used in Principal's performance of the said Contract, the Surety will, upon receipt of notice from the Obligee or a claim in the form required by law, satisfy all undisputed balances due, and make arrangements satisfactory to the interested parties to resolve all amounts disputed in good faith, but in no event shall the liability of the Surety for the Principal's failure to promptly pay for labor, materials, or supplies exceed the amount of this bond.

The Surety agrees to pay to the Obligee upon demand all loss and expense, including attorney's fees, incurred by the Obligee by reason of or on account of any breach of this obligation by the Principal or the Surety.

Provided further, that this bond is made and entered into for the protection of all parties supplying labor or materials in the prosecution of the work provided for in the said Contract, and all such parties shall have a direct right of action under this bond as provided in Chapter 2253 of the Texas Government Code. If any legal action is filed upon this bond, venue shall lie in Denton County, Texas.

The liabilities, rights, limitations and remedies concerning this Bond shall be determined in accordance with the provisions of Chapter 2253 of the Texas Government Code, pursuant to which this bond is executed.

IN WITNESS WHEREOF, the above parties have executed this instrument under their several seals this _____ day of ______ in the year 20____, the name and seal of each party being hereto affixed, and duly signed by its undersigned representative pursuant to authority of its governing body.

CONSTRUCTION MANAGER-AT-RISK

(Firm Name)

(Address)

(Signature)

(City, State, Zip)

(Typed Name and Title)

(Telephone)

(Texas Vendor ID No.)

PERFORMANCE BOND

Surety Bond No.

STATE OF TEXAS § COUNTY OF §

LET IT BE KNOWN BY THIS INSTRUMENT: That we, _______, as Principal, and _______ a corporation duly authorized to do business in the State of Texas, as Surety, are hereby held and firmly bound unto the University of North Texas System, as Obligee, in the sum of ______ Dollars (\$______) for payment whereof the said Principal and Surety bind themselves, their heirs, executors, administrators, and successors, jointly and severally, by the terms and conditions herein.

The conditions of this obligation are such that whereas the Principal entered into a certain contract with the Obligee, as an entity of the State of Texas, dated the _____day of _____, 20 ("Contract"), which is hereto attached and made a part hereof for all purposes, for the purpose of ______

NOW THEREFORE, the condition of this obligation is such that this Performance Bond shall remain in full force and effect unless and until the Principal has faithfully performed the Contract in accordance with the Plans, Specifications and Contract documents. Further, under the terms of this Performance Bond, Principal shall fully indemnify and save harmless the Obligee from all cost and damage which the Obligee may suffer by reason of Principal's default or failure to perform and shall fully reimburse and repay the Obligee all outlay and expense which the Obligee may incur in making good any such default.

In the event that the Principal's failure as defined by the Contract Documents, to faithfully perform the Contract, Surety will within fifteen (15) days of determination of default, assume full responsibility for completion of said Contract and become entitled to payment of the balance of the Contract amount. Conditioned upon the Surety's faithful performance of its obligations, the liability of the Surety for the Principal's default shall not exceed the penalty of this Bond.

The Surety agrees to pay to the Obligee upon demand all loss and expense, including attorney's fees, incurred by the Obligee by reason of or on account of any breach of this obligation by the Principal or the Surety.

Provided further, that the Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the said Contract, or to the work to be performed thereunder, or the Specifications accompanying the same, shall in anyway affect its obligation on this Bond, and it does hereby waive notice of any such change, extension of time, alteration or addition, to the terms of the said Contract or to the work or to the Specifications.

Provided further, that if any legal action be filed upon this Bond, venue shall lie in Denton County, Texas.

The liabilities, rights, limitations and remedies concerning this Bond shall be determined in accordance with the provisions of Chapter 2253 of the Texas Government Code, pursuant to which this Bond is executed.

IN WITNESS WHEREOF, the above parties have executed this instrument under their several seals this _____ day of _____ in the year 20___, the name and corporate seal of each corporate party being hereto affixed, and these present duly signed by its undersigned representative pursuant to authority of its governing body.

ATTEST:	
	(Principal)
(Signature)	(Signature)
(Typed Name and Title)	(Typed Name and Title)
(SEAL)	
ATTEST:	(Surety)
(Signature)	(Signature)
(Typed Name and Title)	(Typed Name and Title)
(SEAL)	
Surety's Texas Local Recording Agent or Resident Agent:	Surety's Home Office Agent or Servicing Agent:
(Signature)	(Name)
(Typed Name)	(Title)
(License No.)	(Address)
(File No)	(City, State, Zip)
(Address)	(Telephone)
(City, State, Zip)	

(Telephone)

HUB Subcontracting Plan (HSP) QUICK CHECKLIST

While this HSP Quick Checklist is being provided to merely assist you in readily identifying the sections of the HSP form that you will need to complete, it is very important that you adhere to the instructions in the HSP form and instructions provided by the contracting agency.

If you will be awarding all of the subcontracting work you have to offer under the contract to only Texas certified HUB vendors, complete:

Section 1 - Respondent and Requisition Information

Section 2 a. - Yes, I will be subcontracting portions of the contract.

Section 2 b. - List all the portions of work you will subcontract, and indicate the percentage of the contract you expect to award to Texas certified HUB vendors. Section 2 c. - Yes

Section 4 - Affirmation

2

GFE Method A (Attachment A) - Complete an Attachment A for each of the subcontracting opportunities you listed in Section 2 b.

If you will be subcontracting any portion of the contract to Texas certified HUB vendors and Non-HUB vendors, and the aggregate percentage of all the subcontracting work you will be awarding to the Texas certified HUB vendors with which you do not have a <u>continuous contract</u>* in place for more than five (5) years <u>meets or exceeds</u> the HUB Goal the contracting agency identified in the "Agency Special Instructions/Additional Requirements", complete:

Section 1 - Respondent and Requisition Information

Section 2 a. - Yes, I will be subcontracting portions of the contract.

Section 2 b. - List all the portions of work you will subcontract, and indicate the percentage of the contract you expect to award to Texas certified HUB vendors and Non-HUB vendors.

Section 2 c. - No

Section 2 d. - Yes

Section 4 - Affirmation

GFE Method A (Attachment A) - Complete an Attachment A for each of the subcontracting opportunities you listed in Section 2 b.

If you will be subcontracting any portion of the contract to Texas certified HUB vendors and Non-HUB vendors or only to Non-HUB vendors, and the aggregate percentage of all the subcontracting work you will be awarding to the Texas certified HUB vendors with which you <u>do not</u> have a <u>continuous contract</u> in place for more than five (5) years <u>does not meet or exceed</u> the HUB Goal the contracting agency identified in the "Agency Special Instructions/Additional Requirements", complete:

Section 1 - Respondent and Requisition Information

Section 2 a. - Yes, I will be subcontracting portions of the contract.

Section 2 b. - List all the portions of work you will subcontract, and indicate the percentage of the contract you expect to award to Texas certified HUB vendors and Non-HUB vendors.

Section 2 c. - No

Section 2 d. - No

Section 4 - Affirmation

GFE Method B (Attachment B) - Complete an Attachment B for each of the subcontracting opportunities you listed in Section 2 b.

If you will not be subcontracting any portion of the contract and will be fulfilling the entire contract with your own resources (i.e., employees, supplies, materials and/or equipment), complete:

Section 1 - Respondent and Requisition Information

Section 2 a. - No, I will not be subcontracting any portion of the contract, and I will be fulfilling the entire contract with my own resources.

Section 3 - Self Performing Justification

Section 4 - Affirmation

*<u>Continuous Contract</u>: Any existing written agreement (including any renewals that are exercised) between a prime contractor and a HUB vendor, where the HUB vendor provides the prime contractor with goods or service, to include under the same contract for a specified period of time. The frequency the HUB vendor is utilized or paid during the term of the contract is not relevant to whether the contract is considered continuous. Two or more contracts that run concurrently or overlap one another for different periods of time are considered by CPA to be individual contracts rather than renewals or extensions to the original contract. In such situations the prime contractor and HUB vendor are entering (have entered) into "new" contracts.



HUB Subcontracting Plan (HSP)

In accordance with Texas Gov't Code §2161.252, the contracting agency has determined that subcontracting opportunities are probable under this contract. Therefore, all respondents, including State of Texas certified Historically Underutilized Businesses (HUBs) must complete and submit this State of Texas HUB Subcontracting Plan (HSP) with their response to the bid requisition (solicitation).

NOTE: Responses that do not include a completed HSP shall be rejected pursuant to Texas Gov't Code §2161.252(b).

The HUB Program promotes equal business opportunities for economically disadvantaged persons to contract with the State of Texas in accordance with the goals specified in the 2009 State of Texas Disparity Study. The statewide HUB goals defined in 34 Texas Administrative Code (TAC) §20.284 are:

- 11.2 percent for heavy construction other than building contracts,
- 21.1 percent for all building construction, including general contractors and operative builders' contracts,
- 32.9 percent for all special trade construction contracts,
- 23.7 percent for professional services contracts,
- 26.0 percent for all other services contracts, and
- 21.1 percent for commodities contracts.

- - Agency Special Instructions/Additional Requirements - -

In accordance with 34 TAC §20.285(d)(1)(D)(iii), a respondent (prime contractor) may demonstrate good faith effort to utilize Texas certified HUBs for its subcontracting opportunities if the total value of the respondent's subcontracts with Texas certified HUBs meets or exceeds the statewide HUB goal or the agency specific HUB goal, whichever is higher. When a respondent uses this method to demonstrate good faith effort, the respondent must identify the HUBs with which it will subcontract. If using existing contracts with Texas certified HUBs to satisfy this requirement, only the aggregate percentage of the contracts expected to be subcontracted to HUBs with which the respondent <u>does not</u> have a <u>continuous contract</u>* in place for <u>more than five (5) years</u> shall qualify for meeting the HUB goal. This limitation is designed to encourage vendor rotation as recommended by the 2009 Texas Disparity Study.

SECTION 1: RESPONDENT AND REQUISITION INFORMATION

a.	Respondent (Company) Name:	State of Texas VID #:
	Point of Contact:	Phone #:
	E-mail Address:	Fax #:
b.	ls your company a State of Texas certified HUB? 🔲 - Yes 🛛 🗌 - No	
c.	Requisition #:	Bid Open Date:

Requisition #:

SECTION 2: RESPONDENT'S SUBCONTRACTING INTENTIONS

After dividing the contract work into reasonable lots or portions to the extent consistent with prudent industry practices, and taking into consideration the scope of work to be performed under the proposed contract, including all potential subcontracting opportunities, the respondent must determine what portions of work, including contracted staffing, goods and services will be subcontracted. Note: In accordance with 34 TAC §20.282, a "Subcontractor" means a person who contracts with a prime contractor to work, to supply commodities, or to contribute toward completing work for a governmental entity.

a. Check the appropriate box (Yes or No) that identifies your subcontracting intentions:

- Yes, I will be subcontracting portions of the contract. (If Yes, complete Item b of this SECTION and continue to Item c of this SECTION.)
- I vill not be subcontracting any portion of the contract, and I will be fulfilling the entire contract with my own resources, including employees, goods and services. (If No, continue to SECTION 3 and SECTION 4.)
- b. List all the portions of work (subcontracting opportunities) you will subcontract. Also, based on the total value of the contract, identify the percentages of the contract you expect to award to Texas certified HUBs, and the percentage of the contract you expect to award to vendors that are not a Texas certified HUB (i.e., Non-HUB).

		HUBs	Bs	Non-HUBs
Item #	Subcontracting Opportunity Description	Percentage of the contract expected to be subcontracted to HUBs with which you <u>do not</u> have a c <u>ontinuous contract</u> [*] in place for <u>more than five (5) years</u> .	Percentage of the contract expected to be subcontracted to HUBs with which you have a <u>continuous contract</u> [*] in place for <u>more than five (5) years</u> .	Percentage of the contract expected to be subcontracted to non-HUBs.
1		%	%	%
2		%	%	%
3		%	%	%
4		%	%	%
5		%	%	%
6		%	%	%
7		%	%	%
8		%	%	%
9		%	%	%
10		%	%	%
11		%	%	%
12		%	%	%
13		%	%	%
14		%	%	%
15		%	%	%
	Aggregate percentages of the contract expected to be subcontracted:	%	%	%

(Note: If you have more than fifteen subcontracting opportunities, a continuation sheet is available online at https://www.comptroller.texas.gov/purchasing/vendor/hub/forms.php).

- c- Check the appropriate box (Yes or No) that indicates whether you will be using <u>only</u> Texas certified HUBs to perform <u>all</u> of the subcontracting opportunities you listed in SECTION 2, Item b.
 - Yes (If Yes, continue to SECTION 4 and complete an "HSP Good Faith Effort Method A (Attachment A)" for each of the subcontracting opportunities you listed.)
 - No (If No, continue to Item d, of this SECTION.)
- d. Check the appropriate box (Yes or No) that indicates whether the aggregate expected percentage of the contract you will subcontract with Texas certified HUBs with which you <u>do not</u> have a <u>continuous contract</u>* in place with for <u>more than five (5) years</u>, <u>meets or exceeds</u> the HUB goal the contracting agency identified on page 1 in the "Agency Special Instructions/Additional Requirements."
 - Yes (If Yes, continue to SECTION 4 and complete an "HSP Good Faith Effort Method A (Attachment A)" for each of the subcontracting opportunities you listed.)
 - No (If No, continue to SECTION 4 and complete an "HSP Good Faith Effort Method B (Attachment B)" for each of the subcontracting opportunities you listed.)

*<u>Continuous Contract</u>: Any existing written agreement (including any renewals that are exercised) between a prime contractor and a HUB vendor, where the HUB vendor provides the prime contractor with goods or service under the same contract for a specified period of time. The frequency the HUB vendor is utilized or paid during the term of the contract is not relevant to whether the contract is considered continuous. Two or more contracts that run concurrently or overlap one another for different periods of time are considered by CPA to be individual contracts rather than renewals or extensions to the original contract. In such situations the prime contractor and HUB vendor are entering (have entered) into "new" contracts.

Requisition #:

SECTION 2: RESPONDENT'S SUBCONTRACTING INTENTIONS (CONTINUATION SHEET)

This page can be used as a continuation sheet to the HSP Form's page 2, Section 2, Item b. Continue listing the portions of work (subcontracting opportunities) you will subcontract. Also, based on the total value of the contract, identify the percentages of the contract you expect to award to Texas certified HUBs, and the percentage of the contract you expect to award to vendors that are not a Texas certified HUB (i.e., Non-HUB).

		HL	JBs	Non-HUBs
Item #	Subcontracting Opportunity Description	Percentage of the contract expected to be subcontracted to HUBs with which you <u>do not</u> have a <u>continuous contract</u> [*] in place for <u>more than five (5) years</u> .	Percentage of the contract expected to be subcontracted to HUBs with which you have a <u>continuous contract</u> * in place for <u>more than five (5) years</u> .	Percentage of the contract expected to be subcontracted to non-HUBs.
16		%	%	%
17		%	%	%
18		%	%	%
19		%	%	%
20		%	%	%
21		%	%	%
22		%	%	%
23		%	%	%
24		%	%	%
25		%	%	%
26		%	%	%
27		%	%	%
28		%	%	%
29		%	%	%
30		%	%	%
31		%	%	%
32		%	%	%
33		%	%	%
34		%	%	%
35		%	%	%
36		%	%	%
37		%	%	%
38		%	%	%
39		%	%	%
40		%	%	%
41		%	%	%
42		%	%	%
43		%	%	%
i	Aggregate percentages of the contract expected to be subcontracted:	%	%	%

*<u>Continuous Contract</u>: Any existing written agreement (including any renewals that are exercised) between a prime contractor and a HUB vendor, where the HUB vendor provides the prime contractor with goods or service under the same contract for a specified period of time. The frequency the HUB vendor is utilized or paid during the term of the contract is not relevant to whether the contract is considered continuous. Two or more contracts that run concurrently or overlap one another for different periods of time are considered by CPA to be individual contracts rather than renewals or extensions to the original contract. In such situations the prime contractor and HUB vendor are entering (have entered) into "new" contracts.

Requisition #:

SECTION 3: SELF PERFORMING JUSTIFICATION (If you responded "No" to SECTION 2, Item a, you must complete this SECTION and continue to SECTION 4.) If you responded "No" to SECTION 2, Item a, in the space provided below explain how your company will perform the entire contract with its own employees, supplies, materials and/or equipment.

SECTION 4: AFFIRMATION

As evidenced by my signature below, I affirm that I am an authorized representative of the respondent listed in SECTION 1, and that the information and supporting documentation submitted with the HSP is true and correct. Respondent understands and agrees that, if awarded any portion of the requisition:

- The respondent will provide notice as soon as practical to all the subcontractors (HUBs and Non-HUBs) of their selection as a subcontractor for the awarded contract. The notice must specify at a minimum the contracting agency's name and its point of contact for the contract, the contract award number, the subcontracting opportunity they (the subcontractor) will perform, the approximate dollar value of the subcontracting opportunity and the expected percentage of the total contract that the subcontracting opportunity represents. A copy of the notice required by this section must also be provided to the contracting agency's point of contact for the contract for the contracting agency's point of contact for the contract <u>no later than ten (10) working days after the contract is awarded</u>.
- The respondent must submit monthly compliance reports (Prime Contractor Progress Assessment Report PAR) to the contracting agency, verifying its compliance with the HSP, including the use of and expenditures made to its subcontractors (HUBs and Non-HUBs). (The PAR is available at https://www.comptroller.texas.gov/purchasing/docs/hub-forms/ProgressAssessmentReportForm.xls).
- The respondent must seek approval from the contracting agency prior to making any modifications to its HSP, including the hiring of additional or different subcontractors and the termination of a subcontractor the respondent identified in its HSP. If the HSP is modified without the contracting agency's prior approval, respondent may be subject to any and all enforcement remedies available under the contract or otherwise available by law, up to and including debarment from all state contracting.
- The respondent must, upon request, allow the contracting agency to perform on-site reviews of the company's headquarters and/or work-site where services
 are being performed and must provide documentation regarding staffing and other resources.

Signature	Printed Name	Title	Date
Reminder:			(mm/dd/yyyy)

- If you responded "Yes" to SECTION 2, Items c or d, you must complete an "HSP Good Faith Effort Method A (Attachment A)" for each of the subcontracting opportunities you listed in SECTION 2, Item b.
- If you responded "No" SECTION 2, Items c and d, you must complete an "HSP Good Faith Effort Method B (Attachment B)" for each of the subcontracting opportunities you listed in SECTION 2, Item b.

Requisition #:

IMPORTANT: If you responded "*Yes*" to **SECTION 2**, **Items c** or **d** of the completed HSP form, you must submit a completed "HSP Good Faith Effort - Method A (Attachment A)" for <u>each</u> of the subcontracting opportunities you listed in **SECTION 2**, **Item b** of the completed HSP form. You may photo-copy this page or download the form at <u>https://www.comptroller.texas.gov/purchasing/docs/hub-forms/hub-sbcont-plan-gfe-achm-a.pdf</u>

SECTION A-1: SUBCONTRACTING OPPORTUNITY

Enter the item number and description of the subcontracting opportunity you listed in SECTION 2, Item b, of the completed HSP form for which you are completing the attachment.

Item Number: Description:

SECTION A-2: SUBCONTRACTOR SELECTION

List the subcontractor(s) you selected to perform the subcontracting opportunity you listed above in SECTION A-1. Also identify whether they are a Texas certified HUB and their Texas Vendor Identification (VID) Number or federal Employer Identification Number (EIN), the approximate dollar value of the work to be subcontracted, and the expected percentage of work to be subcontracted. When searching for Texas certified HUBs and verifying their HUB status, ensure that you use the State of Texas' Centralized Master Bidders List (CMBL) - Historically Underutilized Business (HUB) Directory Search located at http://mycpa.cpa.state.tx.us/tpasscmblsearch/index.isp. HUB status code "**A**" signifies that the company is a Texas certified HUB.

Company Name	Texas certified HUB	Texas VID or federal EIN Do not enter Social Security Numbers. If you do not know their VID / EIN, leave their VID / EIN field blank.	Approximate Dollar Amount	Expected Percentage of Contract
	- Yes - No		\$	%
	- Yes - No		\$	%
	- Yes - No		\$	%
	- Yes - No		\$	%
	- Yes - No		\$	%
	- Yes - No		\$	%
	- Yes - No		\$	%
	- Yes - No		\$	%
	- Yes - No		\$	%
	- Yes - No		\$	%
	- Yes - No		\$	%
	- Yes - No		\$	%
	- Yes - No		\$	%
	- Yes - No		\$	%
	- Yes - No		\$	%
	- Yes - No		\$	%
	- Yes - No		\$	%
	- Yes - No		\$	%
	- Yes - No		\$	%
	- Yes - No		\$	%
	- Yes - No		\$	%
	- Yes - No		\$	%
	- Yes - No		\$	%

REMINDER: As specified in SECTION 4 of the completed HSP form, if you (respondent) are awarded any portion of the requisition, you are required to provide notice as soon as practical to <u>all</u> the subcontractors (HUBs and Non-HUBs) of their selection as a subcontractor. The notice must specify at a minimum the contracting agency's name and its point of contact for the contract, the contract award number, the subcontracting opportunity they (the subcontractor) will perform, the approximate dollar value of the subcontracting opportunity and the expected percentage of the total contract that the subcontracting opportunity represents. A copy of the notice required by this section must also be provided to the contracting agency's point of contact for the contract is awarded.

Requisition #:

IMPORTANT: If you responded "**No**" to **SECTION 2, Items c** and **d** of the completed HSP form, you must submit a completed "HSP Good Faith Effort -Method B (Attachment B)" for <u>each</u> of the subcontracting opportunities you listed in **SECTION 2, Item b** of the completed HSP form. You may photo-copy this page or download the form at <u>https://www.comptroller.texas.gov/purchasing/docs/hub-forms/hub-sbcont-plan-gfe-achm-b.pdf</u>.

SECTION B-1: SUBCONTRACTING OPPORTUNITY

Enter the item number and description of the subcontracting opportunity you listed in SECTION 2, Item b, of the completed HSP form for which you are completing the attachment.

Item Number: Description:

SECTION B-2: MENTOR PROTÉGÉ PROGRAM

If respondent is participating as a Mentor in a State of Texas Mentor Protégé Program, submitting its Protégé (Protégé must be a State of Texas certified HUB) as a subcontractor to perform the subcontracting opportunity listed in **SECTION B-1**, constitutes a good faith effort to subcontract with a Texas certified HUB towards that <u>specific</u> portion of work.

Check the appropriate box (Yes or No) that indicates whether you will be subcontracting the portion of work you listed in SECTION B-1 to your Protégé.

- Yes (If *Yes*, continue to SECTION B-4.)
- No / Not Applicable (If No or Not Applicable, continue to SECTION B-3 and SECTION B-4.)

SECTION B-3: NOTIFICATION OF SUBCONTRACTING OPPORTUNITY

When completing this section you <u>MUST</u> comply with items <u>a</u>, <u>b</u>, <u>c</u> and <u>d</u>, thereby demonstrating your Good Faith Effort of having notified Texas certified HUBs <u>and</u> trade organizations or development centers about the subcontracting opportunity you listed in SECTION B-1. Your notice should include the scope of work, information regarding the location to review plans and specifications, bonding and insurance requirements, required qualifications, and identify a contact person. When sending notice of your subcontracting opportunity, you are encouraged to use the attached HUB Subcontracting Opportunity Notice form, which is also available online at <u>https://www.comptroller.texas.gov/purchasing/docs/hub-forms/HUBSubcontractingOpportunityNotificationForm.pdf.</u>

Retain supporting documentation (i.e., certified letter, fax, e-mail) demonstrating evidence of your good faith effort to notify the Texas certified HUBs and trade organizations or development centers. Also, be mindful that a working day is considered a normal business day of a state agency, not including weekends, federal or state holidays, or days the agency is declared closed by its executive officer. The initial day the subcontracting opportunity notice is sent/provided to the HUBs and to the trade organizations or development centers is considered to be "day zero" and does not count as one of the seven (7) working days.

- a. Provide written notification of the subcontracting opportunity you listed in SECTION B-1, to three (3) or more Texas certified HUBs. Unless the contracting agency specified a different time period, you must allow the HUBs <u>at least seven (7) working days</u> to respond to the notice prior to you submitting your bid response to the contracting agency. When searching for Texas certified HUBs and verifying their HUB status, ensure that you use the State of Texas' Centralized Master Bidders List (CMBL) Historically Underutilized Business (HUB) Directory Search located at http://mycpa.cpa.state.tx.us/tpasscmblsearch/index.jsp. HUB status code "A" signifies that the company is a Texas certified HUB.
- b. List the <u>three (3)</u> Texas certified HUBs you notified regarding the subcontracting opportunity you listed in SECTION B-1. Include the company's Texas Vendor Identification (VID) Number, the date you sent notice to that company, and indicate whether it was responsive or non-responsive to your subcontracting opportunity notice.

Company Name	Texas VID (Do not enter Social Security Numbers.)	Date Notice Sent (mm/dd/yyyy)	Did the HUB Respond?	
			- Yes - No	0
			- Yes - No	o
			- Yes - No	0

- c. Provide written notification of the subcontracting opportunity you listed in SECTION B-1 to two (2) or more trade organizations or development centers in Texas to assist in identifying potential HUBs by disseminating the subcontracting opportunity to their members/participants. Unless the contracting agency specified a different time period, you must provide your subcontracting opportunity notice to trade organizations or development centers at least seven (7) working days prior to submitting your bid response to the contracting agency. A list of trade organizations and development centers that have expressed an interest in receiving notices of subcontracting opportunities is available on the Statewide HUB Program's webpage at https://www.comptroller.texas.gov/purchasing/vendor/hub/resources.php.
- d. List two (2) trade organizations or development centers you notified regarding the subcontracting opportunity you listed in SECTION B-1. Include the date when you sent notice to it and indicate if it accepted or rejected your notice.

Trade Organizations or Development Centers	Date Notice Sent (mm/dd/yyyy)	Was the Notice Accepte	d?
		- Yes - No	o
		- Yes - No	0

Requisition #:

SECTION B-4: SUBCONTRACTOR SELECTION

Enter the item number and description of the subcontracting opportunity you listed in **SECTION 2**, **Item b**, of the completed HSP form for which you are completing the attachment.

a. Enter the item number and description of the subcontracting opportunity for which you are completing this Attachment B continuation page.

Item Number: Description:

b. List the subcontractor(s) you selected to perform the subcontracting opportunity you listed in SECTION B-1. Also identify whether they are a Texas certified HUB and their Texas Vendor Identification (VID) Number or federal Employer Identification Number (EIN), the approximate dollar value of the work to be subcontracted, and the expected percentage of work to be subcontracted. When searching for Texas certified HUBs and verifying their HUB status, ensure that you use the State of Texas' Centralized Master Bidders List (CMBL) - Historically Underutilized Business (HUB) Directory Search located at http://mycpa.cpa.state.tx.us/tpasscmblsearch/index.jsp. HUB status code "A" signifies that the company is a Texas certified HUB.

Company Name	Texas certified HUB	Texas VID or federal EIN Do not enter Social Security Numbers. If you do not know their VID / EIN, leave their VID / EIN field blank.	Approximate Dollar Amount	Expected Percentage of Contract
	- Yes - No		\$	%
	- Yes - No		\$	%
	- Yes - No		\$	%
	- Yes - No		\$	%
	- Yes - No		\$	%
	- Yes - No		\$	%
	- Yes - No		\$	%
	- Yes - No		\$	%
	- Yes - No		\$	%
	- Yes - No		\$	%

c. If any of the subcontractors you have selected to perform the subcontracting opportunity you listed in SECTION B-1 is <u>not</u> a Texas certified HUB, provide <u>written</u> justification for your selection process (attach additional page if necessary):

REMINDER: As specified in SECTION 4 of the completed HSP form, <u>if you (respondent) are awarded any portion of the requisition</u>, you are required to provide notice as soon as practical to <u>all</u> the subcontractors (HUBs and Non-HUBs) of their selection as a subcontractor. The notice must specify at a minimum the contracting agency's name and its point of contact for the contract, the contract award number, the subcontracting opportunity it (the subcontractor) will perform, the approximate dollar value of the subcontracting opportunity and the expected percentage of the total contract that the subcontracting opportunity represents. A copy of the notice required by this section must also be provided to the contracting agency's point of contact for the contract is awarded.



In accordance with Texas Gov't Code, Chapter 2161, each state agency that considers entering into a contract with an expected value of \$100,000 or more shall, before the agency solicits bids, proposals, offers, or other applicable expressions of interest, determine whether subcontracting opportunities are probable under the contract. The state agency I have identified below in Section B has determined that subcontracting opportunities are probable under the requisition to which my company will be responding.

34 Texas Administrative Code, §20.285 requires all respondents (prime contractors) bidding on the contract to provide notice of each of their subcontracting opportunities to at least three (3) Texas certified HUBs (who work within the respective industry applicable to the subcontracting opportunity), and allow the HUBs at least seven (7) working days to respond to the notice prior to the respondent submitting its bid response to the contracting agency. In addition, at least seven (7) working days prior to submitting its bid response to the contracting opportunities to two (2) or more trade organizations or development centers (in Texas) that serves members of groups (i.e., Asian Pacific American, Black American, Hispanic American, Native American, Woman, Service Disabled Veteran) identified in Texas Administrative Code §20.282(19)(C).

We respectfully request that vendors interested in bidding on the subcontracting opportunity scope of work identified in Section C, Item 2, reply no later than the date and time identified in Section C, Item 1. Submit your response to the point-of-contact referenced in Section A.

SECTION A: PRIME CONTRACTOR'S INFORMATION	
Company Name:	State of Texas VID #:
Point-of-Contact:	Dhama //
E-mail Address:	Fax #:
SECTION B: CONTRACTING STATE AGENCY AND REQUISITION	
Agency Name:	
Point-of-Contact:	Phone #·
Requisition #:	Rid Open Date:
	(mm/dd/yyyy)
SECTION C: SUBCONTRACTING OPPORTUNITY RESPONSE DU	E DATE, DESCRIPTION, REQUIREMENTS AND RELATED INFORMATION
1. Potential Subcontractor's Bid Response Due Date:	
If you would like for our company to consider your compa	ny's bid for the subcontracting opportunity identified below in Item 2,
we must receive your bid response no later than	on
	Central Time Date (mm/dd/yyyy)
to us submitting our bid response to the contracting agency, we must p organizations or development centers (in Texas) that serves members American, Woman, Service Disabled Veteran) identified in Texas Administ (A working day is considered a normal business day of a state agency, no by its executive officer. The initial day the subcontracting opportunity notic is considered to be "day zero" and does not count as one of the seven (7)	t including weekends, federal or state holidays, or days the agency is declared closed te is sent/provided to the HUBs and to the trade organizations or development centers
2. Subcontracting Opportunity Scope of Work:	
3. Required Qualifications:	- Not Applicable
4. Bonding/Insurance Requirements:	- Not Applicable
5. Location to review plans/specifications:	- Not Applicable

PROJECT MANUAL



UNT MUSIC JAZZ PRACTICE LAB

Prepared for: UNIVERSITY OF NORTH TEXAS

ISSUED FOR CONSTRUCTION

Project No: 13746 Issue date: OCTOBER 14, 2022

Prepared by:



DOCUMENT 000107 - SEALS PAGE

1.1 **DESIGN PROFESSIONALS OF RECORD**

- Α. Architect:
 - 1.
 - SmithGroup. Responsible for Divisions 01-32 Sections except where indicated as prepared by other design 2. professionals of record.



10/14/2022

- Fire-Protection Engineer: 1. SmithGroup. В.
 - - Responsible for Division 21 and 28 sections. 2.



- C. Plumbing/HVAC Engineer:
 - SmithGroup. 1.
 - 2. Responsible for Division 22 and 23 sections.

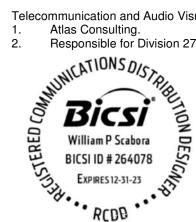


- D. **Electrical Engineer:**
 - SmithGroup. 1.
 - 2. Responsible for Division 26 sections.



- Telecommunication and Audio Visual Engineer: Ε.

 - Responsible for Division 27 sections.



END OF DOCUMENT 000107

TABLE OF CONTENTS

	ls	sue/Revision Date
DIVISION 00	PROCUREMENT AND CONTRACTING REQUIREMENTS	
000107	SEALS PAGE	
000110	TABLE OF CONTENTS	
007000	UNIVERSITY OF NRTH TEXAS SYSTEM UNIFORM GENERAL CONDITIONS A SUPPLEMENTARY GENERAL CONDITIONS	AND 10/14/22
007500	INDEMNIFICATION AND REFERENCE STANDARDS	
	ADDITIONAL SECTIONS PROVIDED BY OWNER UNDER SEPARATE COVER	
DIVISION 01	GENERAL REQUIREMENTS	
011000	SUMMARY OF WORK	
012200	UNIT PRICES	
012300	ALTERNATES	
012500	SUBSTITUTITION PROCEDURES	
012500.13	SUBSTITUTION REQUEST FORM	
012600	CONTRACT MODIFICATION PROCEDURES	
012900	PAYMENT PROCEDURES	
011000	SUMMARY OF WORK	
013100	PROJECT MANAGEMENT AND COORDINATION	
013200	CONSTRUCTION PROGRESS DOCUMENTATION	
013233	PHOTOGRAPHIC DOCUMENTATION	
013300	SUBMITTAL PROCEDURES	
013516	ALTERATION PROJECT PROCEDURES	
014000		
014100	UNT SYSTEM REGULATORY REQUIREMENTS	
014200		
015000	TEMPORARY FACILITIES AND CONTROLS	
015300	MOLD PREVENTION MEASURES	
015720	INDOOR AIR QUALITY PLAN DURING CONSTRUCTION	
016000 017300	PRODUCT REQUIREMENTS	
	CLOSEOUT PROCEDURES	
017700 017823	OPERATION AND MAINTENANCE DATA	
017823	PROJECT RECORD DOCUMENTS	
017839	DEMONSTRATION AND TRAINING	
017900	GENERAL COMMISSIONING REQUIREMENT	
DIVISION 02	EXISTING CONDITIONS	
020413	COMMON SUBMITTAL REQUIREMENTS FOR EXISTING CONDITIONS	
024119	SELECTIVE STRUCTURE DEMOLITION	
DIVISION 04	MASONRY	
040413	COMMON SUBMITTAL REQUIREMENTS FOR MASONRY	
042200	CONCRETE UNIT MASONRY	
DIVISION 05	METALS	
050413	COMMON SUBMITTAL REQUIREMENTS FOR METALS	
055000	METAL FABRICATIONS	
055113	METAL PAN STAIRS	
DIVISION 06	WOOD, PLASTICS, AND COMPOSITES	
	WOOD, FLASTICS, AND CONFOSTES	

060413

061053	MISCELLANEOUS ROUGH CARPENTRY	
064023	ARCHITECTURAL WOODWORK	
064116	PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS	
DIVISION 07	THERMAL AND MOISTURE PROTECTION	
070413	COMMON SUBMITTAL REQUIREMENTS FOR THERMAL AND MOISTURE	
	PROTECTION	
078413	PENETRATION FIRESTOPPING	
079200	JOINT SEALANTS	
079219	ACOUSTICAL JOINT SEALANTS	
079513.13	INTERIOR EXPANSION JOINT COVER ASSEMBLIES	10/14/22
DIVISION 08	OPENINGS	
080413	COMMON SUBMITTAL REQUIREMENTS FOR OPENINGS	
083113	ACCESS DOORS AND FRAMES	
083473.13	METAL SOUND CONTROL DOOR ASSEMBLIES	
087100	DOOR HARDWARE	
088300	MIRRORS	
DIVISION 09	FINISHES	
090190.52	MAINTENANCE REPAINTING	
090413	COMMON SUBMITTAL REQUIREMENTS FOR FINISHES	
090561.13	MOISTURE VAPOR EMISSION CONTROL	
092216	NON-STRUCTURAL METAL FRAMING	
092900	GYPSUM BOARD	
093013	CERAMIC TILING	
095113	ACOUSTICAL PANEL CEILINGS	
096513	RESILIENT BASE AND ACCESSORIES	
096519	RESILIENT TILE FLOORING	
096813	TILE CARPETING	
096816	SHEET CARPETING	
098433	SOUND-ABSORBING AND DIFFUSING WALL UNITS	
098436	SOUND-ABSORBING AND REFELECTING CEILING UNITS	
099123		
DIVISION 10	SPECIALTIES	
100413	COMMON SUBMITTAL REQUIREMENTS FOR SPECIALTIES	
102113.19	PLASTIC TOILET COMPARTMENTS	
102800	TOILET, BATH, AND LAUNDRY ACCESSORIES	
DIVISION 11	EQUIPMENT	
110413	COMMON SUBMITTAL REQUIREMENTS OR EQUIPMENT	
116143	STAGE CURTAINS	
DIVISION 12	FURNISHINGS	
120413	COMMON SUBMITTAL REQUIREMENTS FOR FURNISHINGS	
126100	FIXED AUDIENCE SEATING	10/14/22
DIVISION 14	CONVEYING EQUIPMENT	

COMMON SUBMITTAL REQUIREMENTS FOR WOODS PLASTICS AND COMPOSITES 10/14/22

144200	WHEELCHAIR LIFTS	10/14/22
DIVISION 21	FIRE SUPPRESSION	
210413 210518	COMMON SUBMITTAL REQUIREMENTS FOR FIRE SUPPRESSION ESCUTCHEONS FOR FIRE-SUPPRESSION PIPING	
DIVISION 22	PLUMBING	
220413	COMMON SUBMITTAL REQUIREMENTS FOR PLUMBING	
220517	SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING	10/14/22
220518	ESCUTCHEONS FOR PLUMBING PIPING	10/14/22
220523.12	BALL VALVES FOR PLUMBING PIPING	
220529	HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT	10/14/22
220553	IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT	10/14/22
220719	PLUMBING PIPING INSULATION	10/14/22
221116	DOMESTIC WATER PIPING	10/14/22
221119	DOMESTIC WATER PIPING SPECIALTIES	10/14/22
221316	SANITARY WASTE AND VENT PIPING	10/14/22
221319	SANITARY WASTE PIPING SPECIALTIES	10/14/22
221319.13	SANITARY DRAINS	10/14/22
224213.13	COMMERCIAL WATER CLOSETS	10/14/22
224216.13	COMMERCIAL LAVATORIES	10/14/22
DIVISION 23	HEATING, VENTILATING, AND AIR-CONDITIONING (HVAC)	
230413	COMMON SUBMITTAL REQUIREMENTS FOR HVAC	
230529	HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT	10/14/22
230553	IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT	
230593	TESTING ADJUSTING AND BALANCING FOR HVAC	10/14/22
230713	DUCT INSULATION	10/14/22
230800	COMMISSIONING OF HVAC	
230900	INSTRUMENTATION AND CONTROL FOR HVAC	
233113	METAL DUCTS	
233300	AIR DUCT ACCESSORIES	
233346	FLEXIBLE DUCTS	10/14/22
233600	AIR TERMINAL UNITS	10/14/22
DIVISION 26	ELECTRICAL	
260413	COMMON SUBMITTAL REQUIREMENTS FOR ELECTRICAL	
260519	LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES	10/14/22
260529	HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS	
260533	RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS	
260544	SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLING	10/14/22
260553	IDENTIFICATION FOR ELECTRICAL SYSTEMS	10/14/22
260923	LIGHTING CONTROL DEVICES	10/14/22
260943.23	RELAY BASED LIGHTING CONTROL	10/14/22
262726	WIRING DEVICES	10/14/22
262816	ENCLOSED SWITCHES AND CIRCUIT BREAKERS	10/14/22
DIVISION 27	COMMUNICATIONS	
270010	GENERAL REQUIREMENTS FOR COMMUNICATIONS	10/14/22
271000	STRUCTURED CABLING SYSTEM	
274100	AUDIOVISUAL SYSTEM	10/14/22

DIVISION 28 ELECTRONIC SAFETY AND SECURITY

280413 283100	COMMON SUBMITTAL REQUIREMENTS FOR ELECTRONIC SAFETY AND SECURITY 10/14 FIRE ALARM SYSTEM	
DIVISION 32	EXTERIOR IMPROVEMENTS	
320413 321316	COMMON SUBMITTAL REQUIREMENTS FOR EXTERIOR IMPROVEMENTS	

END OF TABLE OF CONTENTS

<u>UNIFORM GENERAL CONDITIONS</u> <u>FOR CONSTRUCTION AND DESIGN CONTRACTS</u> <u>2022</u>

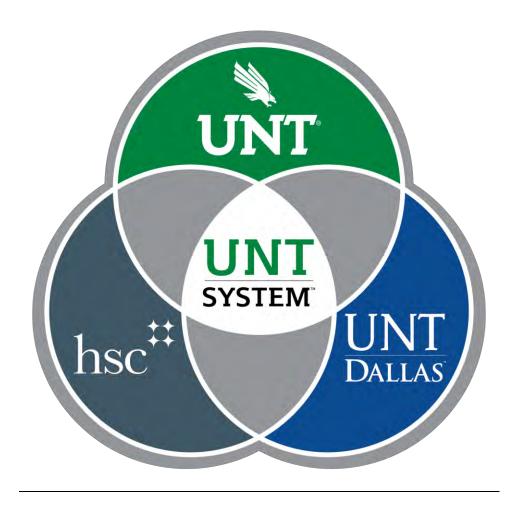


TABLE OF CONTENTS

ARTIC	LE 1. DEFINITIONS	1
ARTIC	LE 2. WAGE RATES AND OTHER LAWS GOVERNING CONSTRUCTION	6
2.1	Environmental Regulations	6
2.2	Wage Rates	
2.2.1	Notification to Workers	
2.2.2	Penalty for Violation	
2.2.3	Complaints of Violations	
2.3	Licensing of Trades	
2.4	Royalties, Patents, and Copyrights	9
<u>2.5</u>	State Sales and Use Taxes	9
2.6	Antiquities	9
2.7	Franchise Tax Status	
ARTIC	LE 3. GENERAL RESPONSIBILITIES OF OWNER	
3.1	Preconstruction Conference	10
3.2	Owner's Construction Manager (OCM)	10
3.2.1	Point of Contact	
3.2.2	Directives	10
3.3	Owner Supplied Materials and Information.	10
3.3.1	Surveys	10
3.3.2	Drawings and Specifications	10
<u>3.3.3</u>	Other Information	10
<u>3.4</u>	Availability of Lands	
<u>3.5</u>	Limitation on Owner's Duties.	11
3.5.1		
<u>3.5.2</u>	No Control No Contravention of Design Professional	11
ARTIC	LE 4. GENERAL RESPONSIBILITIES OF DESIGN PROFESSIONAL	
4.1	Role of Design Professional	11
4.2	Site Visits	
4.3	Inspections	11
4.4	Clarifications and Interpretations	11
4.5	Limitations on Design Professional Authority	
ARTIC	LE 5. GENERAL RESPONSIBILITIES OF CONTRACTOR	. 12
5.1	Contractor's General Responsibilities	
5.2	Project Administration.	12
5.2.1	Contractor's Management Personnel	
5.2.2		13
<u>5.2.3</u>	Services, Materials, and Equipment	13
<u>5.2.4</u>	No Substitutions without Approval	13
<u>5.3</u>	Owner Equipment or Material	13
<u>5.4</u>	Non-Compliant Work	13
5.5	Subcontractors	13
<u>5.5</u> <u>5.5.1</u>	Contract Documents	

5.5.2	Scheduling	
5.6	Continuing the Work	
5.7	Cleaning	
<u>5.8</u>	Acts and Omissions of Contractor, its Subcontractors, and Employees	14
<u>5.9</u>	Ancillary Areas	
<u>5.10</u>	Off-Site Storage	
<u>5.10</u> 5.11	-	
<u>5.11</u> 5.11.1	Separate Contracts Continuation of Contract	
$\frac{5.11.1}{5.11.2}$		
<u>5.11.2</u> 5.11.3		10 16
		10
	LE 6. HISTORICALLY UNDERUTILIZED BUSINESS (HUB)	
<u>SUBCO</u>	NTRACTING PLAN	
<u>6.1</u>	General Description	
<u>6.1.1</u>	Good Faith Effort	
<u>6.2</u>	Compliance with Approved HUB Subcontracting Plan	
<u>6.3</u>	Failure to Demonstrate Good-Faith Effort	
ARTIC	LE 7. BONDS	17
7.1	Construction Bonds	
$\frac{7.1}{7.2}$	Bond Requirements	
$\frac{7.2}{7.2.1}$	Performance Bonds	
$\frac{7.2.1}{7.2.2}$	Payment Bonds	
$\frac{7.2.2}{7.2.3}$	When Bonds Are Due	
$\frac{7.2.5}{7.2.4}$	Power of Attorney	
7.3	Bond Indemnification	
$\frac{7.3}{7.3.1}$	Furnishing Bond Information	
$\frac{7.3.1}{7.3.2}$	Claims on Payment Bonds	
	Payment of Claims when Payment Bond is Not Required	
<u>7.4</u>		
$\frac{7.5}{7.6}$	Sureties	
<u>7.6</u>	Bond Costs	
ARTIC	LE 8. INDEMNITY AND INSURANCE	<u>19</u>
<u>8.1</u>	Indemnification of Owner	
<u>8.1.1</u>	No Third-Party Beneficiaries	19
8.1.2	Notice	19
<u>8.2</u>	Insurance Requirements	
8.2.1	Period of Coverage	
<u>8.2.2</u>	Certificates	
8.2.3	Failure to Provide Certificates	
8.2.4	Contractor's Liability	
8.2.5	Insurance Limits	
8.2.6	Insurers	
<u>8.3</u>	Insurance Coverage Required	
8.3.1	Workers' Compensation Insurance	
8.3.2	Commercial General Liability Insurance	
<u>8.3.3</u>	Asbestos Abatement Liability Insurance	
<u>8.3.4</u>	Comprehensive Automobile Liability Insurance	
<u>8.3.5</u>	All-Risk Builder's Risk Insurance	
<u>8.3.6</u>	"Umbrella" Liability Insurance	
<u>8.4</u>	Policy Requirements. Policies must include the following clauses, as applicable	

<u>8.5</u>	Subcontractor Insurance Coverage	
ARTIC	LE 9 CONSTRUCTION DOCUMENTS, COORDINATION DOCUMEN	TS, AND
	D DOCUMENTS	
9.1	Drawings and Specifications	
9.1.1	Copies Furnished	24
9.1.2	Ownership of Drawings and Specifications.	24
9.2	Interrelation of Documents	
9.3	Resolution of Conflicts in Documents	
9.4	Contractor's Duty to Review Contract Documents	
9.5	Discrepancies and Omissions in Drawings and Specifications	
9.5.1	Design-Build Firm	
9.5.2	Construction Manager-at-Risk Examination and Reporting	
9.5.3	Other Limitations.	
9.6	No Warranty or Representation by Owner	
9.7	Requirements for Record Documents	
9.7.1	Contractor shall:	
9.7.2	Design Professional shall:	
	LE 10. CONSTRUCTION SAFETY	
10.1	General	
10.1.1	Site Visits	
10.2	Notices	
10.2.1	Utilities and Adjacent Properties	
10.2.2	Safety Data Sheets	
10.3	Emergencies	
10.3.1	On Call Response	
10.3.2	Notice	
10.3.3	Owner Remedy	
10.4	Injuries	
10.4.1	Documentation	
10.4.2	Incident Report	
10.5	Environmental Safety	
10.5.1	Subcontractors	
10.5.2	Owner	
10.6	Trenching Plan	
10.6.1	OSHA Regulations	
10.6.2	Texas State Law	
10.6.3	Contractor Responsibility	<u>29</u>
10.7	Crane Safety	
<u>10.8</u>	Unmanned Aircraft System (UAS) Usage	
<u>10.9</u>	Fire Protection Procedures	
10.10	Smoke and Tobacco Free Campus	
ARTIC	LE 11. QUALITY CONTROL	
<u>11.1</u>	Materials & Workmanship	
<u>11.2</u>	Testing	
<u>11.2.1</u>	Owner	
11.2.2	Contractor	
	Standards	
11.2.4	Non-Compliance (Test Results)	

11.2.5	Notice of Testing	
11.2.6	Test Samples	
11.2.7	Covering Up Work	
11.3	Submittals	
11.3.1	Contractor's Submittals	
11.3.2	Review of Submittals	
11.3.3	Correction and Resubmission	
11.3.4	Limits on Shop Drawing Review	
11.3.5	No Substitutions without Approval Unauthorized Substitutions at Contractor's Risk	
11.3.6	Unauthorized Substitutions at Contractor's Risk	
11.4	Field Mock-up	
11.4.1	Minimum	
11.4.2	No Incorporation Unless Approved	
	Schedule	
11.5	Inspection During Construction	
<u>11.5</u> 11.5.1		35
$\frac{11.5.1}{11.5.2}$	Owner's Self Help	
	Notice	
	LE 12. CONSTRUCTION SCHEDULES	
<u>12.1</u>	Contract Time	
<u>12.2</u>	Notice to Proceed	
<u>12.3</u>	Work Progress Schedule	
<u>12.3.1</u>	Work Progress Schedule Updates	
<u>12.3.2</u>	Use of Work Progress Schedules	
12.4	Ownership of Float	
12.5	Completion of Work	
12.5.1	Owner's Self Help	
12.5.2	Requirement to Regain Schedule	
12.5.3	Recovery Schedule	
12.5.4	Owner's Notice Not Acceleration	
12.6	Modification of the Contract Time	
12.6.1	Extension Request	
12.6.2	Weather Days	
12.6.3	Excusable Delay	
12.7	No Damages for Weather Days	40
12.8	Costs for Excusable Delay	
12.9	No Damages for Other Delay	
12.10	Concurrent Delay	
$\frac{12.10}{12.11}$	Time Extension Requests for Changes to the Work or Excusable Delay	
	Content of Request	
	2 No Release	
	Longest Path Analysis	
	Owner Response	
12.11.4	Failure to Complete Work in the Contract Time	
	*	
$\frac{12.13}{12.13}$	Liquidated Damages	
-	Ceasonable Estimate	
	No Waiver	
14.1.7.7	1 INU VV alvol	

ARTICI	LE 13. PAYMENTS	
<u>13.1</u>	Job Order Contracts	
13.2	Schedule of Values	
13.2.1	Requirements	
<u>13.3</u>	Progress Payments	
13.3.1	Preliminary Pay Worksheet	
13.3.2	Contractor's Application for Payment	
13.3.3	Certification by Design Professional	
13.4	Owner's Duty to Pay	
13.4.1	Stored Materials	
	Retainage	
	Price Reduction to Cover Loss	
	<u>Title</u>	
	No Release	
<u>13.4.7</u>	Documentation	
<u>13.5</u>	Time for Payment by Contractor	
ARTICI	LE 14. CHANGES	
14.1	Change Orders	
	Owner Ordered Changes	
	Corrections	
14.2	Lump Sum Change Order Request	
14.2.1	Self-Performed Labor	
14.2.2	Overhead and Profit	
14.2.3	Labor Burden	
14.2.4	Material	
	Equipment	
	Maximum Markup Percentage Allowable on Self-Performed Work	
	Maximum Markup Percentages Allowable on Work Performed by Subcontractors	
	GMP Limitation.	
	No Markup on Bonds and Liability Insurance Costs	
	Direct and Indirect Costs Covered by Markup Percentages	
	Deduct Change Orders and Net Deduct Changes	
	Contingency	
	Unit Price Change Order Requests	
	Cost Plus Change Order Requests	
<u>14.4</u>	Job Order Unit Prices	
<u>14.5</u>	Claims for Additional Costs.	
	Claim with no Requested Change	
	Miscellaneous Claims	
<u>14.5.2</u>	Failure to Notify	
<u>14.6</u>	Minor Changes	
<u>14.7</u>	Concealed Site Conditions.	
<u>14.8</u>	Extension of Time	
<u>14.9</u>	Administration of Change Order Requests	
<u>14.9.1</u>	Procedures.	
<u>14.9.2</u>	Routine Changes	
<u>14.9.3</u>	Documentation	
	Emergencies.	
14.9.5	Coordination with Schedule of Values	

14.10	Construction Change Directive (CCD)	
14.11	Audit of Changes	
ARTIC	LE 15. PROJECT COMPLETION AND ACCEPTANCE	53
15.1	Closing Inspections	
15.1.1		
	Annotation	
15.1.3		
15.1.4		
15.1.5		
15.1.6		
15.2	Owner's Right of Occupancy	
15.3	Acceptance and Payment.	
<u>15.3.1</u>		
15.3.2	Final Payment Documentation	
	Design Professional Approval	
	Offsets and Deductions	
	Final Payment Due	
	Effect of Final Payment	
	Waiver of Claims	
	Effect on Warranty	
	LE 16. WARRANTY AND GUARANTEE	
16.1	Contractor's General Warranty and Guarantee	
16.1.1	Warranty Period	
	Limits on Warranty	
	Events Not Affecting Warranty	
16.2	Separate Warranties	
16.2.1		
16.2.2	Assignment	
16.3	Correction of Defect	
16.4	Certification of No Asbestos Containing Materials or Work	
16.5	Compliance with Acts	
ARTIC	LE 17. SUSPENSION AND TERMINATION	60
17.1	Suspension of Work for Cause	
17.1.1	Cease Work	
17.1.2	Investigation	60
17.1.3	Outcome	
17.1.4	Time	60
17.2	Suspension of Work for Owner's Convenience	60
17.3	Termination by Owner for Cause.	60
17.3.1	Cause	
17.3.2	No Waiver	
17.3.3	Notice	
17.3.4	Cure	
17.3.5	Failure to Cure	
17.3.6	Conversion to Termination for Convenience	
17.4	Termination for Convenience of Owner	
17.4.1	Notice	
17.4.2	Contractor Action	

<u>17.4.3</u>	Contractor Remedy	
17.5	Termination by Contractor	
<u>17.6</u>	Settlement on Termination	
ARTIC	LE 18. DISPUTE RESOLUTION	
18.1	Contracts Less Than \$250,000	
18.2	Contracts \$250,000 or Greater	
18.2.1	Mediation	
<u>18.3</u>	Owner Retained Rights	
<u>18.4</u>	No Waiver	
<u>18.5</u>	No Attorney's Fees	
<u>18.6</u>	Interest	
ARTIC	LE 19. MISCELLANEOUS	
19.1	Right to Audit	
19.2	Records and Inspection.	
19.2.1	Deliverables	
19.2.2	Plans and Specifications	
<u>19.2.3</u>	Ethics Expectations	
<u>19.2.4</u>	Change Order Pricing	
<u>19.2.5</u>	Invoice Accuracy	66
<u>19.2.6</u>	Claims	
<u>19.3</u>	Audit of Subcontractors	66
<u>19.4</u>	Overpricing or Overcharges.	
<u>19.5</u>	Documentation Requirements	
19.6	Supplementary or Special Conditions	
19.6.1	Supplementary Conditions	
19.6.2	Special Conditions	
19.7	Federally Funded Projects	
19.8	Internet-based Project Management Systems	
19.8.1	Accessibility and Administration.	
19.8.2	Training	
19.9	Computation of Time	
19.10	Survival of Obligations	
19.11	No Waiver of Performance	
19.12	Governing Law and Venue	
19.13	Captions and Catch Lines	
19.14	Independent Contractor Status	
19.15	No Third-Party Beneficiaries	
19.16	Child Support Obligor	
<u>19.10</u> 19.17	Buy America Requirements for Iron and Steel Used in Construction	
<u>19.17</u> 19.18	No Assignment	
<u>19.18</u> 19.19	Severability	· · · · · · · · · · · · · · · · · · ·
$\frac{19.19}{19.20}$	Parties Bound.	
<u>19.20</u> 19.21	Public Information	
	Business Ethics Expectations	
<u>19.22</u> 19.22 1	Business Etnics Expectations	
	Reasonable Actions	
	Gifts and Other Considerations	
17.44.3		

19.22.4	Subcontractor
	Other Jobs
19.22.6	Owner Notification
19.22.7	Subcontractors Contracts
19.22.8	Interviews and Audits
19.23	Entire Agreement

UNIFORM GENERAL CONDITIONS FOR CONSTRUCTION AND DESIGN CONTRACTS 2022

ARTICLE 1. DEFINITIONS

Unless the context clearly requires another meaning, the following terms have the meaning assigned herein.

- 1.1 "Addendum/Addenda" means formally issued written or graphic modification and/or interpretations of the Construction Documents that may add to, delete from, clarify or correct the description and/or scope of the Work. Addenda are issued during the bidding phase of the project.
- 1.2 "Application for Final Payment" means Contractor's final invoice for payment that includes any portion of the Work that has been completed for which an invoice has not been submitted, amounts owing to adjustments to the final Contract Sum resulting from approved change orders, and release of remaining Contractor's retainage.
- 1.3 "Application for Payment" means Contractor's monthly partial invoice for payment that includes any portion of the Work that has been completed and performed in accordance with the requirements of the Contract Documents for which an invoice has not been submitted. The Application for Payment must accurately reflect the progress of the Work, be itemized based on the Schedule of Values, bear the notarized signature of Contractor, and not include subcontracted items for which Contractor does not intend to pay.
- 1.4 "Authority Having Jurisdiction" means a federal, state, local or other regional department, or an individual such as a fire marshal, building official, electrical inspector, utility provider or other individual having statutory authority.
- 1.5 "Baseline Schedule" means the initial time schedule prepared by Contractor for Owner's information and acceptance that conveys Contractor's and Subcontractors' activities (including coordination and review activities required in the Contract Documents to be performed by Design Professional and Owner), durations, and sequence of work related to the entire Project to the extent required by the Contract Documents. The schedule clearly demonstrates the Longest Path of activities, durations, and necessary predecessor conditions that drive the end date of the schedule. The Baseline Schedule shall not exceed the time limit current under the Contract Documents.
- 1.6 "Certificate of Final Completion" means the certificate issued by Design Professional that documents, to the best of Design Professional's knowledge and understanding, Contractor's completion of all Contractor's Punch list items and pre-final Punch list items, final cleanup, and Contractor's provision of Record Documents, operations and maintenance manuals, and all other closeout documents required by the Contract Documents.

- 1.7 "Certificate of Substantial Completion" means the certificate executed by the Design Professional, Owner, and Contractor that documents to the best of the Design Professional's and Owner's knowledge and understanding, Contractor's sufficient completion of the Work in accordance with the Contract, so as to be operational and fit for the use intended.
- 1.8 "Change Order" means a written modification of the Contract between Owner and Contractor, agreed to and signed by Owner, Contractor, and Design Professional.
- 1.9 "Change Order Request (COR)" means a Contractor generated document which describes a change in the scope of Work, including a detailed description, Drawings and Specifications, and a request for changes to costs or time, as necessary, to inform Owner of the nature of the requested change to the Contract.
- 1.10 "Close-Out Documents" mean the product brochures, submittals, product/equipment maintenance and operations instructions, manuals, and other documents/warranties, record documents, affidavits of payment, releases of liens and claims, and other documents as may be further defined, identified, and required by the Contract Documents.
- 1.11 "Construction Cost Limitation (CCL)" means the maximum funding authorized by and available to Owner to pay for the construction of the Project, exclusive of: (I) furniture, fixtures and other equipment (FFE) not in the Contract; (ii) Owner's Contingency; and (iii) any design and/or commissioning fees.
- 1.12 "Contract" means the agreement, including all attachments thereto, and all of the Contract Documents between Owner and Contractor.
- 1.13 "Contract Date" is the date when the agreement between Owner and Contractor becomes effective.
- 1.14 "Contract Documents" mean those documents identified as a component of the Contract between Owner and Contractor. These may include, but are not limited to: Drawings; Specifications; Uniform General Conditions; Owner's Special Conditions; Owner's Design Criteria Package for Design-Build Projects; Guaranteed Maximum Price Proposal executed by Owner and Contractor; all Change Orders; all pre-bid and/or pre-proposal addenda; Owner's Request for Proposal and/or Request for Qualifications; and Contractor's response to Owner's Request for Proposal and/or Request for Qualifications.
- 1.15 "Contract Duration" means the period between the Effective Date of the Contract and the end of the Warranty Period.
- 1.16 "Contract Sum" means the total compensation payable to Contractor for completion of the Work in accordance with the terms of the Contract.
- 1.17 "Contract Time" means the period between the start date identified in the Notice to Proceed with construction and the date to achieve Substantial Completion identified in the Notice to Proceed or as subsequently amended by a Change Order.

- 1.18 "Contractor" means the individual, corporation, limited liability company, partnership, joint venture, firm, or other entity contracted to perform the Work, regardless of the type of construction contract used, so that the term as used herein includes a Construction Manager-at-Risk or a Design-Build firm as well as a general or prime Contractor. The Contract Documents refer to Contractor as if singular in number but shall be interpreted to include the plural. The term "Contractor" shall also be inclusive of and apply to Design Professional in these Uniform General Conditions when the context does not indicate otherwise.
- 1.19 "Construction Change Directive" means an approved change in the Work issued by the Owner without the complete agreement of Contractor as to cost and/or time.
- 1.20 "Construction Documents" mean the Drawings, Specifications, and other documents issued to build the Project. Construction Documents become part of the Contract Documents when listed in the Contract or any Change Order.
- 1.21 "Construction Manager-at-Risk", in accordance with Tex. Education Code §51.782, means a sole proprietorship, partnership, corporation, or other legal entity that assumes the risk for construction, rehabilitation, alteration, or repair of a facility at the contracted price as a general contractor and provides consultation to Owner regarding construction during and after the design of the facility.
- 1.22 "Coordination Documents" means an ongoing process performed by the Contractor that documents, in a format approved by the Owner, the review of plans and specifications developed by the Design Professional demonstrating the Contractor understands the scope of the project and reviews complex interrelationships among project components.
- 1.23 "Date of Commencement" means the date designated in the Notice to Proceed for Contractor to commence the Work.
- 1.24 "Day" means a calendar day unless otherwise specifically stipulated.
- 1.25 "Design-Build" means a project delivery method in which the detailed design and subsequent construction is provided through a single contract with a Design-Build Firm. The Design-Build Project delivery shall be implemented in accordance with Tex. Education Code § 51.780.
- 1.26 "Design-Build Firm", in accordance with Texas Education Code § 51.780, means a partnership, corporation, or other legal entity or team that includes an engineer or architect and builder qualified to engage in building construction in Texas.
- 1.27 "Design Professional" means a person registered as an architect pursuant to Tex. Occ. Code Ann., Chapter 1051, as a landscape architect pursuant to Tex. Occ. Code Ann., Chapter 1052, a person licensed as a professional engineer pursuant Tex. Occ. Code Ann., Chapter 1001, and/or a firm employed by Owner or Design-Build Firm to provide professional architectural or engineering services and to exercise overall responsibility for the design of a Project or a significant portion thereof, and to perform the contract administration responsibilities set forth in the Contract.

- 1.28 "Drawings" mean that product and set of documents of Design Professional which graphically depicts the Work.
- 1.29 "Final Completion" means the date determined and certified by Design Professional and Owner on which the Work is fully and satisfactorily complete in accordance with the Contract.
- 1.30 "Final Payment" means the last and final monetary compensation made to Contractor for any portion of the Work that has been completed and accepted for which payment has not been made including adjustments to the final Contract Sum resulting from approved change orders and release of Contractor's retainage.
- 1.31 "Float" means the period of time a task can be delayed without delaying Substantial Completion Date.
- 1.32 "Historically Underutilized Business (HUB)" pursuant to Tex. Gov't Code, Chapter 2161, means a business that is at least 51% owned by an Asian Pacific American, a Black American, a Hispanic American, a Native American and/or an American Woman; is an entity with its principal place of business in Texas; and has an owner residing in Texas with proportionate interest that actively participates in the control, operations, and management of the entity's affairs.
- 1.33 "Longest Path" means the sequence of directly related activities that comprise the longest continuous chain of activities from the start of the first activity to the finish of the last activity. The activities represent critical path plus Float plus historical Weather Days. Each activity in the Longest Path is critical and directly related in that it prevents its successor from being scheduled earlier than it is.
- 1.34 "Notice to Proceed" means written document furnished by the Owner informing Contractor of the date to commence the Work and the date anticipated for Substantial Completion.
- 1.35 "Open Item List" means a list of work activities, Punch list items, changes, or other issues not expected by Owner, Design Professional, and Contractor to be complete prior to Substantial Completion.
- 1.36 "Owner" means the University of North Texas System and/or its component institutions, as a higher education university system and agency of the State of Texas.
- 1.37 "Owner's Construction Manager (OCM)" means the individual assigned by the Owner to act on its behalf and to undertake certain activities as specifically outlined in the Contract. The OCM does not have the authority to bind the Owner or direct changes to the scope, cost, or time of the Contract.
- 1.38 "Owner's Designated Representative (ODR)" means the individual assigned by Owner to act on its behalf and to undertake certain activities as specifically outlined in the Contract. The ODR is the only party authorized to direct changes to the scope, cost, or time of the Contract.
- 1.39 "Progress Assessment Report (PAR)" means the monthly compliance report to Owner verifying compliance with the HUB subcontracting plan (HSP).

- 1.40 "Project" means all activities necessary for realization and completion of Owner's desired building or other structure including all ancillary and related work. This includes design, contract award(s), execution of the Work itself, fulfillment of all Contract and warranty obligations, and work by Owner's forces or other contractors.
- 1.41 "Project Costs" means all costs necessary for the realization and completion of Owner's desired building or other structure including all ancillary and related work. This includes design, contract award(s), execution of the Work itself, fulfillment of all Contract and warranty obligations, and work by Owner's forces or other contractors.
- 1.42 "Proposal Request (PR)" means a document that informs Contractor, Owner, and Design Professional of a proposed change in the Work and appropriately describes or otherwise documents such change including Contractor's pricing for the proposed change.
- 1.43 "Punch List" means a list of items of Work to be completed or corrected by Contractor before Final Completion, and indicates items to be finished, remaining Work to be performed, or Work that does not meet quality or quantity requirements as required in the Contract Documents.
- 1.44 "Reasonably Inferable" means a fair, proper, and moderate conclusion reached by considering all of the facts and deducing a logical conclusion from them.
- 1.45 "Record Documents" mean the Drawings, Specifications, and other materials maintained by Contractor during construction and as corrected by Design Professional, that documents all addenda, Architect's Supplemental Instructions, Change Orders, and postings and markings that record the as-built conditions of the Work and all changes made during construction.
- 1.46 "Request for Information (RFI)" means a written request by Contractor directed to Design Professional and Owner for a clarification of the information provided in the Contract Documents or for direction concerning information necessary to perform the Work.
- 1.47 "Samples" mean representative physical examples of materials, equipment, or workmanship used to confirm compliance with requirements and/or to establish standards for use in execution of the Work.
- 1.48 "Schedule of Values" means the detailed breakdown of the cost of the materials, labor, and equipment necessary to accomplish the Work, submitted by Contractor for approval by Owner and Design Professional.
- 1.49 "Shop Drawings" mean the drawings, diagrams, illustrations, schedules, performance charts, brochures, and other data prepared by Contractor or its agents which detail a portion of the Work.
- 1.50 "Site" means the geographical area of the location of the Work.
- 1.51 "Special Conditions" mean the documents containing terms and conditions which may be unique to the Work or Project.

- 1.52 "Specifications" mean the written product of Design Professional that establishes the quality and/or performance of products utilized in the Work and processes to be used, including testing and verification for producing the Work.
- 1.53 "Subcontractor" means an individual or entity that enters into an agreement with Contractor to perform part of the Work or to provide services, materials, or equipment for use in the Work.
- 1.54 "Submittal Register" means a list provided by Contractor of all items to be furnished for review and approval by Design Professional and Owner and as identified in the Contract Documents including anticipated sequence and submittal dates.
- 1.55 "Substantial Completion" means the date determined and certified by Contractor, Design Professional, and Owner when the Work, or a designated portion thereof, is sufficiently complete, in accordance with the Contract, so as to be operational and fit for the use intended.
- 1.56 "Substantial Completion Date" means the required date for substantial completion of the project. The Substantial Completion Date can only be changed by a written change order.
- 1.57 "Total Float" means the total number of days an activity on the longest path can be delayed without delaying the Substantial Completion Date.
- 1.58 "Unit Price Work" means the Work or a portion of the Work, paid for based on incremental units of measurement.
- 1.59 "Work" means the administration, procurement, materials, equipment, construction, and all services necessary for Contractor, and/or its agents, to fulfill Contractor's obligations under the Contract.
- 1.60 "Work Progress Schedule" means the continually updated time schedule prepared and monitored by Contractor that coordinates and integrates activities of the Project, including Contractor's services, Design Professional's services, the work of other consultants, suppliers, and Owner's activities with the anticipated construction schedules for other contractors. The Work Progress Schedule accurately indicates all necessary and appropriate revisions, including a Longest Path impact analysis, as required by the conditions of the Work and the Project while maintaining a concise comparison to the Baseline Schedule.

ARTICLE 2. WAGE RATES AND OTHER LAWS GOVERNING CONSTRUCTION

2.1 <u>Environmental Regulations.</u> Contractor shall conduct activities in compliance with applicable laws and regulations and other requirements of the Contract relating to the environment and its protection at all times. Unless otherwise specifically determined, Contractor is responsible for obtaining and maintaining permits related to storm water run-off. Contractor shall conduct operations consistent with storm water run-off permit conditions. Contractor is responsible for all items it brings to the Site, including hazardous materials, and all such items brought to the Site by

its Subcontractors and suppliers, or by other entities subject to direction of Contractor. Contractor shall not incorporate hazardous materials into the Work without prior approval of Owner, and shall provide an affidavit attesting to such in association with request for Substantial Completion inspection.

- 2.2 <u>Wage Rates.</u> Contractor shall, and shall cause subcontractors to, comply with the Texas Prevailing Wage law. Contractor shall pay not less than the wage scale of the various classes of labor as shown on the prevailing wage schedule as established by the United States Department of Labor in accordance with the Davis-Bacon Act, as amended. The specified wage rates are minimum rates only. Owner is not bound to pay any claims for additional compensation made by Contractor because Contractor pays wages in excess of the applicable minimum rate contained in the Contract. The prevailing wage schedule is not a representation that qualified labor adequate to perform the Work is available locally at the prevailing wage rates. When requested, Contractor shall furnish competent evidence of compliance with the Texas Prevailing Wage Law and the addresses of all workers.
 - 2.2.1 <u>Notification to Workers.</u> Contractor shall post the prevailing wage schedule in a place conspicuous to all workers on the Project Site and shall notify each worker, in writing, of the following as they commence Work on the Contract: the worker's job classification, the established minimum wage rate requirement for that classification, as well as the worker's actual wage. The notice must be delivered to and signed in acknowledgement of receipt by the worker and must list both the wages and fringe benefits to be paid or furnished for each classification in which the worker is assigned duties.
 - 2.2.1.1 Contractor shall submit a copy of each worker's wage-rate notification to *Owner* with the application for progress payment for the period during which the worker was engaged in activities on behalf of the Project.
 - 2.2.1.2 Pursuant to Tex. Gov't Code § 2258.024, Contractor shall keep, on site, true and accurate records showing the name and occupation of each worker employed by the Contractor or subcontractors and the actual per diem wages paid to each worker. The record shall be open to inspection by the ODR and their agents at all reasonable hours for the duration of the contract.
 - 2.2.1.3 With each application for progress payment, Contractor shall make available upon request certified payroll records, including from subcontractors of any tier level, on Form WH-347 as promulgated by the U.S. Department of Labor, as may be revised from time to time and in unlocked and unprotected Excel format, along with copies of any and all Contract Documents between Contractor and any Subcontractor. Pursuant to Tex. Penal Code § 37.02 and 37.10, Employees of Contractor and subcontractors, including all tier levels, shall be subject to prosecution for submitting certified payroll records that contain materially false information.

- 2.2.1.4 The prevailing wage schedule is determined by Owner in compliance with Tex. Gov't Code, Chapter 2258. Should Contractor at any time become aware that a particular skill or trade not reflected on Owner's prevailing wage schedule will be or is being employed in the Work, whether by Contractor or by Subcontractor, Contractor shall promptly inform *Owner* of the proposed wage to be paid for the skill along with a justification for same and *Owner* shall promptly concur with or reject the proposed wage and classification.
- 2.2.1.5 Contractor is responsible for determining the most appropriate wage for a particular skill in relation to similar skills or trades identified on the prevailing wage schedule. In no case, shall any worker be paid less than the wage indicated for laborers.
- 2.2.1.6 Pursuant to Tex. Labor Code § 214.008, Misclassification of Workers; Penalty, Owner requires Contractor and all subcontractors properly classify individuals as employees or independent contractors.
- 2.2.2 <u>Penalty for Violation</u>. Contractor, and any Subcontractor, will pay to the State a penalty of sixty dollars (\$60) for each worker employed for each day, or portion thereof, that the worker is paid less than the wage rates stipulated in the prevailing wage schedule.
- 2.2.3 <u>Complaints of Violations.</u>
 - 2.2.3.1 <u>Owner's Determination of Good Cause.</u> Upon receipt of information concerning a violation, Owner will conduct an investigation in accordance with Tex. Gov't Code, Chapter 2258, and make an initial determination as to whether good cause exists that a violation occurred. Upon making a good cause finding, Owner will retain the full amounts claimed by the claimant or claimants as the difference between wages paid and wages due under the prevailing wage schedule and any supplements thereto, together with the applicable penalties, such amounts being subtracted from successive progress payments pending a final decision on the violation.
 - 2.2.3.2 <u>No Extension of Time.</u> If Owner's determination proves valid that good cause existed to believe a violation had occurred, Contractor is not entitled to an extension of time for any delay arising directly or indirectly from the arbitration procedures.
 - 2.2.3.3 <u>Cooperation with Owner's Investigation.</u> Contractor shall cooperate with Owner during any investigation hereunder. Such cooperation shall include, but not necessarily be limited to, timely providing the information and/or documentation requested by Owner, which may include certified payroll records on Form WH-347 as promulgated by the U.S Department of Labor, as may be revised from time to time and in unlocked and unprotected Excel

format; and copies of any and all Contract Documents between Contractor and any Subcontractors.

- 2.2.3.4 <u>Notification to Owner</u>. In the event Contractor or Subcontractor elect to appeal an initial determination made pursuant to Paragraph 2.2.3.1, the Contractor and/or Subcontractor, as applicable, shall deliver notice thereof to Owner.
- 2.3 <u>Licensing of Trades.</u> Contractor shall comply with all applicable provisions of State law related to license requirements for skilled tradesmen, contractors, suppliers, and laborers, as necessary to accomplish the Work. In the event Contractor, or one of its Subcontractors, loses its license during the term of performance of the Contract, Contractor shall promptly hire or contract with a licensed provider of the service at no additional cost to Owner.
- 2.4 <u>Royalties, Patents, and Copyrights.</u> Contractor shall pay all royalties and license fees, defend suits or claims for infringement of copyrights and patent rights, and shall hold Owner harmless from loss on account thereof. Provided, however, if Contractor is a Construction Manager-at-Risk, Contractor shall not be responsible for such defense or loss when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications, or other documents prepared by Owner or Design Professional; unless Contractor has reason to believe that the required design, process, or product is an infringement of a copyright or a patent then Contractor shall be responsible for such loss unless notice of such information is promptly furnished to Design Professional.
- 2.5 <u>State Sales and Use Taxes.</u> Owner qualifies for exemption from certain State and local sales and use taxes pursuant to the provisions of Tex. Tax Code, Chapter 151. Upon request from Contractor, Owner shall furnish evidence of tax-exempt status. Contractor may claim exemption from payment of certain applicable State taxes by complying with such procedures as prescribed by the State Comptroller of Public Accounts. Owner acknowledges not all items qualify for exemption. Owner is not obligated to reimburse Contractor for taxes paid on items that qualify for tax exemption.
- 2.6 <u>Antiquities.</u> Contractor shall take precaution to avoid disturbing primitive records and antiquities of archaeological, paleontological, or historical significance. No objects of this nature shall be disturbed without written permission of Owner and the Texas Historical Commission. When such objects are uncovered unexpectedly, the Contractor shall stop all Work in close proximity and notify the OCM and the Texas Historical Commission of their presence and shall not disturb them until written permission and permit to do so is granted. All primitive rights and antiquities, as defined in Chapter 191, Texas Natural Resource Code, discovered on the Owner's property shall remain property of State of Texas. If it is determined by Owner, in consultation with the Texas Historical Commission that exploration or excavation of primitive records or antiquities on the Project Site is necessary to avoid loss, Contractor shall cooperate in salvage work attendant to preservation. If the Work stoppage or salvage work causes an increase in the Contractor's cost of, or time required for, performance of the Work, Contractor may notify the Owner in accordance with Article 14.

2.7 <u>Franchise Tax Status.</u> Upon request, the Contractor agrees to execute and provide to the Owner a Certification of Franchise Tax Payment, on a form approved by the Owner.

ARTICLE 3. GENERAL RESPONSIBILITIES OF OWNER

- 3.1 <u>Preconstruction Conference.</u> Prior to, or concurrent with, the issuance of Notice to Proceed, a conference will be convened for attendance by Owner, Contractor, Design Professional and appropriate Subcontractors. The purpose of the conference is to establish a working understanding among the parties as to the Work, the operational conditions at the Project Site, and general administration of the Project. Topics include communications, schedules, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, maintaining required records and all other matters of importance to the administration of the Project and effective communications between the Project team members.
- 3.2 <u>Owner's Construction Manager (OCM).</u> Prior to the start of construction, Owner will identify its OCM, who has the express authority to act on behalf of the Owner to the extent and for the purposes described in the Contract, including responsibilities for general administration of the Contract.
 - 3.2.1 <u>Point of Contact.</u> Unless otherwise specifically defined elsewhere in the Contract Documents, OCM is the single point of contact between Owner and Contractor. Notice to OCM, unless otherwise noted, constitutes notice to Owner under the Contract.
 - 3.2.2 <u>Directives.</u> All directives on behalf of Owner will be conveyed to Contractor and Design Professional by OCM in writing.

3.3 <u>Owner Supplied Materials and Information.</u>

- 3.3.1 <u>Surveys.</u> Owner will furnish to Contractor those surveys Owner possesses describing the physical characteristics, legal description, limitations of the Site, Site utility locations, and other information used in the preparation of the Contract Documents.
- 3.3.2 <u>Drawings and Specifications.</u> Owner will furnish or cause to be furnished, free of charge, the number of complete sets, paper or electronic, of the Drawings, Specifications, and addenda as provided in the Contract.
- 3.3.3 <u>Other Information.</u> Owner will provide information, equipment, or services under Owner's control to Contractor with reasonable promptness.
- 3.4 <u>Availability of Lands.</u> Owner will furnish, as indicated in the Contract, all required rights to use the lands upon which the Work occurs. This includes rights-of-way and easements for access and such other lands that are designated for use by Contractor. Contractor shall comply with all Owner identified encumbrances or restrictions specifically related to use of lands so furnished. Owner

will obtain and pay for easements for permanent structures or permanent changes in existing facilities, unless otherwise required in the Contract Documents.

- 3.5 <u>Limitation on Owner's Duties.</u>
 - 3.5.1 <u>No Control.</u> Owner will not supervise, direct, control or have authority over, or be responsible for Contractor's means, methods, technologies, sequences, or procedures of construction or the safety precautions and programs incident thereto. Owner is not responsible for any failure of Contractor to comply with laws and regulations applicable to the Work. Owner is not responsible for the failure of Contractor to perform or furnish the Work in accordance with the Contract Documents. Except as provided herein, Owner is not responsible for the acts or omissions of Contractor, or any of its Subcontractors, suppliers, or of any other person or organization performing or furnishing any of the Work on behalf of Contractor.
 - 3.5.2 <u>No Contravention of Design Professional.</u> Owner will not take any action in contravention of a design decision made by Design Professional in preparation of the Contract Documents, when such actions are in conflict with statutes under which Design Professional is licensed for the protection of the public health and safety.

ARTICLE 4. GENERAL RESPONSIBILITIES OF DESIGN PROFESSIONAL

- 4.1 <u>Role of Design Professional.</u> Unless specified otherwise in the Contract between Owner and Contractor, in addition to design services Design Professional shall provide general administration services for Owner during the construction phase of the project. Written correspondence, RFIs, and Shop Drawings/submittals shall be directed to Design Professional for determination and action. Design Professional has the authority to act on behalf of Owner to the extent provided in the Contract Documents, unless otherwise modified by written instrument, which will be furnished to Contractor by OCM, upon request.
- 4.2 <u>Site Visits.</u> Design Professional will make visits to the Site at intervals as provided in the Design Professional's Contract with Owner, to observe the progress and the quality of the various aspects of Contractor's executed Work and report findings to OCM.
- 4.3 <u>Inspections.</u> Design Professional has the authority to interpret Contract Documents and inspect the Work for compliance and conformance with the Contract. Except as referenced in Paragraph 3.1.5.2, Owner retains the sole authority to accept or reject Work and issue direction for correction, removal, or replacement of Work.
- 4.4 <u>Clarifications and Interpretations.</u> It may be determined that clarifications or interpretations of the Contract Documents are necessary. Such clarifications or interpretations will be provided by Design Professional consistent with the intent of the Contract Documents. Design Professional will issue these clarifications with reasonable promptness to Contractor as Design Professional's supplemental instruction ("ASI") or similar instrument. If Contractor believes that such

clarification or interpretation justifies an adjustment in the Contract Sum or the Contract Time, Contractor shall so notify Owner in accordance with the provisions of Article 14.

- 4.5 <u>Limitations on Design Professional Authority.</u> Design Professional is not responsible for:
 - Contractor's means, methods, techniques, sequences, procedures, safety, or programs incident to the Work, nor will Design Professional supervise, direct, control, or have authority over the same;
 - The failure of Contractor to comply with laws and regulations applicable to the furnishing or performing the Work;
 - Contractor's failure to perform or furnish the Work in accordance with the Contract Documents; or
 - Acts or omissions of Contractor, or of any other person or organization performing or furnishing any of the Work.

ARTICLE 5. GENERAL RESPONSIBILITIES OF CONTRACTOR

- 5.1 <u>Contractor's General Responsibilities.</u> Contractor is solely responsible for implementing the Work in full compliance with all applicable laws and the Contract Documents and shall supervise and direct the Work using the best skill and attention to assure that each element of the Work conforms to the Contract requirements. Contractor is solely responsible for all construction means, methods, techniques, safety, sequences, coordination, procedures and protection of the installed work as part of the contract until Substantial Completion of the project. Contractor remains responsible for the care and protection of materials and Work in the areas where Punch list items are completed until Final Completion.
 - 5.1.1 <u>Site Visit.</u> Contractor shall visit the Site before commencing the Work and become familiar with local conditions such as the location, accessibility and general character of the Site and/or building. Contractor shall evaluate and plan for all construction related activities that will potentially impact the safety of students, staff, and visitors. A site-specific safety plan must be provided to the OCM prior to the commencement of any construction activities. The site-specific safety plan must include, at the minimum, project site controls and safety, building locations, delivery logistics, project offices, materials staging and parking.
- 5.2 <u>Project Administration.</u> Contractor shall provide Project administration for all Subcontractors, vendors, suppliers, and others involved in implementing the Work and shall coordinate administration efforts with those of Design Professional and OCM in accordance with these Uniform General Conditions and other provisions of the Contract, and as outlined in the pre-construction conference. Contractor's Project Administration includes periodic daily reporting on weather, work progress, labor, materials, equipment, obstruction to prosecution of the work, accidents and injuries in accordance with the Contract and transmitted no less frequently than on a weekly basis.

- 5.2.1 <u>Contractor's Management Personnel.</u> Contractor shall employ a competent person or persons who will be present at the Project Site during the progress of the Work to supervise or oversee the Work. Contractor's management personnel are subject to the approval of OCM, and shall be removed and replaced at the request of OCM. Contractor shall not change approved staff during the course of the Project without the written approval of OCM unless the staff member leaves the employment of Contractor in which case Contractor shall notify OCM and appoint an approved replacement as soon as reasonably possible. Contractor shall provide additional quality control, safety, and other staff as may be stated in the Contract Documents or as may be necessary or advisable for completion of the Work.
- 5.2.2 <u>Labor.</u> Contractor shall provide competent, suitably qualified personnel to survey, lay-out, and construct the Work as required by the Contract Documents and maintain good discipline and order at the Site at all times.
- 5.2.3 <u>Services, Materials, and Equipment.</u> Unless otherwise specified, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities, incidentals, and services necessary for the construction, performance, testing, start-up, inspection, and completion of the Work. The Contractor shall provide, without extra charge, all incidental items required as a part of the Work, even if not particularly specified or indicated in the Contract Documents.
- 5.2.4 <u>No Substitutions without Approval.</u> Contractor may make substitutions only with the consent of the Owner, after evaluation and recommendation by the Design Professional and in accordance with a Change Order.
- 5.3 <u>Owner Equipment or Material.</u> For Owner furnished equipment or material that will be in the care, custody, and control of Contractor, Contractor will be responsible for any damage or loss.
- 5.4 <u>Non-Compliant Work.</u> Should Design Professional and/or OCM identify Work as noncompliant with the Contract Documents, Design Professional and/or OCM shall communicate the finding to Contractor, and Contractor shall correct such Work at no additional cost to the Owner. The approval of Work by either Design Professional or OCM does not relieve Contractor from the obligation to comply with all requirements of the Contract Documents.
- 5.5 <u>Subcontractors.</u> Contractor shall not employ any Subcontractor, supplier, or other person or organization, whether initially or as a substitute, against whom Owner shall have reasonable objection. Owner will communicate such objections in writing within ten (10) days of receipt of Contractor's intent to use such Subcontractor, supplier, or other person or organization. Contractor is not required to employ any Subcontractor, supplier, or other person or organization to furnish any of the work to whom Contractor has reasonable objection. Contractor shall not substitute Subcontractors without the acceptance of Owner.

- 5.5.1 <u>Contract Documents.</u> All Subcontracts and supply contracts shall be consistent with and bind the Subcontractors and suppliers to the terms and conditions of the Contract Documents including provisions of the Contract between Contractor and Owner.
- 5.5.2 <u>Scheduling.</u> Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, suppliers, and other persons and organizations performing or furnishing any of the Work under a direct or indirect contract or subcontract with Contractor. Contractor shall require all Subcontractors, suppliers, and such other persons and organizations performing or furnishing any of the Work to communicate with Owner only through Contractor. Contractor shall furnish to Owner a copy, at Owner's request, of each first-tier subcontract promptly after its execution. Contractor agrees that Owner has no obligation to review or approve the content of such contracts and that providing Owner such copies in no way relieves Contractor of any of the Contract which require the Subcontractor to be bound to Contractor in the same manner in which Contractor is bound to Owner.
- 5.6 <u>Continuing the Work.</u> Contractor shall carry on the Work and adhere to the progress schedule during all disputes, disagreements, or alternative resolution processes with Owner. Contractor shall not delay or postpone any Work because of pending unresolved disputes, disagreements, or alternative resolution processes, except as Owner and Contractor may agree in writing.
- 5.7 <u>Cleaning.</u> Contractor shall at all times, keep the Site and the Work clean and free from accumulation of waste materials or rubbish caused by the construction activities under the Contract. Contractor shall ensure that the entire Project is thoroughly cleaned prior to requesting Substantial Completion inspection and, again, upon completion of the Project prior to the final inspection.
- 5.8 <u>Acts and Omissions of Contractor, its Subcontractors, and Employees.</u> Contractor shall be responsible for acts and omissions of its employees and its Subcontractors and their agents and employees. Owner may, in writing, require Contractor to remove from the Project any of Contractor's or its Subcontractor's employees or agents whom OCM finds to be careless, incompetent, unsafe, uncooperative, disruptive, or otherwise objectionable.
- 5.9 <u>Ancillary Areas.</u> Contractor shall operate and maintain operations and associated storage areas at the site of the Work in accordance with the following:
 - All Contractor operations, including storage of materials and employee parking upon the Site of Work, shall be confined to areas designated by OCM.
 - Contractor may erect, at its own expense, temporary buildings that will remain its property. Contractor will remove such buildings and associated utility service lines upon completion of the Work, unless Contractor requests and Owner provides written consent that it may abandon such buildings and utilities in place.
 - Contractor will use only established roadways or construct and use such temporary roadways as may be authorized by OCM. Contractor will not allow load limits of

vehicles to exceed the limits prescribed by appropriate regulations or law. Contractor will provide protection to road surfaces, curbs, sidewalks, trees, shrubbery, sprinkler systems, drainage structures, and other like existing improvements to prevent damage and will repair any damage thereto at the expense of Contractor.

- Owner may restrict Contractor's entry to the Site to specifically assigned entrances and routes.
- 5.10 <u>Off-Site Storage.</u> With prior approval by Owner and in the event, Contractor elects to store materials at an off-site location, Contractor must abide by the following conditions, unless otherwise agreed to in writing by Owner:
 - Store materials in a commercial warehouse meeting the criteria stated below.
 - Provide insurance coverage adequate not only to cover materials while in storage, but also in transit from the off-site storage areas to the Project Site. Copies of duly authenticated certificates of insurance must be filed with Owner's representative.
 - Inspection by Owner's representative is allowed at any time. OCM must be satisfied with the security, control, maintenance, and preservation measures.
 - Materials for this Project must be physically separated and marked for the Project in a sectioned-off area. Only materials which have been approved through the submittal process are to be considered for payment.
 - Owner reserves the right to reject materials at any time prior to final acceptance of the complete Contract if they do not meet Contract requirements regardless of any previous progress payment made.
 - With each monthly payment estimate, Contractor must submit a report to OCM and Design Professional listing the quantities of materials already paid for and still stored in the off-site location.
 - Contractor must make warehouse records, receipts, and invoices available to Owner's representatives, upon request, to verify the quantities and their disposition.
 - In the event of Contract termination or default by Contractor, the items in storage off-site, upon which payment has been made, will be promptly turned over to Owner or Owner's agents in place or at a location near the jobsite as directed by OCM. The full provisions of performance and payment bonds on this Project cover the materials off-site in every respect as though they were stored on the Project Site.
- 5.11 <u>Separate Contracts.</u> Owner reserves the right to award other contracts in connection with the Project or other portions of the Project under the same or substantially similar contract conditions, including those portions related to insurance and waiver of subrogation. Owner reserves the right to perform operations related to the Project with Owner's own forces.
 - 5.11.1 <u>Continuation of Contract.</u> Under a system of separate contracts, the conditions described herein continue to apply except as may be amended by Amendment or Change Order.

- 5.11.2 <u>Cooperation.</u> Contractor shall cooperate with other contractors or forces employed on the Project by Owner, including providing access to Site, integration of activities within Contractor's Work Progress Schedule and Project information as requested.
- 5.11.3 <u>Reimbursement.</u> Owner shall be reimbursed by Contractor for costs incurred by Owner which are payable to a separate contractor because of delays, improperly timed activities, or defective construction by Contractor. Owner will equitably adjust the Contract by Change Order for costs incurred by Contractor because of delays, improperly timed activities, damage to the Work, or defective construction by a separate contractor.

ARTICLE 6. <u>HISTORICALLY UNDERUTILIZED BUSINESS (HUB) SUBCONTRACTING PLAN</u>

- 6.1 <u>General Description.</u> The purpose of the Historically Underutilized Business (HUB) program is to promote equal business opportunities for economically disadvantaged persons (as defined by Tex. Gov't Code, Chapter 2161) to contract with the State of Texas in accordance with the goals specified in the State of Texas Disparity Study. The HUB program annual procurement utilization goals are defined in 34 T.A.C. § 20.284.
 - 6.1.1 <u>Good Faith Effort.</u>
 - 6.1.1.1 State agencies are required by statute to make a good faith effort to assist HUBs in participating in contract awards issued by the State. 34 T.A.C., Chapter 20, Subchapter D, Division 1 outlines the State's policy to encourage the utilization of HUBs in State contracting opportunities through race, ethnic, and gender-neutral means.
 - 6.1.1.2 A Contractor who contracts with the State in an amount of \$100,000 or greater is required to make a good faith effort to award subcontracts to HUBs in accordance with 34 T.A.C. § 20.285 by submitting a HUB subcontracting plan within twenty-four (24) hours after the bid or response is due and complying with the HUB subcontracting plan after it is accepted by Owner and during the term of the Contract.
- 6.2 <u>Compliance with Approved HUB Subcontracting Plan.</u> Contractor, having been awarded this Contract in part by complying with the HUB program statute and rules, hereby covenants to continue to comply with the HUB program as follows:
 - Prior to adding or substituting a Subcontractor, promptly notify Owner in the event a change is required for any reason to the accepted HUB subcontracting plan.
 - Conduct the good-faith effort activities required, and provide Owner with necessary documentation to justify approval of a change to the approved HUB subcontracting plan.
 - Cooperate in the execution of a Change Order or such other approval of the change in the HUB subcontracting plans as Contractor and Owner may agree to.

- Maintain and make available to Owner upon request business records documenting compliance with the accepted HUB subcontracting plan.
- Upon receipt of payment for performance of Work, submit to Owner a compliance report, in the format required by Owner that demonstrates Contractor's performance of the HUB subcontracting plan.
- Submit monthly Progress Assessment Reports (PAR) to Owner, verifying compliance with the HUB subcontracting plan, including the use/expenditures made made/to Subcontractors. (The PAR is available at the following link: http://www.window.state.tx.us/procurement/prog/hub/hub-forms/.)
- Promptly and accurately explain and provide supplemental information to Owner to assist in Owner's investigation of Contractor's good-faith effort to fulfill the HUB subcontracting plan and the requirements under 34 T.A.C. § 20.285.
- 6.3 <u>Failure to Demonstrate Good-Faith Effort.</u> Upon a determination by Owner that Contractor has failed to demonstrate a good-faith effort to fulfill the HUB subcontracting plan or any Contract covenant detailed above, Owner may, in addition to all other remedies available to it, report the failure to perform to the Comptroller of Public Accounts, Texas Procurement and Support Services Division, Historically Underutilized Business Program and may bar Contractor from future contracting opportunities with Owner.

ARTICLE 7. <u>BONDS</u>

- 7.1 <u>Construction Bonds.</u> Contractor is required to tender to Owner, prior to commencing the Work, performance and payment bonds, as required by Tex. Gov't Code, Chapter 2253.
- 7.2 <u>Bond Requirements.</u> Each bond shall be executed by a corporate surety or sureties authorized to do business in the State of Texas, acceptable to Owner, and in compliance with the relevant provisions of the Texas Insurance Code. If any bond is for more than ten percent (10%) of the surety's capital and surplus, Owner may require certification that the company has reinsured the excess portion with one or more reinsurers authorized to do business in the State. A reinsurer may not reinsure for more than ten percent (10%) of its capital and surplus. If a surety upon a bond loses its authority to do business in the State, Contractor shall, within thirty (30) days after such loss, furnish a replacement bond at no added cost to Owner.
 - 7.2.1 <u>Performance Bonds.</u> A Performance bond is required if the Contract Sum is in excess of \$100,000. The performance bond is solely for the protection of Owner. The performance bond is to be for the Contract Sum to guarantee the faithful performance of the Work in accordance with the Contract Documents. For Design-Build Projects the performance bond is to be for the full amount of both the construction and design services in accordance with the Contract Documents. The form of the bond shall be approved by Owner. The performance bond shall be effective through Contractor's warranty period.

- 7.2.2 <u>Payment Bonds.</u> A Payment bond is required if the Contract Sum is in excess of \$25,000. The payment bond is to be for the Contract Sum and is payable to Owner solely for the protection and use of payment bond beneficiaries. For Design-Build Projects the payment bond is to be for the full amount of both the construction and design services in accordance with the Contract Documents. The form of the bond shall be approved by Owner.
- 7.2.3 <u>When Bonds Are Due.</u> Payment and performance bonds are due before Contractor commences any Work.
- 7.2.4 <u>Power of Attorney</u>. Each bond shall be accompanied by a valid power of attorney (issued by the surety company and attached, signed and sealed with the corporate embossed seal, to the bond) authorizing the attorney-in-fact who signs the bond to commit the company to the terms of the bond, and stating any limit in the amount for which the attorney can issue a single bond.
- 7.3 <u>Bond Indemnification.</u> The process of requiring and accepting bonds and making claims thereunder shall be conducted in compliance with Tex. Gov't Code, Chapter 2253. IF FOR ANY REASON A STATUTORY PAYMENT OR PERFORMANCE BOND IS NOT HONORED BY THE SURETY, CONTRACTOR SHALL FULLY INDEMNIFY AND HOLD HARMLESS OWNER, AND ITS COMPONENT INSTITUTIONS, REGENTS, ELECTED AND APPOINTED OFFICIALS, DIRECTORS, OFFICERS, EMPLOYEES, AGENTS, REPRESENTATIVES, AND VOLUNTEERS, FROM AND AGAINST ANY COSTS, LOSSES, OBLIGATIONS, OR LIABILITIES IT INCURS AS A RESULT.
 - 7.3.1 <u>Furnishing Bond Information</u>. Owner shall furnish certified copies of the payment bond and the related Contract to any qualified person seeking copies who complies with Tex. Gov't Code § 2253.026.
 - 7.3.2 <u>Claims on Payment Bonds.</u> Claims on payment bonds must be sent directly to Contractor and his surety in accordance with Tex. Gov't Code § 2253.041. All payment bond claimants are cautioned that no lien exists on the funds unpaid to Contractor on such Contract, and that reliance on notices sent to Owner may result in loss of their rights against Contractor and/or his surety. Owner is not responsible in any manner to a claimant for collection of unpaid bills, and accepts no such responsibility because of any representation by any agent or employee.
- 7.4 <u>Payment of Claims when Payment Bond is Not Required.</u> The rights of Subcontractors regarding payment are governed by Tex. Prop. Code § 53.231 53.239 when the value of the Contract between Owner and Contractor is less than \$25,000.00. These provisions set out the requirements for filing a valid lien on funds unpaid to Contractor as of the time of filing the claim, and actions necessary to release the lien and satisfaction of such claim.
- 7.5 <u>Sureties.</u> A surety shall be listed on the US Department of the Treasury's Listing of Approved Sureties maintained by the Bureau of Financial Management Service (FMS), <u>https://fiscal.treasury.gov/surety-bonds/list-certified-companies.html</u>, stating companies holding

Certificates of Authority as acceptable sureties on federal bonds and acceptable reinsuring companies (FMS Circular 570). The Owner will consider acceptable any corporate surety which is qualified under this paragraph and which has a rating of at least B in Best's Insurance Reports – Property – Casualty.

7.6 <u>Bond Costs.</u> The costs of bonds are a pass-through amount to the Owner. No markup amounts are to be included and documentation of bond costs are required in requests for payment. Any costs associated with subcontractor bonds or SubGuard-related items are not paid by the Owner in General Conditions or Cost of Work.

ARTICLE 8. INDEMNITY AND INSURANCE

- 8.1 Indemnification of Owner. Contractor covenants and agrees to FULLY INDEMNIFY and HOLD HARMLESS Owner, and its component institutions, Regents, elected and appointed officials, directors, officers, employees, agents, representatives, and volunteers, individually or collectively, from and against any and all costs, claims, liens, damages, losses, expenses, fees, fines, penalties, proceedings, actions, demands, causes of action, liability, and suits of any kind and nature, including but not limited to, personal or bodily injury, death, or property damage, made upon Owner directly or indirectly arising out of, resulting from, or related to Contractor's activities under the Contract, including any acts or omissions of Contractor, or any director, officer, employee, agent, representative, consultant, or Subcontractor of Contractor, and their respective directors, officers, employees, agents, and representatives while in the exercise of performance of the rights or duties under the Contract. The indemnity provided for in this paragraph does not apply to any liability resulting from the negligence of Owner or separate contractors in instances where such negligence causes personal injury, death, or property damage. IN THE EVENT CONTRACTOR AND OWNER ARE FOUND JOINTLY LIABLE BY A COURT OF COMPETENT JURISDICTION, LIABILITY WILL BE APPORTIONED COMPARATIVELY IN ACCORDANCE WITH THE LAWS OF THE STATE OF TEXAS, WITHOUT WAIVING ANY GOVERNMENTAL IMMUNITY AVAILABLE TO THE STATE UNDER TEXAS LAW AND WITHOUT WAIVING ANY DEFENSES OF THE PARTIES UNDER TEXAS LAW.
 - 8.1.1 <u>No Third-Party Beneficiaries.</u> The provisions of this indemnification are solely for the benefit of the parties hereto and not intended to create or grant any rights, contractual or otherwise, to any other person or entity.
 - 8.1.2 <u>Notice.</u> Contractor shall promptly advise Owner in writing of any claim or demand against Owner or against Contractor known to Contractor related to or arising out of Contractor's activities under this Contract.
 - 8.1.3 The indemnity provisions shall survive the termination of the Contract regardless of the reason for termination.

- 8.2 <u>Insurance Requirements.</u> Design Professional shall carry insurance in the types and amounts indicated in the Contract for the duration of the Contract. Unless otherwise provide for in the Contract, Contractor shall carry insurance in the types and amounts indicated in these Uniform General Conditions for the duration of the Contract. The insurance shall be evidenced by delivery to Owner of certificates of insurance executed by the insurer or its authorized agent stating coverage, limits, expiration dates, and compliance with all applicable required provisions. Upon request, Owner and its agents shall be entitled to receive, without expense, copies of the policies and all endorsements. Contractor shall update all expired policies prior to submission for monthly payment. Failure to update policies shall be reason for withholding of payment until renewal is provided to Owner.
 - 8.2.1 <u>Period of Coverage.</u> Contractor, consistent with its status as an independent contractor, shall provide and maintain all insurance coverages with the minimum amounts described below until the end of the warranty period unless expressly agreed otherwise. Failure to maintain insurance coverage, as required, is grounds for suspension of Work for cause pursuant to Article 17.
 - 8.2.2 <u>Certificates.</u> Contractor shall deliver to Owner true and complete copies of certificates and corresponding policy endorsements prior to the issuance of any Notice to Proceed.
 - 8.2.3 <u>Failure to Provide Certificates.</u> Failure of Owner to demand such certificates or other evidence of Contractor's full compliance with these insurance requirements or failure of Owner to identify a deficiency in compliance from the evidence provided shall not be construed as a waiver of Contractor's obligation to maintain such insurance.
 - 8.2.4 <u>Contractor's Liability.</u> The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner in the Contract Documents.
 - 8.2.5 <u>Insurance Limits.</u> The insurance coverage and limits established herein shall not be interpreted as any representation or warranty that the insurance coverage and limits necessarily will be adequate to protect Contractor.
 - 8.2.6 <u>Insurers.</u> Coverage shall be written on an occurrence basis by companies authorized and admitted to do business in the State of Texas and rated A-, VII or better by A.M. Best Company or similar rating company or otherwise acceptable to Owner.

8.3 Insurance Coverage Required.

- 8.3.1 <u>Workers' Compensation Insurance.</u> Coverage with limits as required by the Texas Workers' Compensation Act, with the policy endorsed to provide a waiver of subrogation as to Owner, and Employer's Liability Insurance with limits of not less than:
 - \$1,000,000 each accident;
 - \$1,000,000 disease each employee; and
 - \$1,000,000 disease policy limit.

- Workers' compensation insurance coverage must meet the statutory requirements of Tex. Lab. Code § 401.011(44), and requirements specific to construction projects for public entities as required by Tex. Lab. Code § 406.096.
- Policies must include (a) Other States Endorsement to include TEXAS if business is domiciled outside the State of Texas, and (b) a waiver of all rights of subrogation in favor of Owner.
- 8.3.2 <u>Commercial General Liability Insurance.</u> Coverage including premises, operations, independent contractor's liability, products, and completed operations and contractual liability, covering, but not limited to, the liability assumed under the indemnification provisions of this Contract, fully insuring Contractor's (or Subcontractor's) liability for bodily injury (including death) and property damage with a minimum limit of:
 - \$1,000,000 per occurrence;
 - \$2,000,000 general aggregate;
 - \$5,000 Medical Expense each person;
 - \$1,000,000 Personal Injury and Advertising Liability;
 - \$2,000,000 products and completed operations aggregate;
 - \$50,000 Damage to Premises Rented by You; and
 - Coverage shall be on an "occurrence" basis.
 - The policy shall include coverage extended to apply to completed operations and explosion, collapse, and underground hazards. The policy shall include endorsement CG2503 Amendment of Aggregate Limits of Insurance (per Project) or its equivalent.
 - If the Work involves any activities within fifty (50) feet of any railroad, railroad protective insurance as may be required by the affected railroad, written for not less than the limits required by such railroad.
- 8.3.3 <u>Asbestos Abatement Liability Insurance.</u> Coverage including coverage for liability arising from the encapsulation, removal, handling, storage, transportation, and disposal of asbestos containing materials. This requirement applies if the Work or the Project includes asbestos containing materials.
 - The combined single limit for bodily injury and property damage will be a minimum of \$1,000,000 per occurrence.
 - Specific requirement for claims-made form: Required period of coverage will be determined by the following formula: continuous coverage for life of the Contract, plus one (1) year (to provide coverage for the warranty period), and an extended discovery period for a minimum of five (5) years which shall begin at the end of the warranty period.
 - Employer's liability limits for asbestos abatement will be:
 - \$1,000,000 each accident;
 - \$1,000,000 disease each employee; and
 - \$1,000,000 disease policy limit.

- 8.3.4 <u>Comprehensive Automobile Liability Insurance.</u> Coverage covering owned, hired, and non-owned vehicles, with a minimum combined single limit for bodily injury (including death) and property damage of \$1,000,000 per occurrence. No aggregate shall be permitted for this type of coverage.
 - Such insurance is to include coverage for loading and unloading hazards.
 - Contractor, or any subcontractor of Contractor, responsible for transporting asbestos or other hazardous materials defined as asbestos shall provide pollution coverage for any vehicle hauling asbestos containing cargo. The policy must include an MCS 90 endorsement with a \$5,000,000 limit and the CA 9948 Pollution Endorsement, or its equivalent.
- 8.3.5 <u>All-Risk Builder's Risk Insurance.</u> Coverage shall be all-risk (or all-risk installation floater for instances in which the project involves solely the installation of material and/or equipment), including, but not limited to, fire, extended coverage, vandalism and malicious mischief, theft and, if applicable, flood, earth movement and named storm. Builder's risk and installation floater limits shall be equal to 100 percent of the Contract Sum plus, if any, existing property and Owner-furnished equipment specified by Owner. The policy shall be written jointly in the names of Owner and Contractor. Subcontractors shall be named as additional insureds. The policy shall have endorsements as follows:
 - This insurance shall be specific as to coverage and not contributing insurance with any permanent insurance maintained on the property.
 - This insurance shall not contain an occupancy clause suspending or reducing coverage should Owner partially occupy the Site and before the parties have determined Substantial Completion.
 - Loss, if any, shall be adjusted with and made payable to Owner as trustee for the insureds as their interests may appear. Owner shall be named as loss payee.
 - For renovation projects or projects that involve portions of Work contained within an existing structure, refer to Supplementary or Special Conditions for possible additional builder's risk insurance requirements.
 - For Owner furnished equipment or materials that will be in care, custody or control of Contractor, Contractor will be responsible for damage and loss.
 - For those properties located within a Tier 1 or 2 windstorm area, named storm coverage must be provided with limits specified by Owner.
 - For those properties located in flood prone areas, flood insurance coverage must be provided with limits specified by Owner.
 - Builder's risk insurance policy shall remain in effect until Substantial Completion.
 - If this Contract is for asbestos abatement only, the foregoing All-Risk Builder's Risk or All-Risk Installation Floater is not required.
- 8.3.6 <u>"Umbrella" Liability Insurance.</u> Coverage during the Contract term, insuring Contractor (or Subcontractor) that provides coverage at least as broad as and applies in excess and follows form of the primary liability coverage required above. The policy shall provide

"drop down" coverage where underlying primary insurance coverage limits are insufficient or exhausted.

• "Umbrella" Liability Insurance coverage shall be for the following Contract amounts in the corresponding coverage amounts:

Contract Amount	Occurrence	Annual Aggregate
< \$1,000,000	No Umbrella	
\$1,000,000 up to < \$3,000,000	\$1,000,000	\$2,000,000
\$3,000,000 up to < \$5,000,000	\$5,000,000	\$5,000,000
\$5,000,000 or greater	\$10,000,000	\$10,000,000

- 8.4 <u>Policy Requirements.</u> Policies must include the following clauses, as applicable:
 - This insurance shall not be suspended, voided, canceled, materially changed, or nonrenewed except after thirty (30) days, or ten (10) days for non-payment of premium, written notice has been given to Owner.
 - It is agreed that Contractor's insurance shall be deemed primary with respect to any insurance or self-insurance carried by Owner for liability arising out of operations under the Contract with Owner.
 - Owner, its officials, directors, employees, representatives, and volunteers are added as additional insureds with respect to operations and activities of, or on behalf of the named insured performed under the Contract with Owner. The additional insured status must cover completed operations as well. This is not applicable to workers' compensation policies.
 - A waiver of subrogation in favor of Owner shall be provided in all policies.
 - If Owner is damaged by the failure of Contractor (or Subcontractor) to maintain insurance as required herein and/or as further described in Owner's Special Conditions, then Contractor shall bear all reasonable costs properly attributable to that failure.
- 8.5 WITHOUT LIMITING ANY OF THE OTHER Subcontractor Insurance Coverage. OBLIGATIONS OR LIABILITIES OF CONTRACTOR, CONTRACTOR SHALL **REQUIRE EACH SUBCONTRACTOR PERFORMING WORK UNDER THE** CONTRACT TO MAINTAIN DURING THE TERM OF THE CONTRACT, THE SAME STIPULATED MINIMUM INSURANCE INCLUDING THE REQUIRED PROVISIONS AND ADDITIONAL POLICY CONDITIONS AS SHOWN ABOVE, AS AN ALTERNATIVE, CONTRACTOR MAY INCLUDE ITS SUBCONTRACTORS AS ADDITIONAL INSUREDS ON ITS OWN COVERAGE AS PRESCRIBED UNDER THESE REQUIREMENTS. CONTRACTOR'S CERTIFICATE OF INSURANCE SHALL NOTE IN SUCH EVENT THAT SUBCONTRACTORS ARE INCLUDED AS ADDITIONAL INSUREDS AND THAT CONTRACTOR AGREES TO PROVIDE WORKERS' COMPENSATION FOR SUBCONTRACTORS AND THEIR EMPLOYEES. CONTRACTOR SHALL OBTAIN AND MONITOR THE CERTIFICATES OF

INSURANNCE FROM EACH SUBCONTRACTOR IN ORDER TO ASSURE COMPLIANCE WITH THE INSURANCE REQUIREMENTS. CONTRACTOR MUST RETAIN THE CERTIFICATES OF INSURANCE FOR THE DURATION OF THE CONTRACT PLUS SEVEN (7) YEARS AND SHALL HAVE THE RESPONSIBILITY OF ENFORCING THESE INSURANCE REQUIREMENTS ITS SUBCONTRACTORS. OWNER SHALL BE ENTITLED, UPON REQUEST AND WITHOUT EXPENSE, TO RECEIVE COPIES OF THESE CERTIFICATES. CONTRUCTION DOCUMENTS, COORDINATION DOCUMENTS, AND RECORD DOCUMENTS.

ARTICLE 9.

CONSTRUCTION DOCUMENTS, COORDINATION DOCUMENTS, AND RECORD DOCUMENTS

9.1 Drawings and Specifications.

- 9.1.1 <u>Copies Furnished.</u> Design Professional will furnish, free of charge, the number of complete sets of Drawings, Specifications, and addenda as provided in the Contract. Contractor will be furnished, free of charge, the number of complete sets of Drawings, Specifications, and addenda as provided in the Contract. Additional complete sets of Drawings and Specifications, if requested, will be furnished at reproduction cost to the one requesting such additional sets. Electronic copies of such documents will be provided to Contractor without charge.
- 9.1.2 <u>Ownership of Drawings and Specifications.</u> All Drawings, Specifications and copies thereof furnished by Design Professional shall be property of the Owner. These documents are not to be used by the Design Professional on any other project. Owner may use the Contract record set and electronic versions as needed for warranty operations or future renovations or additions without written approval of the Design Professional. All additional or confirmatory land survey field notes, sketches and related data, and additional or confirmatory soils engineering or investigations, samples, calculations, test results, and reports, for which Owner has paid for such direct services, shall be the sole property of Owner.
- 9.2 <u>Interrelation of Documents.</u> The Contract Documents as referenced in the Contract between Owner and Contractor are complimentary, and what is required by one shall be as binding as if required by all.
- 9.3 <u>Resolution of Conflicts in Documents.</u> Where conflicts may exist within the Contract Documents, the documents shall govern in the following order: (a) Change Orders or other written, signed amendments or addenda; (b) the Contract; (c) Uniform General Conditions; (d) Drawings; (e) Specifications (but Specifications shall control over Drawings as to quality of materials); and (f) other Contract Documents. Among other categories of documents having the same order of precedence, the term or provision that includes the latest date shall control. Contractor shall notify Design Professional and Owner for resolution of the issue prior to executing the Work in question.

- 9.4 <u>Contractor's Duty to Review Contract Documents.</u> In order to facilitate Contractor's responsibilities for completion of the Work in accordance with and as reasonably inferable from the Contract Documents, Contractor shall, prior to commencing the Work, examine and compare the Contract Documents, information furnished by Owner, relevant field measurements made by Contractor, and any visible or reasonably anticipated conditions at the Site affecting the Work. This duty extends throughout the design phase and construction phase prior to commencing each particular work activity and/or system installation. Updated Coordination Documents shall be provided to the Owner and Design Professional monthly.
- 9.5 <u>Discrepancies and Omissions in Drawings and Specifications.</u> Contractor shall immediately report to OCM and to Design Professional the discovery of any discrepancy, error, omission, or inconsistency in the Contract Documents prior to execution of the Work. When performing as a Construction Manager-at-Risk, Contractor has a shared responsibility with Design Professional for discovery and resolution of discrepancies, errors, omissions, and inconsistencies in the Contract Documents. In such case, Contractor's responsibility pertains to review, coordination, and recommendation of resolution strategies within budget constraints.
 - 9.5.1 <u>Design-Build Firm.</u> It is recognized that Contractor is not acting in the capacity of a licensed design professional, unless it is performing as a Design-Build firm. When performing as a Design-Build firm, Contractor has sole responsibility for discrepancies, errors, and omissions in the Drawings and Specifications.
 - 9.5.2 <u>Construction Manager-at-Risk Examination and Reporting.</u> When performing as a Construction Manager-at-Risk, Contractor has no liability for discrepancies, errors, omissions, or inconsistencies unless Contractor fails to immediately report in writing a discovered or apparent discrepancy, error, omission, or inconsistency to OCM and Design Professional. Should Contractor fail to perform the examination and reporting obligations of these provisions, Contractor is responsible for avoidable costs and direct and/or consequential damages.
 - 9.5.3 <u>Other Limitations.</u> Unless Contractor is performing as a Design-Build Firm or a Construction Manager-at-Risk, Contractor's examination of Contract Documents is to facilitate construction and does not create an affirmative responsibility to detect discrepancies, errors, omissions, or inconsistencies or to ascertain compliance with applicable laws, building codes, or regulations.
- 9.6 <u>No Warranty or Representation by Owner.</u> Owner makes no representations, express or implied, about the adequacy or accuracy of the Drawings, Specifications, or other Construction Documents provided or their suitability for their intended use. Owner expressly disclaims any implied warranty that the Construction Documents are adequate, accurate, or suitable for their intended use.
- 9.7 <u>Requirements for Record Documents.</u>
 - 9.7.1 Contractor shall:

- 9.7.1.1 Maintain at the Site one copy of all Drawings, Specifications, addenda, approved submittals, Contract modifications, Change Orders, and all Project correspondence and one record copy of approved Shop Drawings, Samples, and similar required submittals.
- 9.7.1.2 Keep current and maintain Drawings and Specifications in good order with postings and markings to record actual conditions of Work, and show and reference all changes made during construction. Provide Owner and Design Professional access to these documents.
- 9.7.1.3 Keep current and maintain the record set of Drawings and Specifications which reflect the actual field conditions and representations of the Work performed, whether it be directed by addendum, Change Order, or otherwise. Make available all records prescribed herein for reference and examination by Owner and Design Professional, and their representatives and agents.
- 9.7.1.4 Be responsible for marking the Record Documents for all Contractor initiated documents and changes to the Contract Documents due to coordination and actual field conditions, including RFIs. During construction, update the Record Documents, including all related RFI's, ASI's CCD's, and CO's, at least monthly prior to submission of periodic partial pay estimates. Failure to maintain current Record Documents constitutes cause for denial of a progress payment otherwise due.
- 9.7.1.5 Within thirty (30) days of Substantial Completion, Contractor shall furnish the Design Professional a copy of its marked-up Record Documents and a preliminary copy of each instructional manual, maintenance and operating manual, parts catalog, wiring diagrams, spare parts, specified written warranties and like publications, or parts for all installed equipment, systems, and like items, and as described in the Contract Documents. A complete set must be provided to the Design Professional within seven (7) days of Final Completion.

9.7.2 <u>Design Professional shall:</u>

- 9.7.2.1 In coordination with Contractor, shall update Record Documents to accurately depict progress of the Work and "as-built" condition of the Project.
- 9.7.2.2 Be responsible for updating the Record Documents for any addenda, Change Orders, Design Professional supplemental instructions, and any other alterations to the Contract Documents generated by Design Professional or Owner. Design Professional shall provide Owner with an electronic copy of the Auto-CADD files, BIM files, and Record Documents in both native format and a reproducible format within thirty (30) days following Final Completion.

9.7.2.3 Upon final completion and as a condition of final payment, once Record Documents are determined acceptable by OCM and with input from the Contractor, provide one (1) reproducible copy and one (1) electronic media copy of all Record Documents incorporating all of the above requirements, unless required otherwise.

ARTICLE 10. CONSTRUCTION SAFETY

- 10.1 <u>General.</u> It is the duty and responsibility of Contractor and all of its Subcontractors to be familiar with, enforce, and comply with all requirements of Public Law No. 91-596, 29 U.S.C. § 651 et. seq., the Occupational Safety and Health Act of 1970, (OSHA) and all amendments thereto. Contractor shall prepare a site-specific safety plan specific to the Project and submit it to OCM and Design Professional prior to commencing Work. In addition, Contractor and all of its Subcontractors shall comply with all applicable laws and regulations of any public body having jurisdiction for safety of persons or property to protect them from damage, injury, or loss and erect and maintain all necessary safeguards for such safety and protection.
 - 10.1.1 <u>Site Visits.</u> The OCM/ODR may perform random visits to Project Sites to address adherence to the site-specific safety plans and any Contractor safety requirements. Any violations that are discovered will be reported to Contractor for prompt remediation and correction. Poor performance in regards to safety, as determined by the OCM/ODR, is grounds for contract termination and/or immediate removal. The OCM/ODR may also require meetings with contractors regarding safety on the Project. The OCM/ODR may request to review safety policies of Contractor, Contractor's safety inspection forms, and the most current site-specific safety plan, as required.
- 10.2 <u>Notices.</u> Contractor shall provide notices as follows:
 - 10.2.1 <u>Utilities and Adjacent Properties.</u> Notify owners of adjacent property, including those that own or operate utilities, utility services, and/or underground facilities, when prosecution of the Work may affect them or their facilities, and cooperate with them in the protection, removal, relocation and replacement, and access to their facilities and/or utilities.
 - 10.2.2 <u>Safety Data Sheets.</u> Coordinate the exchange of safety data sheets (SDSs) or other hazard communication information required to be made available to or exchanged between or among employers at the site in connection with laws and regulations. Maintain a complete file of SDSs for all materials in use on site throughout the construction phase and make such file available to Owner and its agents as requested.
- 10.3 <u>Emergencies.</u> In any emergency affecting the safety of persons or property, Contractor shall act to minimize, mitigate, and prevent threatened damage, injury, or loss. Contractor shall:
 - 10.3.1 <u>On Call Response.</u> Have authorized agents of Contractor respond immediately upon call at any time of day or night when circumstances warrant the presence of Contractor to

protect the Work or adjacent property from damage or to take such action pertaining to the Work as may be necessary to provide for the safety of the public.

- 10.3.2 Notice.
 - 10.3.2.1 <u>To OCM and Design Professional:</u> Give OCM and Design Professional prompt notice of all such events.
 - 10.3.2.2 <u>Changes or Variations to Work:</u> If Contractor believes that any changes in the Work or variations from Contract Documents have been caused by its emergency response, promptly notify Owner within twenty-four (24) hours of the emergency response event.
- 10.3.3 <u>Owner Remedy.</u> Should Contractor fail to respond, Owner is authorized to direct other forces to take action as necessary and Owner may deduct any cost of remedial action from funds otherwise due Contractor.
- 10.4 <u>Injuries.</u> In the event of an incident or accident involving outside medical care for an individual on or near the Work, Contractor shall notify OCM and other parties as may be directed promptly, but no later than twenty-four (24) hours after Contractor learns that an event required medical care. Contractor shall:
 - 10.4.1 <u>Documentation</u>. Record the location of the event and the circumstances surrounding it, by using photography or other means, and gather witness statements and other documentation which describes the event.
 - 10.4.2 <u>Incident Report.</u> Supply OCM and Design Professional with an incident report no later than thirty-six (36) hours after the occurrence of the event. In the event of a catastrophic incident (one (1) fatality or three (3) workers hospitalized), barricade and leave intact the scene of the incident until all investigations are complete. A full set of incident investigation documents, including facts, finding of cause, and remedial plans shall be provided within one (1) week after occurrence, unless otherwise directed by legal counsel. Contractor shall provide OCM with written notification within one (1) week of such catastrophic event if legal counsel delays submission of full report.
- 10.5 <u>Environmental Safety.</u> Upon encountering any previously unknown potentially hazardous material, or other materials potentially contaminated by hazardous material, Contractor shall immediately stop work activities impacted by the discovery, secure the affected area, and notify OCM immediately.
 - 10.5.1 <u>Subcontractors.</u> Contractor shall bind all Subcontractors to the same duty.
 - 10.5.2 <u>Owner.</u> Upon receiving such notice, OCM will promptly engage qualified experts to make such investigations and conduct such tests as may be reasonably necessary to determine the existence or extent of any environmental hazard. Upon completion of this investigation, OCM will issue a written report to Contractor identifying the material(s)

found and indicate any necessary steps to be taken to treat, handle, transport or dispose of the material.

- 10.5.2.1 Owner may hire third-party Contractors to perform any or all such steps.
- 10.5.2.2 Should compliance with OCM's instructions result in an increase in Contractor's cost of performance or delay the Work, upon Contractor's submission of substantiated costs or an updated Work Progress Schedule and substantiated critical path analysis, Owner will make an equitable adjustment to the Contract Sum and/or the time of completion, and issue a Change Order accordingly.
- 10.6 <u>Trenching Plan.</u> When the project requires excavation which either exceeds a depth of four (4) feet, or results in any worker's upper body being positioned below grade level, Contractor is required to submit a trenching plan to OCM prior to commencing trenching operations unless an engineered plan is part of the Contract Documents. The plan is required to be prepared and sealed by a professional engineer registered in the State of Texas and hired or employed by Contractor or Subcontractor to perform the work. Said engineer cannot be anyone who is otherwise either directly or indirectly engaged on this project.
 - 10.6.1 <u>OSHA Regulations</u>: All trench excavations shall be performed in full compliance with OSHA Regulations. The regulation identified as 29 CFR Subpart P Excavations, consisting of sections 1926.650 through 1926.652 with Appendices A through F, of the OSHA Health and Safety Regulations, as amended or modified, shall apply to Contractor's trench excavations. Contractor shall meet and comply with this regulation and all other applicable safety standards that have been adopted by government agencies that have jurisdiction over this Project. It is the Contractor's responsibility to comply with any additional requirements resulting from any pre-construction conference relating to coordination of geotechnical investigation subjects.
 - 10.6.2 <u>Texas State Law:</u> Texas State Law (Underground Facility Damage Prevention and Safety Act: Tex. Util. Code, Chapter 251) requires Contractors submit all required notifications to the authorities having jurisdiction two working days prior to commencement of all excavation site work. It is the Contractor's responsibility to inform Texas Excavation Safety System (1-800-DIG-TESS or 811) about all planned excavations and provide adequate notice. Contractor is required to coordinate identification of underground facilities with the Design Professional and ODR, and site mark approximate locations prior to planned excavation.
 - 10.6.3 <u>Contractor Responsibility</u>: It is the sole duty and responsibility of the Contractor to determine the specific applicability of the designed trench safety systems to each field condition and to make inspections of the trench safety systems. Contractor shall maintain a permanent record of inspections, readily available to the ODR at any time.

- 10.7 Crane Safety. Any and all construction associated activities with crane operations must be coordinated and reviewed with OCM/ODR prior to commencement of such activities. Prior to the operation of any crane on Site, a suitable location needs to be determined and consulted with the OCM/ODR. Such location must be included on the site-specific safety plan. Consideration should be made to the capacity and type of crane in safe relationship to the physical site location limitations, as well as any existing or future underground/overhead conditions and utilities. Contractor is required to coordinate identification of underground/overhead facilities with Design Professional and ODR and site mark approximate locations prior to initial planned setup and activities. Any critical lift plans must be reviewed by OCM/ODR prior to activity occurring. If possible, avoiding critical lifts is preferred. All crane operators must be certified by the National Commission for Certification of Crane Operators (NCCCO). All signal persons & riggers at a minimum need to be qualified in accordance with OSHA standard. Contractor should have certified riggers & signal persons working on campus and Owner reserves the right to request such certification depending on the scope of work being performed. Contractor shall develop a lift plan for any crane activities being performed. The lift plan must be submitted to OCM/ODR prior to any lifting or hoisting activities occurring, with any additional documentation, including but not limited to, equipment manuals, inspections, certifications and licenses to be provided to the owner upon request.
- 10.8 <u>Unmanned Aircraft System (UAS) Usage.</u> Any UAS operation on Owner's property must follow Federal Aviation Administration (FAA) regulations, state law, and Owner's policies and procedures. Any images or video obtained from a pre-authorized and compliant UAS flight on Owner's property must be approved for use by the Owner prior to usage of any such images or video obtained. Any violations will result in an ODR directed no-fly restriction for UAS operations on Owner's property.
- 10.9 <u>Fire Protection Procedures.</u> Contractor shall maintain compliance with all Life/Safety Code requirements throughout the duration of the Contract and take precautions to prevent potential fire hazards at the jobsite. Contractor shall adhere to the preventative fire protection procedures of the University of North Texas System Fire Marshal and instruct all associated subcontractors, skilled tradesmen, contractors, material men, suppliers and/or laborers of the procedures for preventative fire measures. Construction sites and structures are required to have proper site access and egress, active and certified extinguishing devices or systems at all times, and all fire and egress systems clearly marked and identified. Fire department access (fire lanes) shall be kept clear of vehicles, equipment and materials at all times. Occupied buildings which require any fire protection systems to be non-active, require two weeks advance notice and life safety protection method of procedures must be reviewed by University of North Texas System Fire Marshal, prior to system deactivation.
- 10.10 <u>Smoke and Tobacco Free Campus.</u> All campuses within the University of North Texas System are designated 'Smoke and Tobacco Free' environments. Due to State health, sanitation and safety regulations, tobacco products are not permitted to be consumed by construction personnel in any Owner's property, occupied or unoccupied, including mechanical and other service spaces. Contractor shall be responsible for enforcing this policy on the construction site, at all times.

ARTICLE 11. QUALITY CONTROL

11.1 <u>Materials & Workmanship.</u> Contractor shall execute Work in a good and workmanlike matter in accordance with the Contract Documents. Contractor shall develop and provide a quality control plan specific to this Project and acceptable to Owner. Where Contract Documents do not specify quality standards, complete and construct all Work in compliance with generally accepted construction industry standards. Unless otherwise specified, incorporate all new materials and equipment into the Work under the Contract.

11.2 <u>Testing.</u>

- 11.2.1 <u>Owner</u>. Owner is responsible for coordinating and paying for routine and special tests required to confirm compliance with quality and performance requirements, except as stated below or otherwise required by the Contract Documents.
- 11.2.2 <u>Contractor</u>. Contractor shall provide the following testing:
 - 11.2.2.1 Any test of basic material or fabricated equipment included as part of a submittal for a required item in order to establish compliance with the Contract Documents.
 - 11.2.2.2 Any test of basic material or fabricated equipment offered as a substitute for a specified item on which a test may be required in order to establish compliance with the Contract Documents.
 - 11.2.2.3 Preliminary, start-up, pre-functional, and operational testing of building equipment and systems as necessary to confirm operational compliance with requirements of the Contract Documents.
 - 11.2.2.4 All subsequent tests on original or replaced materials conducted as a result of prior testing failure.
- 11.2.3 <u>Standards.</u> All testing shall be performed in accordance with standard test procedures by an accredited laboratory, or special consultant as appropriate, acceptable to Owner. Results of all tests shall be provided promptly to OCM, Design Professional, and Contractor.
- 11.2.4 <u>Non-Compliance (Test Results).</u> Should any of the tests indicate that a material and/or system does not comply with the Contract requirements, the burden of proof remains with Contractor, subject to:
 - 11.2.4.1 Contractor selection and submission of the laboratory for Owner acceptance.
 - 11.2.4.2 Acceptance by Owner of the quality and nature of tests.

- 11.2.4.3 All tests taken in the presence of Design Professional and/or OCM, or their representatives.
- 11.2.4.4 If tests confirm that the material/systems comply with Contract Documents, Owner will pay the cost of the test.
- 11.2.4.5 If tests reveal noncompliance, Contractor will pay those laboratory fees and costs of that particular test and all future tests, of that failing Work, necessary to eventually confirm compliance with Contract Documents.
- 11.2.4.6 Proof of noncompliance with the Contract Documents will make Contractor liable for any corrective action which OCM determines appropriate, including complete removal and replacement of noncompliant work or material.
- 11.2.5 <u>Notice of Testing</u>. Contractor shall give OCM and Design Professional timely notice of its readiness and the date arranged so OCM and Design Professional may observe such inspection, testing, or approval.
- 11.2.6 <u>Test Samples.</u> Contractor is responsible for providing Samples of sufficient size for test purposes and for coordinating such tests with the Work Progress Schedule to avoid delay.
- 11.2.7 <u>Covering Up Work.</u> If Contractor covers up any Work without providing Owner an opportunity to inspect, Contractor shall, if requested by OCM, uncover and recover the work at Contractor's expense.
- 11.3 <u>Submittals.</u>
 - 11.3.1 <u>Contractor's Submittals.</u> Contractor shall submit with reasonable promptness consistent with the Project schedule and in orderly sequence all Shop Drawings, Samples, or other information required by the Contract Documents, or subsequently required by Change Order. Prior to submitting, Contractor shall review each submittal for general compliance with Contract Documents and approve submittals for review by Design Professional and Owner by an approval stamp affixed to each copy. Submittal data presented without Contractor's stamp will be returned without review or comment, and any delay resulting from failure is Contractor's responsibility.
 - 11.3.1.1 Contractor shall within twenty-one (21) days of the effective date of the Notice to Proceed with construction, submit to OCM and Design Professional, a submittal schedule/register, organized by specification section, listing all items to be furnished for review and approval by Design Professional and Owner. The list shall include Shop Drawings, manufacturer literature, certificates of compliance, materials Samples, materials colors, guarantees, and all other items identified throughout the Specifications.
 - 11.3.1.2 Contractor shall indicate the type of item, Contract requirements reference, and Contractor's scheduled dates for submitting the item along with the

requested dates for approval answers from Design Professional and Owner. The Submittal Register shall indicate the projected dates for procurement of all included items and shall be updated at least monthly with actual approval and procurement dates. Contractor's Submittal Register must be reasonable in terms of the review time for complex submittals. Contractor's submittal schedule must be consistent with the Work Progress Schedule and identify critical submittals. Show and allow a minimum of fifteen (15) days duration after receipt by Design Professional and OCM for review and approval. If resubmittal required, allow a minimum of an additional *seven (7)* days for review. Submit the updated Submittal Register with each request for progress payment. Owner may establish routine review procedures and schedules for submittals at the preconstruction conference and/or elsewhere in the Contract Documents. If Contractor fails to update and provide the Submittal Register as required, Owner may, after seven (7) days notice to Contractor.

- 11.3.1.3 Contractor shall coordinate the Submittal Register with the Work Progress Schedule. Do not schedule Work requiring a submittal to begin prior to scheduling review and approval of the related submittal. Revise and/or update both schedules monthly to ensure consistency and current project data. Provide to OCM the updated Submittal Register and schedule with each application for progress payment. Refer to requirements for the Work Progress Schedule for inclusion of procurement activities therein. Regardless, the Submittal Register shall identify dates submitted and returned and shall be used to confirm status and disposition of particular items submitted, including approval or other action taken and other information not conveniently tracked through the Work Progress Schedule.
- 11.3.1.4 By submitting Shop Drawings, Samples or other required information, Contractor represents that it has determined and verified all applicable field measurements, field construction criteria, materials, catalog numbers and similar data; and has checked and coordinated each Shop Drawing and Sample with the requirements of the Work and the Contract Documents.
- 11.3.2 <u>Review of Submittals.</u> Design Professional and OCM review is only for conformance with the design concept and the information provided in the Contract Documents. Responses to submittals will be in writing. The approval of a separate item does not indicate approval of an assembly in which the item functions. The approval of a submittal does not relieve Contractor of responsibility for any deviation from the requirements of the Contract unless Contractor informs Design Professional and OCM of such deviation in a clear, conspicuous, and written manner on the submittal transmittal and at the time of submission, and obtains Owner's written specific approval of the particular deviation.
- 11.3.3 <u>Correction and Resubmission</u>. Contractor shall make any corrections required to a submittal and resubmit the required number of corrected copies promptly so as to avoid

delay, until submittal approval. Direct attention in writing to Design Professional and OCM, when applicable, to any new revisions other than the corrections requested on previous submissions.

- 11.3.4 <u>Limits on Shop Drawing Review.</u> Contractor shall not commence any Work requiring a submittal until review of the submittal under Subsection 11.3.2. Contractor shall construct all such work in accordance with reviewed submittals. Comments incorporated as part of the review in Subsection 11.3.2 of Shop Drawings and Samples is not authorization to Contractor to perform extra work or changed work unless authorized through a Change Order. Design Professional's and OCM's review does not relieve Contractor from responsibility for defects in the Work resulting from errors or omissions of any kind on the submittal, regardless of any approval action.
- 11.3.5 <u>No Substitutions without Approval.</u> OCM and Design Professional may receive and consider Contractor's request for substitution when Contractor agrees to reimburse Owner for review costs and satisfies the requirements of this section. If Contractor does not satisfy these conditions, OCM and Design Professional will return the request without action except to record noncompliance with these requirements. Owner will not consider the request if Contractor cannot provide the product or method because of failure to pursue the Work promptly or coordinate activities properly. Contractor's request for a substitution may be considered by OCM and Design Professional when:
 - 11.3.5.1 The Contract Documents do not require extensive revisions; and
 - 11.3.5.2 Proposed changes are in keeping with the general intent of the Contract Documents and the design intent of Design Professional and do not result in an increase in cost to Owner; and
 - 11.3.5.3 The request is timely, fully documented, properly submitted and one or more of the following apply:
 - Contractor cannot provide the specified product, assembly or method of construction within the Contract Time;
 - The request directly relates to an "or-equal" clause or similar language in the Contract Documents;
 - The request directly relates to a "product design standard" or "performance standard" clause in the Contract Documents;
 - The requested substitution offers Owner a substantial advantage in cost, time, energy conservation or other considerations, after deducting additional responsibilities Owner must assume;
 - The specified product or method of construction cannot receive necessary approval by an authority having jurisdiction, and OCM can approve the requested substitution;
 - Contractor cannot provide the specified product, assembly or method of construction in a manner that is compatible with other materials and

where Contractor certifies that the substitution will overcome the incompatibility;

- Contractor cannot coordinate the specified product, assembly or method of construction with other materials and where Contractor certifies they can coordinate the proposed substitution; or
- The specified product, assembly or method of construction cannot provide a warranty required by the Contract Documents and where Contractor certifies that the proposed substitution provides the required warranty.
- The manufacture of the specified product has been removed from production due to cancellation or obsolescence.
- 11.3.6 <u>Unauthorized Substitutions at Contractor's Risk.</u> Contractor is financially responsible for any additional costs or delays resulting from unauthorized substitution of materials, equipment or fixtures other than those specified. Contractor shall reimburse Owner for any increased design or contract administration costs resulting from such unauthorized substitutions.
- 11.4 <u>Field Mock-up.</u> Mock-ups shall be constructed prior to commencement of a specified scope of work to confirm acceptable workmanship.
 - 11.4.1 <u>Minimum.</u> As a minimum, field mock-ups shall be constructed for roofing systems, exterior veneer / finish systems, glazing systems, and any other Work requiring a mock-up as identified throughout the Contract Documents. Mock-ups for systems not part of the Project scope shall not be required.
 - 11.4.2 <u>No Incorporation Unless Approved.</u> Mock-ups may be incorporated into the Work if allowed by the Contract Documents and if acceptable to OCM. If mock-ups are freestanding, they shall remain in place until otherwise directed by Owner.
 - 11.4.3 <u>Schedule.</u> Contractor shall include field mock-ups in their Work Progress Schedule and shall notify OCM and Design Professional of readiness for review sufficiently in advance to coordinate review without delay.
- 11.5 <u>Inspection During Construction.</u> Contractor shall provide sufficient, safe, and proper facilities, including equipment as necessary for safe access, at all reasonable times for observation and/or inspection of the Work by Owner or Design Professional and their agents. Contractor shall not cover up any Work with finishing materials or other building components prior to providing Owner and Design Professional and their agents an opportunity to perform an inspection of the Work.
 - 11.5.1 <u>Corrected Work.</u> Should corrections of the Work be required for approval, Contractor shall not cover up corrected Work until Owner indicates approval.
 - 11.5.2 <u>Owner's Self Help.</u> Should Contractor be unable to perform corrective work without impacting the overall WPS, Owner reserves the right to hire a separate Contractor to

complete the correction. The cost of the correction performed by separate Contractor will be charged back to Contractor.

11.5.3 <u>Notice.</u> Contractor shall provide notification of at least five (5) working days or otherwise as mutually agreed, to OCM of the anticipated need for an inspection so that Contractor may proceed with cover-up of Work. Should OCM fail to make the necessary inspection within the agreed period, Contractor may proceed with cover-up Work, but is not relieved of responsibility for Work to comply with requirements of the Contract Documents.

ARTICLE 12. CONSTRUCTION SCHEDULES

- 12.1 <u>Contract Time.</u> **TIME IS AN ESSENTIAL ELEMENT OF THE CONTRACT**. The Contract Time is the time between the dates indicated in the Notice to Proceed for commencement of the Work and for achieving Substantial Completion. The Contract Time can be modified only by Change Order. Failure to achieve Substantial Completion within the Contract Time will cause damage to Owner and may subject Contractor to liquidated damages as provided in the Contract Documents. If Contractor fails to achieve Final Completion within thirty (30) days after Substantial Completion, Contractor shall be responsible for Owner's additional inspection, project management, and maintenance cost to the extent caused by Contractor's failure to achieve Final Completion.
- 12.2 <u>Notice to Proceed.</u> Owner will issue a Notice to Proceed which shall state the dates for commencing Work and for achieving Substantial Completion of the Work.
- 12.3 <u>Work Progress Schedule.</u> Refer to Division 1 of the Specifications for additional schedule requirements. Contractor shall submit for review and approval a Construction Baseline Schedule to Owner and Design Professional no later than twenty-one (21) days after the effective date of the Notice to Proceed with construction. The Construction Baseline Schedule shall indicate the dates for starting and completing the various aspects required to complete the work and shall utilize the Longest Path Method with fully editable logic. The schedule shall include mobilization, procurement, installation, testing, inspection, delivery of Close-out Documents, and acceptance of all Work. This Baseline Schedule shall become the comparison to the actual conditions throughout the Contract duration and become a part of the Work Progress Schedule (WPS). Contractor shall coordinate and integrate the Work Progress Schedule with the services and activities of Owner, Contractor, Design Professional, other consultants/suppliers, subcontractors and the requirements of governmental entities.

This section applies to construction phase Work Progress Schedules. Requirements for design phase scheduling for Construction Manager-at-Risk and Design Build contracts are outlined in the specific agreements.

12.3.1 <u>Work Progress Schedule Updates.</u>

- 12.3.1.1 Contractor shall update the Work Progress Schedule and the Submittal Register weekly during the Owner/Architect/Contractor (OAC) meetings, at a minimum, to reflect progress to date and current plans for completing the Work, while maintaining the Baseline Schedule, and shall submit electronic and paper copies of the update to Design Professional and OCM as directed but at a minimum with each request for payment. Owner has no duty to make progress payments unless accompanied by the updated Work Progress Schedule.
- 12.3.1.2 Contractor should revise the Work Progress Schedule as necessary or appropriate for the management of the Work. All updated Work Progress Schedules must show the anticipated date of completion and reflect all extensions of time granted through Change Order as of the date of the update.
- 12.3.1.3 Contractor shall identify all proposed changes to schedule logic to Owner and to Design Professional via an executive summary accompanying the updated Work Progress Schedule for review and approval prior to implementation of any revisions to the Work Progress Schedule. Schedule changes that materially impact Owner's operations shall be communicated within forty-eight (48) hours to OCM.
- 12.3.1.4 The Work Progress Schedule constitutes Contractor's representation to Owner of the accurate depiction of all progress to date and that Contractor will follow the schedule as submitted in performing the Work.
- 12.3.2 <u>Use of Work Progress Schedules.</u> The Work Progress Schedule is for Contractor's use in managing the Work and submittal of the Work Progress Schedule, and successive updates or revisions, is for the information of Owner and to demonstrate that Contractor has complied with requirements for planning and completing the Work.
 - 12.3.2.1 Owner will coordinate its own activities with Contractor's activities as shown on the Work Progress Schedule.
 - 12.3.2.2 Owner's review of the Work Progress Schedule, or update or revision, does not indicate any approval of Contractor's proposed sequences and duration.
 - 12.3.2.3 Owner's review of a Work Progress Schedule update or revision indicating early or late completion does not constitute Owner's consent, alter the terms of the Contract, or waive either Contractor's responsibility for timely completion or Owner's right to damages for Contractor's failure to so do.
 - 12.3.2.4 Contractor's scheduled dates for completion of any activity or the entire Work do not constitute a change in terms of the Contract. Change Orders are the only method of modifying the Substantial Completion Date(s) and Contract Time.

- 12.4 <u>Ownership of Float.</u> Unless indicated otherwise in the Contract Documents, Contractor shall develop its schedule, pricing, and execution plan to provide a minimum of ten percent (10%) total Float at acceptance of the Baseline Schedule. Float time contained in the Work Progress Schedule is not for the exclusive benefit of Contractor or Owner, but belongs to the Project and may be consumed by either party. Before Contractor uses any portion of the Float, Contractor must submit a written request to Owner and receive Owner's written authorization to use the portion of Float. Owner's approval will not unreasonably be withheld.
- 12.5 <u>Completion of Work.</u> Contractor is responsible and accountable for completing the Work within the Contract Time stated in the Contract, or as otherwise amended by Change Order.
 - 12.5.1 <u>Owner's Self Help.</u> Should Contractor be unable to complete portion of Work, Owner may hire separate Contractor to complete these items. The cost to complete this Work will be charged back to Contractor.
 - 12.5.2 <u>Requirement to Regain Schedule.</u> If, in the judgment of Owner, the Work is behind schedule and the rate of placement of Work is inadequate to regain scheduled progress to insure timely completion of the entire Work or a separable portion thereof, Contractor, when so informed by Owner, shall immediately take action to increase the rate of Work placement by:
 - 12.5.2.1 An increase in working forces.
 - 12.5.2.2 An increase in equipment or tools.
 - 12.5.2.3 An increase in hours of work or number of shifts.
 - 12.5.2.4 Expedited delivery of materials.
 - 12.5.2.5 Other action proposed if acceptable to Owner.
 - 12.5.3 <u>Recovery Schedule.</u> Within ten (10) days after such notice, Contractor shall notify OCM in writing of the specific measures taken and/or plan to increase the rate of progress. Contractor shall include an estimate as to the date of scheduled progress recovery and an updated Work Progress Schedule illustrating Contractor's plan for achieving timely completion of the Work. Should Owner deem the plan of action inadequate, Contractor shall take additional steps or make adjustments as necessary to its plan of action until it meets with Owner's approval.
 - 12.5.4 <u>Owner's Notice Not Acceleration</u>. Owner's notice to Contractor shall not be considered acceleration by Owner and Owner shall not be responsible for any increased costs incurred by Contractor.
- 12.6 <u>Modification of the Contract Time.</u> Delays and extensions of Contract Time are valid only if properly noticed and documented by Change Order.

- 12.6.1 <u>Extension Request.</u> When a delay is an Excusable Delay, as defined below, and such delay prevents Contractor from completing the Work within the Contract Time, Contractor may be granted an extension of Contract Time. Owner will extend Contract Time by the number of days lost due to Excusable Delay, as measured by a substantiated critical path analysis of the Work Progress Schedule; provided, however, in no event will an extension of Contract Time be granted for delays that merely extend the duration of non-critical activities, or concurrent delay or which only consume Float. All extensions of Contract Time will be granted in calendar days.
- 12.6.2 <u>Weather Days.</u> "Weather Days" means days contained in the Baseline Schedule that are reasonably foreseeable adverse weather conditions and will not constitute an Excusable Delay. "Seasonably foreseeable adverse weather conditions" means weather conditions in keeping with the historical average listed by the National Oceanic and Atmospheric Administration on its website, www.noaa. When a Weather Day prevents critical path activities at the site from proceeding, Contractor shall: (a) immediately notify OCM for confirmation of the conditions and provide a detailed list of critical path activities impacted; and (b) at the end of each calendar month, submit to OCM and Design Professional a list of Weather Days occurring in that month along with documentation of the impact on critical path activities. Based on substantiated critical path analysis to the Work Progress Schedule, Owner will issue a Weather Day confirmation for any Contract Time extension to be documented by Change Order.
- 12.6.3 <u>Excusable Delay</u>. An "Excusable Delay" is a delay to Contractor's current schedule caused by circumstances listed below that prevents Contractor from completing the Work within the Contract Time. Based on substantiated critical path analysis to the Work Progress Schedule, any Contract Time extension will be issued by Change Order. Excusable Delay may be caused by the following:
 - 12.6.3.1 Discrepancies, errors, omissions, and inconsistencies in design, which Design Professional corrects by means of changes in the Drawings and Specifications; provided, however, that this does not apply if (a) Contractor is a Design-Build Firm, or (b) Contractor is a Construction Manager-at-Risk and failed to promptly report a discovered or apparent discrepancy, error, omission, or inconsistency during the pre-construction phase.
 - 12.6.3.2 Unanticipated physical conditions at the Site, which Design Professional corrects by means of changes to the Drawings and Specifications or for which ODR directs changes in the Work identified in the Contract Documents.
 - 12.6.3.3 Changes in the Work that delay activities identified in Contractor's Work Progress Schedule as "critical" to completion of the entire Work, if such changes are directed by ODR or recommended by Design Professional and directed by ODR.

- 12.6.3.4 Suspension of Work for unexpected natural events, civil unrest, strikes or other events which are not within the reasonable control of Contractor.
- 12.6.3.5 Suspension of Work for convenience of Owner, which prevents Contractor from completing the Work within the Contract Time.
- 12.7 <u>No Damages for Weather Days.</u> An extension of Contract Time shall be the sole remedy of Contractor for delays in performance of the Work due to Weather Days, and Contractor shall not be entitled to any compensation or recovery of any direct or indirect costs or damages.
- 12.8 <u>Costs for Excusable Delay.</u> In the event that Contractor incurs additional direct costs because of an Excusable Delay (other than described in Subsection 12.6.3.4) within the reasonable control of Owner, in addition to an extension of Contract Time the Contract Sum will be equitably adjusted by Owner pursuant to the provisions of Article 14.
- 12.9 No Damages for Other Delay. Except for direct costs for Excusable Delay as provided above, Contractor has no claim for monetary damages for delay or hindrances to the Work from any cause, whether or not such delays are foreseeable, except for delays caused solely by acts of Owner that constitute intentional interference with Contractor's performance of the Work and then only to the extent such acts continue after Contractor notifies Owner in writing of such interference. For delays caused by any act other than the sole intentional interference of Owner that continues after notice, Contractor shall not be entitled to any compensation or recovery of any damages including, without limitation, direct and indirect costs, consequential damages, lost opportunity costs, impact damages, loss of productivity, or other similar damages. Owner's exercise of any of its rights or remedies under the Contract including, without limitation, ordering changes in the Work or directing suspension, rescheduling, or correction of the Work, shall not be construed as intentional interference with Contractor's performance of the work, shall not be construed as intentional interference with Contractor's performance of the work, shall not be construed as intentional interference with Contractor's performance of the work regardless of the extent or frequency of Owner's exercise of such rights or remedies.
- 12.10 <u>Concurrent Delay.</u> Notwithstanding anything herein to the contrary, when the completion of the Work is simultaneously delayed by a Weather Day or an Excusable Delay and a delay arising from a cause not designated as excusable, Contractor will not be entitled to an extension of Contract Time for the period of concurrent delay.
- 12.11 <u>Time Extension Requests for Changes to the Work or Excusable Delay.</u> Extensions to Contract Time requested in association with changes to the Work directed or requested by Owner shall be included with Contractor's proposed costs for such change. If Contractor believes that the completion of the Work is delayed by Excusable Delay, Contractor shall give OCM written notice, stating the nature of the delay and the activities potentially affected, within five (5) days after the onset of the event or circumstance giving rise to the Excusable Delay. Contractor shall provide sufficient written evidence to document the Excusable Delay. In the case of a continuing cause of delay, only one claim is necessary. Claims for extensions of time should be made in numbers of whole or half days.

- 12.11.1 <u>Content of Request.</u> Within ten (10) days after the cessation of the Excusable Delay, Contractor shall formalize in writing its request for extension of Contract Time to include substantiation of the excusable nature of the delay and a complete analysis of impact to critical path activities. Based on substantiated critical path analysis to the Work Progress Schedule, any Contract Time extension granted will be issued by Change Order.
- 12.11.2 <u>No Release</u>. No extension of time releases Contractor or the Surety furnishing a performance or payment bond from any obligations under the Contract or such a bond. Those obligations remain in full force until the discharge of the Contract.
- 12.11.3 Longest Path Analysis. Contractor shall provide with each time extension request a quantitative demonstration of the impact of the delay on completion of the Work and Contract Time, based on the Work Progress Schedule. Contractor shall include with time extension requests a reasonably detailed narrative setting forth:
 - 12.11.3.1 The nature of the delay and its cause due to a change in the Work or an Excusable Delay and the basis of Contractor's claim of entitlement to an extension of Contract Time.
 - 12.11.3.2 Documentation of the actual impacts of the claimed delay on the Longest Path in Contractor's Work Progress Schedule, and any concurrent delays.
 - 12.11.3.3 Description and documentation of steps taken by Contractor to mitigate the effect of the claimed delay, including, when appropriate, the modification of the Work Progress Schedule.
- 12.11.4 <u>Owner Response.</u> Owner will respond to the time extension request by providing to Contractor written notice of the number of days granted, if any, and giving its reason if this number differs from the number of days requested by Contractor.
 - 12.11.4.1 Owner will not grant time extensions for delays that do not affect the Contract Substantial Completion date.
 - 12.11.4.2 Owner will respond to each properly submitted Time Extension Request within a reasonable time following receipt. If Owner does not have enough information to make a determination or cannot reasonably make a determination within forty-five (45) days, Owner will notify Contractor in writing.
- 12.12 <u>Failure to Complete Work in the Contract Time.</u> **TIME IS AN ESSENTIAL ELEMENT OF THE CONTRACT.** Contractor's failure to achieve substantial completion by the Contract Time or to achieve Substantial Completion as required will cause damage to Owner. These damages shall be liquidated by agreement of Contractor and Owner, in the amount per day as set forth in Section 12.13 below or elsewhere in the Contract Documents.

12.13 <u>Liquidated Damages.</u> Unless otherwise stated in the Contract, for each consecutive calendar day beyond the Contract Time that Substantial Completion of the Work is not achieved, Contractor shall pay Owner, within ten (10) days following written demand, an amount determined by the following schedule:

Project Cost		Liquidated Damages
From	<u>To</u>	Per Day
	<u><</u> \$ 1,000,000	<u>\$ 250</u>
<u>\$ 1,000,000</u>	<\$ 25,000,000	<u>\$ 1,000</u>
\$ 25,000,000	<\$ 50,000,000	<u>\$ 2,500</u>
<u>\$ 50,000,000</u>	<\$ 75,000,000	<u>\$ 5,000</u>
<u>\$ 75,000,000</u>	<\$ 100,000,000	<u>\$ 7,500</u>
> \$ 100,000,000		<u>\$ 10,000</u>

- 12.13.1 <u>Reasonable Estimate.</u> Such amount is not a penalty but liquidated damages representing the parties' estimate at the time of Contract execution of the damages that Owner will sustain for late Substantial Completion of Work. The parties stipulate and agree that the actual damages sustained by Owner for late Substantial Completion of the Work will be uncertain and difficult to ascertain, that calculating Owner's actual damages would be impractical, unduly burdensome, and cause unnecessary delay, and that the amount of daily liquidated damages set forth above is a reasonable estimate.
- 12.13.2 <u>Offset.</u> Owner may also recover the liquidated damages from any money due or that becomes due Contractor. The amount of liquidated damages may be adjusted by the terms of the Contract.
- 12.13.3 <u>No Waiver</u>. Payment or offset of the liquidated damages does not preclude recovery under the Contract, except for claims related to delays in Substantial Completion or Final Completion. Owner's right to receive liquidated damages shall not affect Owner's right to terminate the Contract as provided in these Uniform General Conditions or elsewhere in the Contract Documents, nor shall termination of the Contract release Contractor from the obligation to pay liquidated damages.

ARTICLE 13. <u>PAYMENTS</u>

13.1 <u>Job Order Contracts</u>. Contractor shall submit to OCM pricing based on the **regional** RS Means or Gordian Group pricing. The Job Order may be a fixed price, lump-sum contract based on unit pricing applied to estimated quantities or unit price order based on the quantities and line items delivered and the coefficient applied to the work items.

- 13.2 <u>Schedule of Values (utilized in Construction-Manager-at-Risk and General Construction</u> <u>Agreement).</u> Contractor shall submit to OCM and Design Professional for acceptance a Schedule of Values accurately itemizing material and labor for the various classifications of the Work based on the organization of the specification sections and of sufficient detail acceptable to OCM. The accepted Schedule of Values will be the basis for the progress payments under the Contract.
 - 13.2.1 <u>Requirements.</u>
 - 13.2.1.1 No progress payments will be made prior to receipt and acceptance of the Schedule of Values, provided in such detail as required by OCM, and submitted not less than twenty-one (21) days after the effective date of the Notice to Proceed. The Schedule of Values shall follow the order of trade divisions of the Specifications and include itemized costs for General Conditions, costs for preparing Close-Out Documents, fees, contingencies, and Owner cash allowances, if applicable, so that the sum of the items will equal the Contract Sum. As appropriate, assign each item labor and/or material values, the subtotal thereof equaling the value of the Work in place when complete.
 - 13.2.1.2 Owner requires that the Work items be inclusive of the cost of the Work items only. Any contract markups for overhead and profit, General Conditions, etc., shall be contained within separate line items for those specific purposes which shall be divided into at least two (2) lines, one (1) for labor and one (1) for materials.
 - 13.2.1.3 Contractor shall retain a copy of all worksheets used in preparation of its bid or proposal, supported by a notarized statement that the worksheets are true and complete copies of the documents used to prepare the bid or proposal, and shall make the worksheets available to Owner at the time of Contract execution. Thereafter, Contractor shall grant Owner during normal business hours access to said copy of worksheets at any time during the period commencing upon execution of the Contract and ending one (1) year after final payment.
- 13.3 <u>Progress Payments.</u> Contractor will receive periodic progress payments for Work performed, materials in place, suitably stored on Site, or as otherwise agreed to by Owner and Contractor. Payment is not due until receipt by Owner or its designee of a correct and complete Pay Application in electronic and/or hard copy format as required by the Contract Documents, and certified by Design Professional. Progress payments are made provisionally and do not constitute acceptance of Work not in accordance with the Contract Documents. Owner will not process progress payment applications for Change Order Work until all parties execute the Change Order.
 - 13.3.1 <u>Preliminary Pay Worksheet</u>. Once each month that a progress payment is to be requested, the Contractor shall submit to Design Professional and OCM a complete, clean copy of a preliminary pay worksheet or preliminary pay application, to include the following:

- 13.3.1.1 Contractor's estimate of the amount of Work performed, labor furnished, and materials incorporated into the Work, using the established Schedule of Values;
- 13.3.1.2 An updated Work Progress Schedule reflecting progress of Work, including the executive summary and all required schedule reports. The progress of Work shall be the same progress as payment request;
- 13.3.1.3 HUB subcontracting plan Progress Assessment Report (PAR); The PAR should document compliance with the HUB Plan.
- 13.3.1.4 Reimbursable Expenses: Reimbursable expenses incurred solely and directly in support of the Project within one of the following categories:
 - Travel expenditures at State of Texas reimbursement rates, provided that reimbursement will not be granted for travel 1) within the Denton-Dallas-Fort Worth area or 2) involving less than 150 miles round-trip; or
 - Reproductions, printing, printing supplies, plotting, photographs, renderings, postage, binding, collating, delivery and handling of reports; Drawings and Specifications or other project-related work product other than that used solely in-house by Contractor at actual expense incurred; or
 - Fees and associated reimbursable expenses paid to consultants hired in accordance with prior written approval from Owner.
 - Expenses excluded from reimbursement include telephone charges, FAX services, alcoholic beverages, laundry service, valet service, entertainment expenses and any non-Project related items.
 - Reimbursement of tips shall not exceed fifteen percent (15%).
- 13.3.1.5 Such additional documentation as Owner may require in the Contract Documents; and
- 13.3.1.6 Construction payment affidavit.
- 13.3.2 <u>Contractor's Application for Payment.</u> As soon as practicable, but in no event later than seven (7) days after receipt of the preliminary pay worksheet, Design Professional and OCM will meet with Contractor to review the preliminary pay worksheet and to observe the condition of the Work. Based on this review, OCM and Design Professional may require modifications to the preliminary pay worksheet prior to the submittal of an Application for Payment, and will promptly notify Contractor of revisions necessary for approval. As soon as practicable, Contractor shall submit its Application for Payment on the appropriate and completed form, reflecting the required modifications to the Schedule of Values required by Design Professional and/or OCM, and must attach all additional

documentation required by OCM and/or Design Professional, as well as an affidavit affirming that all payrolls, bills for labor, materials, equipment, subcontracted work, and other indebtedness connected with Contractor's Application for Payment are paid or will be paid within the time specified in Tex. Gov't Code, Chapter 2251. No Application for Payment is complete unless it fully reflects all required modifications, and attaches all required documentation including Contractor's affidavit.

- 13.3.3 <u>Certification by Design Professional.</u> Within five (5) days or earlier following Design Professional's receipt of Contractor's formal Application for Payment, Design Professional will review the Application for Payment for completeness, and forward it to OCM. Design Professional will certify that the application is complete and payable, or that it is incomplete, stating in particular what is missing. If the Application for Payment is incomplete, Contractor shall make the required corrections and resubmit the Application for Payment for processing.
- 13.4 <u>Owner's Duty to Pay.</u> Owner has no duty to pay the Contractor except on receipt by OCM of: (a) a complete Application for Payment certified by Design Professional; and (b) Contractor's updated Work Progress Schedule.
 - 13.4.1 <u>Stored Materials.</u> Payment for stored materials and/or equipment confirmed by Owner and Design Professional to be on-site or otherwise properly stored is limited to eighty-five percent (85%) of the invoice price or eighty-five percent (85%) of the scheduled value for the materials or equipment, whichever is less.
 - 13.4.2 <u>Retainage.</u> Owner will withhold from each progress payment, as retainage, whichever is more of the following three options: (a) five percent (5%) of the total earned amount; (b) the amount authorized by law; or (c) as otherwise set forth in the Contract Documents. Retainage will be managed in conformance with Tex. Gov't Code, Chapter 2252, Subchapter B.
 - 13.4.2.1 Contractor shall provide written consent of its surety and concurrence of Design Professional for any request for reduction or release of retainage.
 - 13.4.2.2 At least sixty-five percent (65%) of the Contract, or such other discrete Work phase as set forth in Subsection 15.1.6 or Work package delineated in the Contract Documents, must be completed before Owner can consider a retainage reduction or release, and only if permissible by law.
 - 13.4.2.3 Contractor shall not withhold retainage from its Subcontractors and suppliers in amounts that are any percentage greater than that withheld in its Contract with Owner under this subsection, unless otherwise acceptable to Owner.
 - 13.4.3 <u>Price Reduction to Cover Loss.</u> Owner may reduce any Application for Payment, prior to payment to the extent necessary to protect Owner from loss on account of actions of Contractor including, but not limited to, the following:

- 13.4.3.1 Defective or incomplete Work not remedied;
- 13.4.3.2 Damage to Work of a separate Contractor;
- 13.4.3.3 Failure to maintain scheduled progress;
- 13.4.3.4 Reasonable evidence provided with Work Progress Schedule that the Work will not be completed within the Contract Time;
- 13.4.3.5 Persistent failure to carry out the Work in accordance with the Contract Documents;
- 13.4.3.6 Reasonable evidence that the Work cannot be completed for the unpaid portion of the Contract Sum;
- 13.4.3.7 Assessment of fines for violations of prevailing wage rate law; or
- 13.4.3.8 Failure to include the appropriate amount of retainage for that periodic progress payment.
- 13.4.4 <u>Title.</u>
 - 13.4.4.1 Title to all material and Work covered by progress payments transfers to Owner upon payment.
 - 13.4.4.2 Transfer of title to Owner does not: (a) relieve Contractor and its Subcontractors of the sole responsibility for the care and protection of materials and Work upon which payments have been made until final acceptance; (b) diminish the responsibility of Contractor and its Subcontractors to restore any damaged Work; or (c) waive the right of Owner to require the fulfillment of all the terms of the Contract.
- 13.4.5 <u>Contracts with No Payment Bond.</u> For a Contract in any amount less than \$25,000.00, payment will be made in one lump sum at the Final Completion of the Work, including Punch list items and change orders.
- 13.4.6 <u>No Release</u>. Progress payments to Contractor do not release Contractor or its surety from any obligations under the Contract.
- 13.4.7 Documentation.
 - 13.4.7.1 Upon Owner's request, Contractor shall furnish manifest proof of the status of Subcontractor's accounts in a form acceptable to Owner.
 - 13.4.7.2 Pay estimate certificates must be signed by a corporate officer or a representative duly authorized by Contractor.

- 13.4.7.3 Provide copies of bills of lading, invoices, delivery receipts, or other evidence of the location and value of such materials in requesting payment for materials. For purposes of Tex. Gov't Code § 2251.021(a)(2), the date the performance of service is complete is the date when ODR approves the Application for Payment.
- 13.5 <u>Time for Payment by Contractor:</u> Pursuant to Tex. Gov't Code § 2251.023, upon Contractor's receipt of payment from Owner, Contractor shall pay Subcontractor the appropriate share of the payment not later than the tenth (10th) day after the date the Contractor receives the payment. The appropriate share is overdue on the eleventh (11th) day after the date Contactor receives the payment.

ARTICLE 14. CHANGES

14.1 <u>Change Orders.</u> A Change Order issued after execution of the Contract is a written order to Contractor, signed by ODR, Contractor, and Design Professional, authorizing a change in the Work or an adjustment in the Contract Sum or the Contract Time. The Contract Sum and the Contract Time can only be changed by Change Order. A Change Order signed by Contractor indicates his agreement therewith, including the adjustment in the Contract Sum and/or the Contract Time. ODR may issue a written authorization for Contractor to proceed with Work of a Change Order in advance of final execution by all parties in accordance with the provisions herein or other Contract provisions.

Whenever Change Orders Requests to adjust the contract price become necessary, the Owner will have the right to select the method of pricing to be used by the Contractor among the following options: 1) lump sum Change Order; 2) unit price Change Order, or 3) cost plus fee Change Order.

- 14.1.1 <u>Owner Ordered Changes.</u> Owner, without invalidating the Contract and without approval of Contractor's Surety, may order changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions, and the Contract Sum and the Contract Time will be adjusted accordingly. All such changes in the Work shall be authorized by Change Order or Construction Change Directive, and shall be performed under the applicable conditions of the Contract Documents. If such changes cause an increase or decrease in Contractor's cost of, or time required for, performance of the Work, an adjustment to Contract Sum or Contract Time shall be made and authorized by a Change Order.
- 14.1.2 <u>Corrections.</u> It is recognized by the parties hereto and agreed by them that the Drawings and Specifications may not be complete or free from discrepancies, errors, omissions, or inconsistencies, or that they may require changes or additions in order for the Work to be completed to the satisfaction of Owner. Accordingly, it is the express intention of the parties, notwithstanding any other provisions in the Contract, that any discrepancies, errors, omissions, or inconsistencies in such Drawings and Specifications, or any changes in or additions to Drawings and Specifications or to the Work ordered by Owner and any

resulting delays in the Work or increases in Contractor's costs and expenses arising out of such discrepancies, errors, omissions, or inconsistencies shall not constitute or give rise to any claim, demand, or cause of action of any nature whatsoever in favor of Contractor, whether for breach of Contract, or otherwise. However, Contractor will be entitled to the time or sum stated to be due Contractor in any Change Order approved and signed by all parties, which shall constitute full compensation to Contractor for all costs, expenses, and damages to Contractor.

- 14.2 <u>Lump Sum Change Order Request.</u> Contractor will submit a properly itemized Lump Sum Change Order Request covering the additional work and/or the work to be deleted. This Request will be itemized for the various components of work and segregated by labor, material and equipment in a detailed format satisfactory to Owner. Owner will require itemized Change Orders on all Change Order Requests from Contractor, subcontractors and sub-subcontractors regardless of tier. Details to be submitted include detailed line item estimates showing detailed materials quantity take-offs, material prices by item, and related labor hour pricing information and extensions (by line item or by drawing as applicable).
 - 14.2.1 <u>Self-Performed Labor</u>. Estimated labor costs to be included for self-performed work shall be based on the actual cost per hour paid by any Contractor (regardless of tier) for those workers or crews of workers who the Contractor reasonably anticipates will perform the Change Order work. Estimated labor hours shall include hours only for the worker and working foreman directly involved in performing the change order work. Supervision above the level of working foreman (such as general foreman, superintendent, project manager, etc.) is considered to be included in the markup percentages as outlined in the Contract. Note: No separate allowances for warranty or safety expenses will be allowed as a direct cost of a Change Order. Costs attributed to warranty expenses and safety expense will be considered to be covered by the markup percentage as outlined in the Contract.
 - 14.2.2 <u>Overhead and Profit.</u> Overhead shall be considered to include insurance beyond the scope of Article 8, field and office supervisors and assistants, including safety and scheduling personnel, use of small tools, incidental job burdens, and general home office expenses. No separate allowance will be made.
 - 14.2.3 <u>Labor Burden</u>. Labor burden allowable in Change Orders shall be defined as Contractor's net actual cost of payroll taxes (FICA, Medicare, SUTA, FUTA), net actual cost for Contractor's cost of union benefits (or other usual and customary fringe benefits if the employees are not union employees), and net actual cost to Contractor for worker's compensation insurance taking into consideration adjustments for experience modifiers, premium discounts, dividends, rebates, expense constants, assigned risk pool costs, net cost reductions due to policies with deductibles for self-insured losses, assigned risks rebates, etc. Contractor shall reduce their standard payroll tax percentages to properly reflect the effective cost reduction due to the estimated impact of the annual maximum wages subject to payroll taxes. (An estimated percentage for labor burden may be used for pricing change orders. However, the percentage used for labor burden to price change orders will be

examined at the conclusion of the project and an adjustment to the approved change orders will be processed if it is determined that the actual labor burden percentage should have been more or less than the estimated percentage used.)

- 14.2.3.1 <u>Non-Reimbursable Labor Burden.</u> Employee Stock Ownership Plan (ESOP) related to fringe benefit costs are specifically considered non-reimbursable labor burden and any ESOP costs are considered covered by the allowable change order markups to cover overhead and profit.
- 14.2.4 <u>Material.</u> Estimated material change order costs shall reflect Contractor's reasonably anticipated net actual cost for the purchase of the material needed for the change order work. Estimated material costs shall reflect cost reductions available to Contractor due to "non-cash" discounts, trade discounts, free material credits, and/or volume rebates. "Cash" discounts (i.e. prompt payment discounts of 1.5% or less) available on material purchased for change order work shall be credited to Owner if Contractor has provided Owner funds in time for Contractor to take advantage of any such "cash" discounts. Price quotations from material suppliers must be itemized with unit prices for each specific item to be purchased. "Lot pricing" quotations will not be considered sufficient substantiating detail.
- 14.2.5 <u>Equipment.</u> Allowable change order estimated costs may include appropriate amounts for rental of major equipment specifically needed to perform the change order work (defined as tools and equipment with an individual purchase order cost of more than \$750). For Contractor owned equipment, the "bare" equipment rental rates allowed to be used for pricing change order proposals shall be 75% of the monthly rate listed in the most current publication of The AED Green Book divided by 173.3 to arrive at a maximum hourly rate to be applied to the hours the equipment is used performing the change order work. Further, for Contractor owned equipment the aggregate equipment rent charges for any signed piece of equipment used in all change order work shall be limited to 50% of the fair market value of the piece of equipment when the first change order is priced involving usage of the piece of equipment. Fuel necessary to operate the equipment will be considered a separate direct cost associated with the change order work.
- 14.2.6 <u>Maximum Markup Percentage Allowable on Self-Performed Work.</u> With respect to pricing change orders, the maximum markup percentage fee to be paid to any Contractor (regardless of tier) on self-performed work shall be a single markup percentage not-to-exceed fifteen percent (15%) of the net direct cost of 1) direct labor and allowable labor burden costs applicable to the change order or extra work 2) the net cost of material and installation equipment incorporated into the change or extra work, and 3) net rental cost of major equipment and related fuel costs necessary to complete the change in the work.
- 14.2.7 <u>Maximum Markup Percentages Allowable on Work Performed by Subcontractors</u>. With respect to pricing the portion of change order proposals involving work performed by Subcontractors, the maximum markup percentage fee allowable to the Contractor supervising the Subcontractor's work shall not exceed five percent (5%) of the net of all

approved change order work performed by all subcontractors combined for any particular Change Order Request.

- 14.2.8 <u>GMP Limitation.</u> For Contracts based on a GMP, the Construction Manager-at-Risk or Design Builder shall NOT be entitled to a percentage mark-up or additional fee on any Change Order Work unless the Change Order increases the GMP or if contingency funds are utilized. If the GMP increases or contingency funds are utilized, the Construction-Manager-at-Risk or Design Builder will be allowed additional fees at the rate specified in the Contract.
- 14.2.9 <u>No Markup on Bonds and Liability Insurance Costs</u>. Change Order cost adjustments due increases or decreases in bond or insurance costs (if applicable) shall not be subject to any markup percentage fee.
- 14.2.10 Direct and Indirect Costs Covered by Markup Percentages. As a further clarification, the agreed upon markup percentage fee is intended to cover the Contractor's profit and all indirect costs associated with the Change Order Work. Items intended to be covered by the markup percentage fee include, but are not limited to: home office expenses, branch office and field office overhead expense of any kind; project management; superintendents, general foremen; non-working foremen; estimating; engineering; coordinating; expediting; purchasing; detailing; legal; accounting; data processing or other administrative expenses; shop drawings; permits; auto insurance and umbrella insurance; pick-up truck costs; ESOP related costs; and warranty expense costs. The cost for the use of small tools is also to be considered covered by the markup percentage fee. Small tools shall be defined as tools and equipment (power or non-power) with an individual purchase cost of less than \$750.
- 14.2.11 <u>Deduct Change Orders and Net Deduct Changes.</u> The application of the markup percentage referenced in the Contract will apply to both additive and deductive change orders. In the case of a deductive change order, the credit will be computed by applying the sliding scale percentages as outlined above so that a deductive change order would be computed in the same manner as an additive change order. In those instances where a change order involves but additive and deductive work, the additions and deductions will be netted and the markup percentage adjustments will be applied to the net amount.
- 14.2.12 <u>Contingency</u>. In no event will any lump sum or percentage amounts for "contingency" be allowed to be added as a separate line item in change order estimates. Unknowns attributed to labor hours will be accounted for when estimating labor hours anticipated to perform the work. Unknowns attributable to material scrap and waste will be estimated as part of the material costs.
- 14.3 <u>Unit Price Change Order Requests</u>. As an alternative to Lump Sum Change Order Request, the Owner or the Contractor acting with the approval of the Owner may choose the option to use Contract unit prices. Agreed upon Contract unit prices shall be the same for added quantities and deductive quantities. Unit prices are not required to be used for pricing change orders where other methods of pricing change order work are more equitable.

- 14.3 Cost Plus Change Order Requests. As an alternative to either Lump Sum Change Order Requests or Unit Price Change Order Requests, the Owner may elect to have any extra work performed on a cost plus markup percentage fee basis. Upon written notification, the Contractor shall perform such authorized extra work at actual cost for direct labor (working foreman, journeymen, apprentices, helpers, etc.), actual cost of labor burden, actual cost of material used to perform the extra work, and actual cost of rental of major equipment (without any charge for administration, clerical expense, general supervision or superintendent of any nature whatsoever, including general foremen, or the cost or rental of small tools, minor equipment, or plant) plus the approved markup percentage fee. The intent of this clause is to define allowable cost plus chargeable costs to be the same as those allowable when pricing Lump Sum Change Requests as outlined above. Owner and Contractor may agree in advance in writing on a maximum price for this work and Owner shall not be liable for any charge in excess of the maximum. Daily time sheets with names of all Contractor's employees working on the project will be required to be submitted to the Owner for both labor and equipment used by the Contractor for the time periods during which extra work is performed on a cost plus fee basis. Daily time sheets will break down the paid hours worked by the Contractor's employees showing both base contract work as well as extra work performed by each employee.
- 14.4 <u>Job Order Unit Prices.</u> Job Order unit prices as stated in the contract document or Change Order Request shall be based upon a regional RS Means Book or Gordian Group pricing.
- 14.5 <u>Claims for Additional Costs.</u>
 - 14.5.1 <u>Claim with no Requested Change.</u> If Contractor wishes to make a claim for an increase in the Contract Sum not related to a requested change, Contractor shall give Owner and Design Professional written notice thereof within twenty-one (21) days after the occurrence of the event giving rise to such claim, but, in any case before proceeding to execute the Work considered to be additional cost or time, except in an emergency endangering life or property in which case Contractor shall act in accordance with Section 10.3. No such claim shall be valid unless so made. If Owner and Contractor cannot agree on the amount of the adjustment in the Contract Sum, it shall be determined as set forth under Article 18. Any change in the Contract Sum resulting from such claim must be authorized by a Change Order.
 - 14.5.2 <u>Miscellaneous Claims.</u> If Contractor claims that additional cost is involved because of, but not limited to: (1) any written interpretation of the Contract Documents; (2) any order by Owner to stop the Work pursuant to Article 17 where Contractor was not at fault; or (3) any written order for a minor change in the Work issued pursuant to Section 14.6, Contractor shall make such claim as provided in Section 14.5.1.
 - 14.5.3 <u>Failure to Notify.</u> Should Contractor fail to call to the attention of Owner and Design Professional to discrepancies, errors, omissions, or inconsistencies in the Contract Documents, but claim additional costs for corrective Work after Contract award or after Owner's acceptance of Contractor's Construction Manager-at-Risk guaranteed maximum price, Owner may assume intent to circumvent competitive bidding for the necessary

corrective Work. In such case, Owner may choose to let a separate Contract for the corrective Work, or issue a CCD to require performance by Contractor. Claims for time extensions or for extra cost resulting from delayed notice of patent Contract Document discrepancies, errors, omissions, or inconsistencies will not be considered by Owner.

- 14.6 <u>Minor Changes.</u> Design Professional, with concurrence of OCM, will have authority to order minor changes in the Work not involving an adjustment in the Contract Sum or an extension of the Contract Time. Such changes shall be affected by written order which Contractor shall carry out promptly and record on as-built Record Documents.
- 14.7 <u>Concealed Site Conditions.</u> Contractor is responsible for visiting the Site and being familiar with local conditions such as the location, accessibility, and general character of the Site and/or building. If, in the performance of the Contract, subsurface, latent, or concealed conditions at the Site are found to be materially different from the information included in the Contract Documents, or if unknown conditions of an unusual nature are disclosed differing materially from the conditions usually inherent in Work of the character shown and specified, OCM and Design Professional shall be notified in writing of such conditions, Design Professional, with the approval of ODR, will promptly make such changes in the Drawings and Specifications as deemed necessary to conform to the different conditions. Any increase or decrease in the cost of the Work, or in the time within which the Work is to be completed, resulting from such changes will be adjusted by Change Order.
- 14.8 <u>Extension of Time</u>. All changes to the Contract Time made as a consequence of requests as required in the UGC's, must be documented by Change Order.
- 14.9 <u>Administration of Change Order Requests.</u> All changes in the Contract shall be administered in accordance with procedures approved by Owner, and when required, make use of such electronic information management system(s) as Owner may employ.
 - 14.9.1 Procedures.
 - 14.9.1.1 Procedures for administration of Change Orders shall be established by Owner and stated in the Contract Documents.
 - 14.9.1.2 No oral order, oral statement, or oral direction of Owner or his duly appointed representative shall be treated as a change under this article or entitle Contractor to an adjustment.
 - 14.9.2 <u>Routine Changes.</u> Routine changes shall be formally initiated by Design Professional or Owner by means of a Proposal Request form detailing requirements of the proposed change for pricing by Contractor, or may be initiated by Contractor by means of a Change Order Request form detailing proposed work, pricing, and time. This action may be preceded by communications between Contractor, Design Professional, and OCM concerning the need and nature of the change, but such communications shall not constitute a basis for beginning the proposed Work by Contractor. Except for emergency conditions described

below, approval of Contractor's cost proposal by Design Professional and ODR will be required for authorization to proceed with the Work being changed. Owner will not be responsible for the cost of Work changed without prior approval and Contractor may be required to remove Work so installed.

- 14.9.3 <u>Documentation</u>. All proposed costs or time for Change Order Work must be supported by itemized accounting of material, equipment, and associated itemized installation costs in sufficient detail following the outline and organization of the established Schedule of Values, and be supported by documented impact to critical path activities, to permit analysis by Design Professional and ODR using current estimating guides and/or practices. Photocopies of Subcontractor and vendor proposals shall be furnished unless specifically waived by ODR. Contractor shall provide written response to a change request within twenty-one (21) days of receipt.
- 14.9.4 <u>Emergencies.</u> Emergency changes to save life or property may be initiated by Contractor alone with the claimed cost and/or time of such work to be fully documented as to necessity and detail of the reported costs and/or time.
- 14.9.5 <u>Coordination with Schedule of Values.</u> The method of incorporating approved Change Orders into the parameters of the accepted Schedule of Values must be coordinated and administered in a manner acceptable to Owner.
- 14.10 <u>Construction Change Directive (CCD).</u> Owner may issue a written CCD directing a change in the Work prior to reaching agreement with Contractor on the adjustment, if any, in the Contract Sum and/or the Contract Time. Owner retains sole discretion whether or not to issue any CCD. Owner's issuance of a CCD does not require Owner to issue subsequent Change Orders. Owner and Contractor shall negotiate for appropriate adjustments, as applicable, to the Contract Sum or the Contract Time arising out of a CCD. Contractor shall not submit its costs for CCD Work with its Application for Payment until a Change Order has been issued. The Parties reserve their rights as to the disputed amount, subject to Article 18.
- 14.11 <u>Audit of Changes.</u> All Change Orders are subject to audit by Owner or its representative at any time and Change Order amounts may be adjusted lower as a result of such audit.

ARTICLE 15. PROJECT COMPLETION AND ACCEPTANCE

- 15.1 <u>Closing Inspections.</u>
 - 15.1.1 <u>Purpose of Inspection.</u> Inspection is for determining the completion of the Work, and does not relieve Contractor of its overall responsibility for completing the Work in a good and competent fashion, in compliance with the Contract. Work accepted with incomplete Punch list items, or the failure of Owner or other parties to identify Work that does not comply with the Contract Documents or is defective in operation or workmanship, does

not constitute a waiver of Owner's rights under the Contract or relieve Contractor of its responsibility for performance or warranties.

- 15.1.2 <u>Annotation</u>. Any Certificate issued under this Article may be annotated to indicate that it is not applicable to specified portions of the Work, or that it is subject to any limitation as determined by Owner.
- 15.1.3 <u>Substantial Completion Inspection.</u> When Contractor considers the entire Work or part thereof Substantially Complete, it shall notify OCM in writing that the Work will be ready for Substantial Completion inspection on a specific date. Contractor shall include with this notice Contractor's Punch list to indicate that it has previously inspected all the Work associated with the request for inspection, noting items it has corrected and included all remaining work items with date scheduled for completion or correction prior to final inspection. The failure to include any items on this list does not alter the responsibility of Contractor to complete all Work in accordance with the Contract Documents. If any of the items on this list prevents the Project from being used as intended, Contractor shall not request a Substantial Completion inspection. Owner and its representatives will review the list of items and schedule the requested inspection, or inform Contractor in writing that such an inspection is premature because the Work is not sufficiently advanced or conditions are not as represented on Contractor's list.
 - 15.1.3.1 Prior to the Substantial Completion inspection, Contractor shall furnish a copy of its marked-up Record Documents and a preliminary copy of each instructional manual, maintenance and operating manual, parts catalog, wiring diagrams, spare parts, specified written warranties, and like publications or parts for all installed equipment, systems, and like items as described in the Contract Documents. Delivery of these items is a prerequisite for requesting the Substantial Completion inspection.
 - 15.1.3.2 On the date requested by Contractor, or as mutually agreed upon pending the status of the Open Items List, Design Professional, OCM, Contractor, and other Owner representatives as determined by Owner will jointly attend the Substantial Completion inspection, which shall be conducted by OCM or Owner's representative. If Owner and Design Professional determines that the Work is Substantially Complete, Design Professional will issue a Certificate of Substantial Completion to be signed by Design Professional, Owner, and Contractor establishing the date of Substantial Completion and identifying responsibilities for security and maintenance. Design Professional will provide with this certificate a list of Punch list items (the pre-final Punch list) for completion prior to final inspection. This list may include items in addition to those on Contractor's Punch list, which the inspection team deems necessary to correct or complete prior to final inspection. If Owner occupies the Project upon determination of Substantial Completion, Contractor shall complete all corrective Work at the convenience of Owner, without disruption to Owner's use of the Project for its intended purposes.

- 15.1.4 <u>Final Inspection</u>. Contractor shall correct or complete all items on the final Punch list before requesting a Final Completion inspection and Final Payment. Unless otherwise agreed to in writing by the parties, Contractor shall complete this work within thirty (30) days of receiving the final Punch list. Upon completion of the final Punch list, Contractor shall notify Design Professional and OCM in writing stating the disposition of each final Punch list item. Design Professional, Owner, and Contractor shall promptly inspect the completed items. When the final Punch list is complete, and the Contract is fully satisfied according to the Contract Documents Design Professional will issue a certificate establishing the date of Final Completion. Completion of all Work is a condition precedent to Contractor's right to receive Final Payment.
- 15.1.5 Additional Inspections.
 - 15.1.5.1 If Owner's inspection team determines that the Work is not Substantially Complete at the Substantial Completion inspection, Owner or Design Professional will give Contractor written notice listing cause(s) of the rejection. Contractor will set a time for completion of incomplete or defective work acceptable to Owner. Contractor shall complete or correct all work so designated prior to requesting a second Substantial Completion inspection. Owner's or Design Professional's failure to include items as causes of rejection does not constitute a waiver of Owner's right under the Contract or relieve Contractor of its responsibility for performance.
 - 15.1.5.2 If Owner's inspection team determines that the Work is not complete at the Final Completion inspection, Owner or Design Professional will give Contractor written notice listing the cause(s) of the rejection. Contractor will set a time for completion of incomplete or defective work acceptable to Owner. Contractor shall complete or correct all Work so designated prior to again requesting a final inspection. Owner's or Design Professional's failure to include items as causes of rejection does not constitute a waiver of Owner's right under the Contract or relieve Contractor of its responsibility for performance.
 - 15.1.5.3 The Contract contemplates three (3) comprehensive inspections: the Substantial Completion inspection, the Final Completion inspection, and the inspection of completed final Punch list items. The cost to Owner of additional inspections resulting from the Work not being ready for one or more of these inspections is the responsibility of Contractor. Owner may issue a CO deducting these costs from Final Payment. Upon Contractor's written request, Owner will furnish documentation of any costs so deducted. Work added to the Contract by Change Order after Substantial Completion inspection is not corrective Work for purposes of determining timely completion, or assessing the cost of additional inspections.

- 15.1.6 <u>Phased Completion.</u> The Contract may provide, or Project conditions may warrant, as determined by ODR, that designated elements or parts of the Work be completed in phases. Where phased completion is required or specifically agreed to by the parties, the provisions of the Contract related to closing inspections, occupancy, and acceptance apply independently to each designated element or part of the Work. For all other purposes, unless otherwise agreed by the parties in writing, Substantial Completion of the Work as a whole is the date on which the last element or part of the Work as a whole is the date on which the last element or part of the Work as a whole is the date on which the last element or part of the Work as a whole is the date on which the last element or part of the Work as a whole is the date on which the last element or part of the Work as a whole is the date on which the last element or part of the Work as a whole is the date on which the last element or part of the Work as a Final Completion certificate.
- 15.2 <u>Owner's Right of Occupancy.</u> Owner may occupy or use all or any portion of the Work following Substantial Completion, or at any earlier stage of completion. Should Owner wish to use or occupy the Work, or part thereof, prior to Substantial Completion, Owner will notify Contractor in writing and identify responsibilities for security and maintenance. Work performed on the premises by third parties on Owner's behalf does not constitute occupation or use of the Work by Owner for purposes of this Article. All Work performed by Contractor after occupancy, whether in part or in whole, shall be at the convenience of Owner so as to not disrupt Owner's use of, or access to, occupied areas of the Project.

15.3 Acceptance and Payment.

- 15.3.1 <u>Request for Final Payment.</u> Following the certified completion of all Work, including all final Punch list items, cleanup, and the delivery of Record Documents, Contractor shall submit a certified Application for Final Payment and include all sums held as retainage and forward to Design Professional and OCM for review and approval.
- 15.3.2 <u>Final Payment Documentation.</u> Contractor shall submit, prior to or with the Application for Final Payment, final copies of all Close-Out Documents, maintenance and operating instructions, guarantees and warranties, certificates, Record Documents, and all other items required by the Contract. Contractor shall submit evidence of return of access keys and cards, evidence of delivery to Owner of attic stock, spare parts, and other specified materials. Contractor shall submit consent of surety to Final Payment form and an affidavit that all payrolls, bills for materials and equipment, subcontracted work, and other indebtedness connected with the Work, except as specifically noted, are paid, will be paid after payment from Owner, or otherwise satisfied within the period of time required by Tex. Gov't Code, Chapter 2251. Contractor shall furnish documentation establishing payment or satisfaction of all such obligations, such as receipts, releases, and waivers of claims and liens arising out of the Contract. Contractor is affidavit notes that claim as an exception.
- 15.3.3 <u>Design Professional Approval.</u> Design Professional will review a submitted Application for Final Payment promptly but in no event later than ten (10) days after its receipt. Prior to the expiration of this deadline, Design Professional will either: 1) return the Application

for Final Payment to Contractor with corrections for action and resubmission; or 2) accept it, note approval, and send to Owner.

- 15.3.4 <u>Offsets and Deductions.</u> Owner may deduct from the Final Payment all sums due from Contractor. If the Certificate of Final Completion notes any Work remaining, incomplete, or defects not remedied, Owner may deduct the cost of remedying such deficiencies from the Final Payment. On such deductions, Owner will identify each deduction, the amount, and the explanation of the deduction on or by the twenty-first (21st) day after Owner's receipt of an approved Application for Final Payment. Such offsets and deductions shall be incorporated via a final Change Order, including a CCD as may be applicable.
- 15.3.5 <u>Final Payment Due</u>. Final Payment is due and payable by Owner, subject to all allowable offsets and deductions, on the thirtieth (30th) day following Owner's approval of the Application for Payment. If Contractor disputes any amount deducted by Owner, Contractor shall give notice of the dispute on or before the thirtieth (30th) day following receipt of Final Payment. Failure to do so will bar any subsequent claim for payment of amounts deducted.
- 15.3.6 <u>Effect of Final Payment</u>. Final Payment shall not constitute a waiver of claims by Owner relating to the condition of the Work including those arising from:
 - 15.3.6.1 Faulty or defective Work appearing after Substantial Completion (latent defects);
 - 15.3.6.2 Failure of the Work to comply with the requirements of the Contract Documents;
 - 15.3.6.3 Terms of any warranties required by the Contract, or implied by law; or
 - 15.3.6.4 Claims arising from personal injury or property damage to third parties.
- 15.3.7 <u>Waiver of Claims</u>. Acceptance of final payment constitutes a waiver of all claims and liens by Contractor except those specifically identified in writing and submitted to ODR prior to the application for Final Payment.
- 15.3.8 <u>Effect on Warranty.</u> Regardless of approval and issuance of Final Payment, the Contract is not deemed fully performed by Contractor and closed until the expiration of all warranty periods.

ARTICLE 16. WARRANTY AND GUARANTEE

16.1 <u>Contractor's General Warranty and Guarantee.</u> Contractor warrants to Owner that all Work is executed in accordance with the Contract, complete in all parts and in accordance with approved practices and customs, and of the required finish and workmanship. Contractor further warrants

that unless otherwise specified, all materials and equipment incorporated in the Work under the Contract are new. Owner may, at its option, agree in writing to waive any failure of the Work to conform to the Contract, and to accept a reduction in the Contract Sum for the cost of repair or diminution in value of the Work by reason of such defect. Absent such a written agreement, Contractor's obligation to perform and complete the Work in accordance with the Contract Documents is absolute and is not waived by any inspection or observation, or lack thereof, by Owner, Design Professional, or others, by making any progress payment or final payment, by the use or occupancy of the Work or any portion thereof by Owner, at any time, or by any repair or correction of such defect made by Owner.

- 16.1.1 <u>Warranty Period.</u> Except as may be otherwise specified or agreed, Contractor shall repair all defects in materials, equipment, or workmanship appearing within one (1) year from the date of Substantial Completion of the Work. If Substantial Completion occurs by phase, the warranty period for that particular Work begins on the date of Substantial Completion of that phase, or as otherwise stipulated on the Certificate of Substantial Completion for that particular Work.
- 16.1.2 <u>Limits on Warranty.</u> Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
 - 16.1.2.1 Modification or improper maintenance or operation by persons other than Contractor, Subcontractors, or any other individual or entity for whom Contractor is not responsible, unless Owner is compelled to undertake maintenance or operation due to the neglect of Contractor.
 - 16.1.2.2 Normal wear and tear under normal usage after acceptance of the Work by Owner.
- 16.1.3 <u>Events Not Affecting Warranty.</u> Contractor's obligation to perform and complete the Work in a good and workmanlike manner in accordance with the Contract Documents is absolute. None of the following will constitute an acceptance of defective Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:
 - 16.1.3.1 Observations, or lack thereof, by Owner and/or Design Professional;
 - 16.1.3.2 Recommendation to pay any progress or final payment by Design Professional;
 - 16.1.3.3 The issuance of a certificate of Substantial Completion or any payment by Owner to Contractor under the Contract Documents;
 - 16.1.3.4 Use or occupancy of the Project or any part thereof by Owner;
 - 16.1.3.5 Any acceptance by Owner or any failure to do so;

- 16.1.3.6 Any review by Owner of a Shop Drawing or sample submittal; or
- 16.1.3.7 Any inspection, test or approval by others.
- 16.2 <u>Separate Warranties.</u> If a particular piece of equipment or component of the Work for which the Contract requires a separate warranty is placed in continuous service before Substantial Completion, the warranty period for that equipment or component will not begin until Substantial Completion, regardless of any warranty agreements in place between suppliers and/or Subcontractors and Contractor. Contractor shall assume any duty to repair not otherwise covered by those warranty agreements. Owner will certify the date of service commencement in the Substantial Completion certificate.
 - 16.2.1 <u>Assumption.</u> In addition to Contractor's warranty and duty to repair, Contractor expressly assumes all warranty obligations required under the Contract for specific building components, systems, and equipment.
 - 16.2.2 <u>Assignment.</u> Contractor may satisfy any such obligation by obtaining and assigning to Owner a complying warranty from a manufacturer, supplier, or Subcontractor. Where an assigned warranty is tendered and accepted by Owner which does not fully comply with the requirements of the Contract, Contractor remains liable to Owner on all elements of the required warranty not provided by the assigned warranty.
- 16.3 <u>Correction of Defects.</u> Upon receipt of written notice from Owner, or any agent of Owner designated as responsible for management of the warranty period, of the discovery of a defect, Contractor shall promptly remedy the defect(s), and provide written notice to Owner and designated agent indicating action taken. In case of emergency where delay would cause serious risk of loss or damage to Owner, or if Contractor fails to remedy within thirty (30) days, or within another period agreed to in writing, Owner may correct the defect and be reimbursed the cost of remedying the defect from Contractor or its surety.
- 16.4 <u>Certification of No Asbestos Containing Materials or Work.</u> Contractor shall provide a notarized certification to Owner that all equipment and materials used in fulfillment of its Contract responsibilities are non-Asbestos Containing Building Materials (ACBM). This certification must be provided no later than Contractor's application for Final Payment. Contractor shall insure that Texas Department of State Health Services licensed individual, consultants or companies are used for any required asbestos work including asbestos inspection, asbestos abatement plans/specifications, asbestos abatement, asbestos project management and third-party asbestos monitoring.
- 16.5 <u>Compliance with Acts.</u> Contractor shall warrant and ensure compliance with the following Acts by Contractor or Contractor's Subcontractors and assigns:
 - Asbestos Hazard Emergency Response Act (AHERA-40 CFR 763-99 (7));
 - National Emission Standards for Hazardous Air Pollutants (NESHAP-EPA 40 CFR 61, Subpart M-National Emission Standard for Asbestos); and

• Texas Asbestos Health Protection Rules (TAHPR-Tex. Admin. Code Title 25, Part 1, Ch. 295C, Asbestos Health Protection)

ARTICLE 17. SUSPENSION AND TERMINATION

- 17.1 <u>Suspension of Work for Cause.</u> Owner may, at any time without prior notice, suspend all or any part of the Work, if after reasonable observation and/or investigation, Owner determines it is necessary to do so to prevent or correct any condition of the Work, which constitutes an immediate safety hazard, or which may reasonably be expected to impair the integrity, usefulness, or longevity of the Work when completed.
 - 17.1.1 <u>Cease Work.</u> Owner will give Contractor a written notice of suspension for cause, setting forth the reason for the suspension and identifying the Work suspended. Upon receipt of such notice, Contractor shall immediately stop the Work so identified.
 - 17.1.2 <u>Investigation</u>. As soon as practicable following the issuance of such a notice, Owner will initiate and complete a further investigation of the circumstances giving rise to the suspension, and issue a written determination of the findings. Contractor shall cooperate with Owner's investigation.
 - 17.1.3 <u>Outcome.</u> If it is confirmed that the cause was within the control of Contractor, Contractor will not be entitled to an extension of Contract Time or any compensation for delay resulting from the suspension. If the cause is determined not to have been within the control of Contractor, and the suspension has prevented Contractor from completing the Work within the Contract Time, the suspension shall be considered an Excusable Delay and an extension of Contract Time will be granted through a Change Order.
 - 17.1.4 <u>Time.</u> Suspension of Work under this provision will be no longer than is reasonably necessary to investigate and remedy the conditions giving rise to the suspension.
- 17.2 <u>Suspension of Work for Owner's Convenience.</u> Upon seven (7) days written notice to Contractor, Owner may at any time without breach of the Contract suspend all or any portion of the Work for its own convenience. When such a suspension prevents Contractor from completing the Work within the Contract Time, it shall be considered an Excusable Delay. A notice of suspension for convenience may be modified by Owner at any time on seven (7) days written notice to Contractor. If Owner suspends the Work for its convenience for more than sixty (60) consecutive days, Contractor may elect to terminate the Contract pursuant to the provisions of the Contract.
- 17.3 <u>Termination by Owner for Cause.</u>
 - 17.3.1 <u>Cause.</u> Upon written notice to Contractor and its surety, Owner may, without prejudice to any right or remedy, terminate the Contract and take possession of the Site and of all materials, equipment, tools, construction equipment, and machinery thereon owned by Contractor under any of the following circumstances:

- 17.3.1.1 Persistent or repeated failure or refusal, except during complete or partial suspensions of work authorized under the Contract, to supply enough properly skilled workmen or proper materials;
- 17.3.1.2 Persistent disregard of laws, ordinances, rules, regulations, or orders of any public authority having jurisdiction, including Owner;
- 17.3.1.3 Persistent failure to prosecute the Work in accordance with the Contract, and to ensure its completion within the Contract Time;
- 17.3.1.4 Failure to remedy defective work;
- 17.3.1.5 Failure to pay Subcontractors, laborers, and material suppliers pursuant to Tex. Gov't Code, Chapter 2251;
- 17.3.1.6 Persistent endangerment to the safety of labor or of the Work;
- 17.3.1.7 Failure to supply or maintain statutory bonds or to maintain required insurance pursuant to the Contract;
- 17.3.1.8 Any material breach of the Contract; or
- 17.3.1.9 Contractor's insolvency, bankruptcy, or demonstrated financial inability to perform the Work.
- 17.3.2 <u>No Waiver</u>. Failure by Owner to exercise the right to terminate in any instance is not a waiver of the right to do so in any other instance.
- 17.3.3 <u>Notice.</u> Owner may immediately terminate the Contract under the provisions of this Section 17.3 upon written notice to Contractor and Contractor's sureties. Owner may also give notice to Contractor and Contractor's sureties of Owner's intent to terminate the Contract under the provisions of this Section 17.3 at any later date upon written notice to Contractor and its sureties.
- 17.3.4 <u>Cure.</u> Should Contractor or its surety, after having received notice of Owner's intent to terminate at a later date, demonstrate to the satisfaction of Owner that Contractor or its surety are proceeding to correct such default with diligence and promptness, upon which the notice of intent to terminate was based, the notice of intent to terminate may be rescinded in writing by Owner. If so rescinded, the Work may continue without an extension of Contract Time.
- 17.3.5 <u>Failure to Cure.</u> Should Contractor or its surety fail, after having received notice of Owner's intent to terminate, to commence and continue correction of such default with diligence and promptness to the satisfaction of Owner within the date specified by Owner, Owner may arrange for completion of the Work and deduct the cost of completion from the unpaid Contract Sum.

- 17.3.5.1 This amount includes the cost of additional Owner costs such as Design Professional services, other consultants, and contract administration.
- 17.3.5.2 Owner will make no further payment to Contractor or its surety unless the costs to complete the Work are less than the Contract balance, then the difference shall be paid to Contractor or its surety. If such costs exceed the unpaid balance, Contractor or its surety will pay the difference to Owner.
- 17.3.5.3 This obligation for payment survives the termination of the Contract.
- 17.3.5.4 Owner reserves the right in termination for cause to take assignment of all the Contracts between Contractor and its Subcontractors, vendors, and suppliers. Owner will promptly notify Contractor of the contracts Owner elects to assume. Upon receipt of such notice, Contractor shall promptly take all steps necessary to effect such assignment.
- 17.3.6 <u>Conversion to Termination for Convenience</u>. In the event that any termination of the Contract for cause under this Section 17.3 is later determined to have been improper, the termination shall automatically convert to a termination for convenience of Owner and Contractor's recovery for termination shall be strictly limited to the payments allowable under Subsection 17.4.3.
- 17.4 <u>Termination for Convenience of Owner</u>. Owner reserves the right, without breach, to terminate the Contract prior to, or during the performance of the Work, for any reason. Upon such an occurrence, the following shall apply:
 - 17.4.1 <u>Notice.</u> Owner will immediately notify Contractor and Design Professional in writing, specifying the reason for and the effective date of the Contract termination. Such notice may also contain instructions necessary for the protection, storage, or decommissioning of incomplete Work or systems, and for safety.
 - 17.4.2 <u>Contractor Action</u>. Upon receipt of the notice of termination, Contractor shall immediately proceed with the following obligations, regardless of any delay in determining or adjusting any amounts due at that point in the Contract:
 - 17.4.2.1 Stop all work.
 - 17.4.2.2 Place no further subcontracts or orders for materials or services.
 - 17.4.2.3 Terminate all subcontracts for convenience.
 - 17.4.2.4 Cancel all materials and equipment orders as applicable.
 - 17.4.2.5 Take action that is necessary to protect and preserve all property related to the Contract which is in the possession of Contractor.

- 17.4.3 <u>Contractor Remedy.</u> When the Contract is terminated for Owner's convenience, Contractor may recover from Owner payment for all Work completed including the corresponding pro rata portion of Contractor's overhead and profit. Contractor may not claim lost profits on other work or lost business opportunities.
- 17.5 <u>Termination by Contractor</u>. If the Work is stopped for a period of ninety (90) days under an order of any court or other public authority having jurisdiction, or as a result of an act of government, such as a declaration of a national emergency making materials unavailable, through no act or fault of Contractor or Subcontractor or their agents or employees or any other persons performing any of the Work under a contract with Contractor, then Contractor may, upon thirty (30) additional days written notice to ODR, terminate the Contract and recover from Owner payment for all Work completed including the corresponding pro rata portion of Contractor's overhead and profit, but not lost profits on other work or lost business opportunities. If the cause of the Work stoppage is removed prior to the end of the thirty (30) day notice period, Contractor may not terminate the Contract.
- 17.6 <u>Settlement on Termination.</u> When the Contract is terminated for any reason, at any time prior to one hundred eighty (180) days after the effective date of termination, Contractor shall submit a final termination settlement proposal to Owner based upon recoverable costs as provided under the Contract. If Contractor fails to submit the proposal within the time allowed, Owner may determine the amount due to Contractor because of the termination and pay the determined amount to Contractor as final payment.

ARTICLE 18. DISPUTE RESOLUTION

- 18.1 <u>Contracts Less Than \$250,000.</u> The dispute resolution process provided for in Texas Government Code, Chapter 2260, shall be used by Contractor or Design Professional to attempt to resolve any claim for breach of Contract made by Contractor or Design Professional that is not resolved under procedures described throughout the Uniform General Conditions or any Supplementary or Special Conditions of the Contract, *where the amount in controversy is less than \$250,000*.
- 18.2 <u>Contracts \$250,000 or Greater.</u> Contractor or Design Professional and Owner shall use the following dispute resolution process prior to initiating any litigation or filing suit in a court of competent jurisdiction.
 - 18.2.1 <u>Mediation.</u> If a dispute arises out of or relates to the Contract or the breach thereof in which the amount in controversy is \$250,000 or greater, and if the dispute cannot be settled through negotiation, the parties agree first to try to settle the dispute by mediation using the procedures specified in this section prior to the commencement of any legal action. The parties commit to participate in the proceedings in good faith with the intention of resolving the dispute if at all possible.
 - 18.2.1.1 The party seeking to initiate mediation of a dispute shall give written notice to the other party describing the nature of the dispute, the initiating party's claim

for relief and identifying one or more individuals with authority to settle the dispute on such party's behalf. The party receiving such notice shall have five (5) business days to designate by written notice one or more individuals with authority to settle the dispute on such party's behalf.

- 18.2.1.2 The parties shall then have ten (10) business days to submit to each other a written list of acceptable qualified mediators not affiliated with any of the parties. The mediator shall possess the qualifications required under Civil Practice and Remedies Code, § 154.052, be subject to the standards and duties prescribed by Civil Practice and Remedies Code, §154.053, and have the qualified immunity prescribed by Civil Practice and Remedies Code, §154.055, if applicable. The parties shall mutually agree on the mediator.
- 18.2.1.3 In consultation with the mediator selected, the parties shall promptly designate a mutually convenient time and place for the mediation, and unless circumstances require otherwise, such time to be not later than forty-five (45) days after selection of the mediator.
- 18.2.1.4 The parties agree to participate in the mediation to its conclusion. The mediation shall be terminated (i) by the execution of a settlement agreement by the parties, (ii) by a declaration of the mediator that the mediation is terminated, or (iii) by a written declaration of a party to the effect that the mediation process is terminated at the conclusion of one (1) full day's mediation session. Even if the mediation is terminated without a resolution of the dispute, the parties agree not to terminate negotiations and not to commence any legal action or seek other remedies prior to the expiration of five (5) days following the mediation. Notwithstanding the foregoing, any party may commence litigation within such five (5) day period if litigation could be barred by an applicable statute of limitations or in order to request an injunction to prevent irreparable harm.
- 18.2.1.5 The parties shall share the cost of the mediation process equally although each party's attorneys and witnesses or specialists are the direct responsibility of each party and their fees and expenses shall be the responsibility of the individual parties.
- 18.2.1.6 The entire mediation process is confidential, and no stenographic, visual or audio record shall be made. All conduct, statements, promises, offers, views and opinions, whether oral or written, made in the course of the mediation by any party, their agents, employees, representatives or other invitees and by the mediator are confidential and shall, in addition and where appropriate, be deemed to be privileged and shall not be discoverable or admissible for any purpose, including impeachment, in any litigation or other proceeding involving the parties.

- 18.3 <u>Owner Retained Rights.</u> Nothing herein shall hinder, prevent, or be construed as a waiver of Owner's right to seek redress on any disputed matter in a court of competent jurisdiction.
- 18.4 <u>No Waiver.</u> Except as may be expressly and specifically provided otherwise by Chapter 114, Texas Civil Practice & Remedies Code, nothing herein shall be construed as a waiver of sovereign immunity; nor constitute or be construed as a waiver of any of the privileges, rights, defenses, remedies, or immunities available to the State of Texas or the University of North Texas System.
- 18.5 <u>No Attorney's Fees.</u> In any litigation between Owner and Contractor or Design Professional arising from the Contract or Project, neither party will be entitled to an award of legal fees or costs in any judgment regardless of which is deemed the prevailing party.
- 18.6 <u>Interest.</u> Owner shall be billed in accordance with Chapter 2251 of Texas Government Code and interest, if any, on past due payments shall accrue and be paid in accordance with 2251 of the Texas Government Code.

ARTICLE 19. MISCELLANEOUS

- 19.1 Right to Audit. Owner, or any of its duly authorized auditors or representatives including the State Auditor's Office, shall during regular business hours and upon reasonable notice have access to and the right to examine, and be permitted to audit and copy, any directly pertinent books, documents, papers, and records of Contractor, including, without limitation, complete documentation supporting accounting entries, books, correspondence, instructions, drawings, receipts, subcontracts, Subcontractor's quotes, proposals, purchase order, vouchers, memoranda, schedules, electronic data, pictures, videos, logs, minutes, notes, reports and other data relating to the Project. Further, Contractor or Design Professional agree to include in all subcontracts a provision to the effect that Subcontractor agrees that Owner or any of its duly authorized representatives shall have access to and the right to examine any directly pertinent books, documents, papers, and records of such Subcontractor relating to any claim arising from the Contract and subcontract, whether or not the Subcontractor is a party to the claim. The period of access and examination described herein shall continue until the later of seven (7) years after Final Payment or final disposition of any disputes, claims, litigation, or appeals arising out of the Contract.
- 19.2 <u>Records and Inspection.</u> Owner's representatives may (without limitation) conduct verifications such as counting employees at the construction site, witnessing the distribution of payroll, verifying information and amounts through interviews and written confirmations with Contractor employees, Subcontractors and vendors. Contractor's "records" as referred to in this contract shall include any and all information, materials and data of every kind and character, including without limitation, records, books, papers, documents, subscriptions, recordings, agreements, purchase orders, leases contracts, commitments, arrangements, notes, daily diaries, emails, superintendent reports, drawings, receipts, vouchers and memoranda and any and all other agreements, sources of information and matters that may in the Owner's judgment have any bearing on or pertain to

any matters, rights, duties or obligations under or covered by any Contract Documents. Such records shall include written policies and procedures; time sheets; payroll registers; payroll records; cancelled payroll checks; subcontract files (including proposals of successful and unsuccessful bidders, bid recaps, negotiation notes, etc.); original bid estimates; estimating work sheets; correspondence; change order files (including documentation; invoices and related payment documentation; general ledger, information detailing cash and trade discounts earned, insurance rebates and dividends; and any other contractor records which may have a bearing on matters of interest to the Owner in connection with the contractor's dealings with the Owner (all foregoing hereinafter referred to as "records" to the extent necessary to adequately permit evaluation and verification of any or all of the following:

- 19.2.1 Deliverables: Compliance with contract requirements for deliverables
- 19.2.2 Plans and Specifications: Compliance with approved plans and specifications
- 19.2.3 Ethics Expectations: Compliance with Owner's business ethics expectations
- 19.2.4 <u>Change Order Pricing</u>: Compliance with contract provisions regarding the pricing of Change Orders
- 19.2.5 <u>Invoice Accuracy</u>: Accuracy of Contractor representations regarding the pricing of invoices
- 19.2.6 <u>Claims</u>: Accuracy of Contractor representations related to claims submitted by the Contractor or any of his payees.
- 19.3 <u>Audit of Subcontractor</u>: Contractor shall require all payees receiving \$10,000 or more in connection with this contract to comply with the audit requirements herein by including the requirements hereof in a written contract agreement.
- 19.4 <u>Overpricing or Overcharges:</u> If an audit inspection or examination discloses overpricing or overcharges to the Owner (of any nature) by the Contractor and/or Subcontractors in excess of \$100,000, in addition to adjusting for overcharges, the reasonable actual cost of the Owner's audit shall be reimbursed to the Owner by Contractor. Any adjustments and/or payments which must be made as a result of any such audit or inspection of Contractor's records shall be made within a reasonable amount of time (not to exceed 90 days) from presentation of Owner's finding to Contractor.
- 19.5 <u>Documentation Requirements:</u> In addition to the normal paperwork documentation the Contractor typically furnishes to the Owner, in order to facilitate efficient use of Owner resources when reviewing and/or auditing the Contractor's billings and related reimbursable cost records, Contractor agrees to furnish upon request the following types of information in the specified computer (PC) readable file format(s), as applicable:

Type of Record	PC Readable File Format
Monthly Job Cost Detail_	.pdf and Excel_
Detailed Job Cost History To Date_	.pdf and Excel_
Monthly Labor Distribution Detail (if not already separately detailed in the Job Cost Detail)	.pdf and Excel_
Total Job To Date Labor Distribution Detail (if not already separately detailed in the Job Cost History To Date)_	.pdf and Excel_
Employee Timesheets Documenting Time Worked By All Individuals Who Charge Reimbursable Time To The Project_	
Daily Foreman Reports Listing Names And Hours And Tasks Of Personnel Who Worked On The Project_	.pdf_
Daily Superintendent Reports_	.pdf_
Detailed Subcontract Status Reports (showing original subcontract value, approved subcontract change orders, subcontractor invoices, payments to subcontractors, etc.)_	
Copies Of Executed Subcontracts With All Subcontractors_	.pdf_
Copies Of All Executed Change Orders Issued To Subcontractors_	.pdf_
Copies Of All Documentation Supporting All Reimbursable Job Costs (subcontractor payment applications, vendor invoices, internal cost charges, etc.)	

- 19.6 <u>Supplementary or Special Conditions.</u> When the Work contemplated by Owner is of such a character that the foregoing Uniform General Conditions of the Contract cannot adequately cover necessary and additional contractual relationships, the Contract may include Supplementary General or Special Conditions as described below:
 - 19.6.1 <u>Supplementary Conditions.</u> Supplementary Conditions may describe the standard procedures and requirements of contract administration. Supplementary Conditions may expand upon matters covered by the Uniform General Conditions, where necessary, provided the expansion does not weaken the character or intent of the Uniform General

Conditions. Supplementary Conditions are of such a character that it is to be anticipated that Owner may normally use the same, or similar, conditions to supplement each of its several projects.

- 19.6.2 <u>Special Conditions.</u> Special Conditions shall relate to a particular Project and be unique to that Project but shall not weaken the character or intent of the Uniform General Conditions.
- 19.7 <u>Federally Funded Projects.</u> On federally funded projects, Owner may waive, suspend, or modify any provision in these Uniform General Conditions which conflicts with any federal statue, rule, regulation, or procedure, where such waiver, suspension, or modification is essential to receipt by Owner of such federal funds for the Project. In the case of any Project wholly financed by federal funds, any standards required by the enabling federal statute, or any federal rules, regulations, or procedures adopted pursuant thereto, shall be controlling.
- 19.8 <u>Internet-based Project Management Systems.</u> At its option, Owner may administer its design and construction management through an Internet-based management system. In such cases, Contractor shall conduct communication through this media and perform all Project related functions utilizing this database system. This includes correspondence, submittals, Requests for Information, vouchers, or payment requests and processing, amendment, Change Orders, and other administrative activities.
 - 19.8.1 Accessibility and Administration.
 - 19.8.1.1 When used, Owner will make the software accessible via the Internet to all Project team members.
 - 19.8.1.2 Owner shall administer the software.
 - 19.8.2 <u>Training</u>. When used, Owner shall provide training to the Project team members.
- 19.9 <u>Computation of Time.</u> In computing any time period set forth in this Contract, the first day of the period shall not be included, but the last day shall be.
- 19.10 <u>Survival of Obligations.</u> All representations, indemnifications, warranties and guarantees made in accordance with the Contract Documents will survive final payment, completion and acceptance of the Work, as well as termination for any reason. All duties imposed upon the Contractor by reason of termination, including without limitation the duty to assign subcontracts and contracts with vendors and suppliers, shall likewise survive the termination of the Contract.
- 19.11 <u>No Waiver of Performance.</u> The failure of either party in any instance to insist on the performance of any of the terms, covenants or conditions of the Contract Documents, or to exercise any of the rights granted thereunder, shall not be construed as waiver of any such term, covenant, condition or right with respect to further performance.
- **19.12** <u>Governing Law and Venue.</u> The Contract shall be governed by the laws of the State of Texas. Venue for any suit arising from the Contract will be in a court of competent jurisdiction subject to

the mandatory venue statute set forth in § 105.151 of the Texas Education Code, or if mandatory venue is not applicable in the county in which the Project is located.

- 19.13 <u>Captions and Catch Lines</u>. The captions and catch lines used throughout the Uniform General Conditions and elsewhere in the Contract Documents are for ease of reference only and have no effect on the meaning of the terms and conditions set forth herein.
- 19.14 <u>Independent Contractor Status.</u> The Contract Documents create an independent contractor relationship between the Owner and Contractor and neither party's employees or contractors shall be considered employees, contractors, partners or agents of the other party.
- 19.15 <u>No Third-Party Beneficiaries.</u> The parties do not intend, nor shall any clause be interpreted to create in any third party, any obligations to, or right of benefit by, such third party under these Contract Documents from either the Owner or Contractor.
- 19.16 <u>Child Support Obligor</u>. Notwithstanding anything to the contrary within the Contract Documents, it is understood and agreed between the parties that in accordance with the laws of the State of Texas, a child support obligor who is more than thirty (30) days delinquent in paying child support, and a business entity in which an obligor is a sole proprietor, partner, shareholder, or owner with an ownership interest of at least twenty-five percent (25%), is not eligible to receive payments from state funds under a contract to provide property, materials or services until all arrearages have been paid or the obligor is in compliance with a written repayment agreement.
- 19.17 <u>Buy America Requirements for Iron and Steel Used in Construction.</u> In accordance with Texas Government Code 2252, Section 2252.202, all iron or steel products (i.e., rolled structural shapes including wide flange beams and columns, angles, bars, plates, sheets, hollow structural sections, pipe, etc.) shall be produced, manufactured and fabricated in the United States.
- 19.18 <u>No Assignment.</u> This Contract may not be assigned by either party without the prior written consent of the other, except either party may, upon notice to the other party but without the other party's consent, assign this Contract to a present or future affiliate or successor, provided that any such assignment by Contractor shall be contingent on Owner's determination that the assignee is qualified to perform the Work, is in good standing with the State of Texas and otherwise eligible to do business with the State of Texas.
- 19.19 <u>Severability.</u> If any provision, sentence, clause or article of this Contract is found to be invalid or unenforceable for any reason, the remaining provisions shall continue in effect as if the invalid or unenforceable provision were not in the Contract. All provisions, sentences, clauses and articles of this Contract are severable for this purpose.
- 19.20 <u>Parties Bound.</u> Execution of this Contract by each party binds the entity represented as well as its employees, agents, successors and assigns to its faithful performance.
- 19.21 <u>Public Information.</u> Owner shall release information to the extent required by the Texas Public Information Act and other applicable law. If requested, Contractor shall make public information available to Owner in an electronic format.

19.22 Business Ethics Expectations

- 19.22.1 <u>Contractor</u>: During the course of pursuing contracts with the Owner and while performing the Work in accordance with the Contract, Contractor agrees to maintain business ethics standards aimed at avoiding any impropriety or conflict of interest which could be construed to have an adverse impact on the Owner's best interests
- 19.22.2 <u>Reasonable Action</u>: Contractor shall take reasonable actions to prevent any actions or conditions which could result in a conflict with the Owners' best interests. These obligations shall apply to the activities of Contractor employees, agents, subcontractors, subcontractor employees, consultants of Contractor, etc.
- 19.22.3 <u>Gifts and Other Considerations</u>: Contractor and its employees, agents, subcontractors, and material suppliers (or their representatives) should not make or cause to be made any cash payments, commissions, employment, gifts, entertainment, free travel, loans free work, substantially discounted work, or any other considerations to the Owner's representatives, employees or their relatives.
- 19.22.4 <u>Subcontractors</u>: Contractor and its employees, agents or subcontractors (or their relatives) should not receive any cash payments, commissions, employment, gifts, entertainment, free travel, loans, free work, or substantially discounted work or any other considerations from subcontractors, or material suppliers or any other individuals, organizations, or businesses receiving funds in connection with the Project.
- 19.22.5 <u>Other Jobs</u>: Contractor shall not receive the benefit of discounted bids or reduced payments on other jobs as an offset to bids, base subcontracts, and/or change orders on the Project.
- 19.22.6 <u>Owner Notification</u>: It is expected that the ODR be notified as soon as possible whenever anyone aware of these business ethics expectations believes there has been a failure to comply with the provisions herein or an attempt to have someone violate the business ethics expectations.
 - Notifications may be made anonymously.
 - Contractor representatives and/or subcontractor representatives familiar with the Project shall provide upon request a Certified Management Representation Letter in a form agreeable to the Owner stating that they are not aware of any situations violating the business ethics expectations outlined herein or any similar potential conflict of interest situations in connection with the Project.
- 19.22.7 <u>Subcontractor Contracts</u>: Contractor agrees to include the Business Ethics Expectation clause in all contracts with Subcontractors, subconsultants and material suppliers receiving more than \$10,000 in funds in connection with the Project.
- 19.22.8 <u>Interviews and Audits</u>: Contractor and any other third party receiving more than \$10,000 in connection with the Project shall permit interviews of employees and audits of its records by ODR to evaluate compliance with business ethics expectations. Such reviews and audits

will encompass all dealings and activities of Contractor's employees, agents, representatives, vendors, subcontractors, and other third parties paid by Contractor.

19.23 <u>Entire Agreement.</u> The Contract Documents supersede in full all prior discussions and agreements (oral and written) between the parties relating to the subject matter hereof and constitute the entire agreement.

SECTION 007500 - INDEMNIFICATION AND REFERENCE STANDARDS

PART1- GENERAL

1.1 DEFINITION

A. The Architect is SmithGroup, Incorporated, Dallas, TX.

1.2 INDEMNIFICATION

- A. To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Architect, Architect's consultants, and officers, directors, agents and employees of any of them from and against all claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from the performance of the Work, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by negligent acts or omissions of the Contractor, a subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Article on Indemnification.
- B. In claims against any person or entity indemnified under this Article on Indemnification by an employee of the Contractor, a subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under this Article on Indemnification shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or a subcontractor under workers' or workmen's compensation acts, disability benefit acts or other employee benefit acts.
- C. Except to the extent that the Architect would otherwise be liable for negligence under this Agreement, the Contractor shall agree, to the fullest extent permitted by law, to indemnify and hold the Architect harmless from any damage, liability or cost, including reasonable attorney's fees and costs of defense, arising from, allegedly arising from, or in any way connected with changes made by anyone other than the Architect or from any use of the Drawings, Specifications or other Instruments of Service in electronic form (except for normal and customary maintenance and repair) on other than the Project that is the subject of this Agreement, without the prior written consent of the Architect.
- D. Insurance: The Contractor shall procure and maintain sufficient contractual liability insurance to fulfill Contractor's obligations under these indemnification requirements. Such insurance shall be endorsed to include the Architect, Architect's consultants, and officers, directors, agents and employees of any of them as additional insured, and it shall provide that the insurance carriers have no right of subrogation against those indemnified hereunder.
- E. Mold Exclusion: Contractor's Commercial General Liability insurance shall contain no exclusion that would deny coverage for any claim for either bodily injury or property damage arising out of or otherwise caused, in whole or in part, by any fungus, mildew, mold, or resulting allergens. If such exclusion exists and cannot be removed by endorsement, Contractor shall submit proof of coverage for mold claims under a Pollution Legal Liability of Contractor's Pollution Liability policy

1.3 REFERENCE STANDARDS

A. No provision of any reference standard, manual, statute, code or regulation (whether or not specifically incorporated by reference in the Contract Documents) shall be effective to change the duties and responsibilities of the Owner, Contractor, Architect, Architect's consultants, or officers, directors, agents or employees of any of them from those set forth in the Contract Documents, nor shall it be effective to assign to the Architect, Architect's consultants, or officers, directors, agents or any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility for construction means, methods, techniques, sequences or procedures, or for safety precautions and programs in connection with the Work, or for the Contractor's failure to carry out the Work in accordance with the Contract Documents, or for the acts or omissions of the Contractor, subcontractors, or any of their agents or employees, or any other persons performing the Work.

SECTION 011000 - SUMMARY OF WORK

PART1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes:
 - 1. Project information
 - 2. Work covered by Contract Documents
 - 3. Phased construction
 - 4. Work by Owner
 - 5. Owner-furnished products
 - 6. Access to site
 - 7. Coordination with occupants
 - 8. Work restrictions
 - 9. Specification and drawing conventions
 - 10. Special provisions
 - 11. Purpose of Division 1 General Requirements

1.3 PROJECT INFORMATION

- A. Owner: University of North Texas System
- B. Project Identification: University of North Texas Music Jazz Practice Labs
- C. Project Location: 415 South Avenue C, Denton, Texas 76203-5017
- D. Architect: SmithGroup
- E. Construction Manager-at-Risk:
 - 1. Construction Manager-at-Risk for this Project is Project's constructor. In Divisions 01 through 32 Sections, the terms "Construction Manager" and "Contractor" are synonymous.
- F. Project Web Site: A Project Web site administered by the Contractor will be used for purposes of managing communication and documents during the construction stage.
 - 1. See Division 01 Section 013100 "Project Management and Coordination" for Contractor's requirements for utilizing the Project Web site.

1.4 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of the Project is defined by the Contract Documents and consists of the following:
 - 1. The renovation of the lab west music room inside the main music building is approximately 3,000 square feet. This project consists of renovating the main lab room and its associated anterooms. The design intent includes major upgrades acoustically throughout the space to elevate the room to match the caliper of musician and teaching that takes place in this space. Primary function and size of the room are not being adjusted. New wall and ceiling acoustics are being employed to provide better sound attenuation across the room for both the musicians and the audience. Audio visual components both for teaching and performing are being provided. The renovation also includes the addition of "sound and light lock" with an ADA lift kit to address the needs of physically different individuals all being done within the footprint of the existing facility.
- B. The Drawings and Specifications do not necessarily indicate or describe all Work required for completion of Project.
- C. The Contract Documents describe the essential elements sufficiently to determine the scope of the Project.
- D. Provide all items required for complete operating systems including items not necessarily shown in these Contract Documents, but that can be reasonably inferred as being required for a complete operating system.
- E. The Drawings and Specifications indicate the basic quality of material and quality of construction required for the entire Project

- F. Type of Contract
 - 1. Project will be constructed under a Guaranteed Maximum Price contract.

1.5 STARTING WORK:

- A. The Contractor shall not start work until the Notice to Proceed has been issued and all insurance
- B. certificates have been reviewed and accepted by The University of North Texas System.
 - 1. The Contractor shall furnish the required Insurance Certificates to the
 - 2. Contract Compliance Coordinator. (UGSC, Article 5).
- C. Before commencing Work, submit an updated copy of the Contractor's construction schedule showing the sequence, commencement, completion dates for all phases of the Work.

1.6 WORK BY OWNER

- A. General: Cooperate fully with Owner so work may be carried out smoothly, without interfering with or delaying work under this Contract or work by Owner. Coordinate the Work of this Contract with work performed by Owner.
- B. Fees Paid by Owner: Impact Fees.
- C. Fees Reimbursed by Owner: Tap Fees and Meter Fees.

1.7 ACCESS TO SITE

- A. Use of Site: Limit use of Project site to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated. Use of any area outside of work area must be approved by Owner.
- B. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weather-tight condition throughout construction period. Repair damage caused by construction operations to equal or better condition.
- C. Unless otherwise indicated or specified, or unless otherwise directed by the Owner; water, gas, lighting, power and telephone conduits and wires, sewer lines, and other surface and subsurface structures and lines, shall be maintained by Contractor and shall not be disturbed, disconnected or damaged by the Contractor during progress of Work. Should Contractor in performance of the Work disturb, disconnect or damage any of the above, any cost arising from such disturbance or in replacing or repair shall be borne by the Contractor.

1.8 COORDINATION WITH OCCUPANTS

- A. Partial Owner Occupancy: Owner will occupy the premises during entire construction period, except for areas under construction. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations. Maintain existing exits unless otherwise indicated.
 - 1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and approval of authorities having jurisdiction.
 - 2. Notify the Owner not less than three (3) days in advance of activities that will affect Owner's operations.

1.9 WORK RESTRICTIONS

- A. Work Restrictions, General: Comply with restrictions on construction operations.
 - 1. Comply with limitations on use of public streets and other requirements of authorities having jurisdiction.
- B. On-Site Work Hours: Limit work in the existing building to hours as directed by Owner.
 - 1. Hours for Utility Shutdowns: Coordinated with Owner, with not less than two (2) weeks written notice of intended shutdown.
- C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
 - 1. Notify Owner not less than three (3) days in advance of proposed utility interruptions.
 - 2. Obtain Owner's written permission before proceeding with utility interruptions.

- D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.
 - 1. Notify Owner not less than three (3) days in advance of proposed disruptive operations.
 - 2. Obtain Owner's written permission before proceeding with disruptive operations.
- E. Nonsmoking Campus: Smoking is not permitted anywhere on any UNT campus.
- F. Employee Identification: Provide identification tags for Contractor personnel working on the Project site. Require personnel to utilize identification tags at all times.

1.10 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
 - 1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
 - 2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
- C. Drawing Coordination: Requirements for materials and products identified on the Drawings are described in detail in the Specifications. One or more of the following are used on the Drawings to identify materials and products:
 - 1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
 - 2. Abbreviations: Materials and products are identified by abbreviations published as part of the U.S. National CAD Standard and scheduled on Drawings.
 - 3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

1.11 SPECIAL PROVISIONS

- A. Review Owner's tree protection and mitigation policy (Denton Campus ONLY) available at http://policy.unt.edu/policy/8-6.
- B. Review Owner's Campus Design Guidelines (Denton ONLY) available at https://facilities.unt.edu/sites/default/files/DESIGN%20GUIDELINES%202017_rev%203_09.01.17.pdf

1.12 DIVISION 1 - GENERAL REQUIREMENTS

A. The specification sections contained with Division 01 - General Requirements, serve to expand and define in more detail, the administrative and procedural requirements outlined in Section 007000 - General Conditions. Should any provisions with Division 01 sections be in conflict with the General Conditions, the General Conditions shall govern.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

SECTION 012200 - UNIT PRICES

PART1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Setion, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for unit prices.

1.3 DEFINITIONS

A. Unit price is an amount incorporated into the Agreement, applicable during the duration of the Work as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or deducted from the Contract Sum by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased.

1.4 PROCEDURES

- A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, overhead, and profit.
- B. Measurement and Payment: See individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.
- C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.
- D. List of Unit Prices: A schedule of unit prices is included in Part 3. Specification Sections referenced in the Part 3 "Schedule of Unit Prices" Article contain requirements for materials described under each unit price.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF UNIT PRICES

- A. Unit Price No. 1 : Moisture Vapor Emission Control
 - 1. Description: Concrete slab applied moisture vapor emission control products on concrete slans that do not comply with moisture requirements for finish flooring installation in accordance with Section 090561.13 "Moisture Vapor Control."
 - 2. Unit of Measurement: Per square foot.

SECTION 012300 - ALTERNATES

PART1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

- A. Alternate: An amount proposed by Contractor and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the base bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
 - 1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
 - 2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

- A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
 - 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.
- C. Execute accepted alternates under the same conditions as other work of the Contract.
- D. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

- A. Alternate No. 001 :
 - 1. Base Bid: Individual stall toilet rooms with shread lavator space (Refer to Option 1 in the Drawing set).
 - 2. Alternate: Men's and Women's toilet rooms (Refer to Option 2 in the Drawing set).

SECTION 012500 - SUBSTITUTION PROCEDURES

PART1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

1.3 DEFINITIONS

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
 - 1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
 - 2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.4 SUBMITTALS

- A. Substitution Requests: Submit one (1) PDF file of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Substitution Request Form: Use CSI Form 012500.13
 - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified product, fabrication, or installation cannot be provided, if applicable.
 - b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, which will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable specification section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
 - d. Product Data: including drawings and descriptions of products and fabrication and installation procedures
 - e. Samples, where applicable or requested
 - f. Certificates and qualification data, where applicable or requested
 - g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
 - h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
 - j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
 - k. Cost information, including a proposal of change, if any, in the Contract Sum.
 - I. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
 - m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

- 3. Design Professional's Action: If necessary, Design Professional will request additional information or documentation for evaluation within seven (7) days of receipt of a request for substitution. Design Professional will notify Contractor of acceptance or rejection of proposed substitution within fifteen (15) days of receipt of request, or seven (7) days of receipt of additional information or documentation, whichever is later.
 - a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
 - b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage qualified testing agency to perform compatibility tests recommended by manufacturers.

1.6 PROCEDURES

A. Coordination: Modify or adjust affected work as necessary to integrate work of the approved substitutions.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately upon discovery of need for change, but not later than fifteen (15) days prior to time required for preparation and review of related submittals.
 - 1. Conditions: Design Professional will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - b. Substitution request is fully documented and properly submitted.
 - c. Requested substitution will not adversely affect Contractor's construction schedule.
 - d. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - e. Requested substitution is compatible with other portions of the Work.
 - f. Requested substitution has been coordinated with other portions of the Work.
 - g. Requested substitution provides specified warranty.
 - h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- B. Substitutions for Convenience: Not allowed, unless otherwise indicated. If allowed Design Professional will consider requests for substitution if received within sixty (60) days after commencement of the Work. Requests received after that time may be considered or rejected at discretion of Design Professional.
 - 1. Conditions: Design Professional will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Design Professional will return requests without action, except to record noncompliance with these requirements:
 - Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect Design Professional redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
 - b. Requested substitution does not require extensive revisions to the Contract Documents.
 - c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - d. Substitution request is fully documented and properly submitted.
 - e. Requested substitution will not adversely affect Contractor's construction schedule.
 - f. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - g. Requested substitution is compatible with other portions of the Work.
 - h. Requested substitution has been coordinated with other portions of the Work.
 - i. Requested substitution provides specified warranty.
 - j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 3 - EXECUTION (Not Used)

SECTION 012500.13 - SUBSTITUTION REQUEST FORM

PROJECT:				(After Contract Award)							
TO:											
NO.							DAT	E:	-		
				acceptance ction 012500 "				ct or system as a substitution s":	in accordance with		
1.	SPE	CIFI		CT OR SYSTE	EM						
	Sub	bstitution request for:									
	Spe	cifica	tion Section	No.:		_Article	e/ Pa	aragraph:			
2.	RE	SON	I FOR SUBS		EQUEST						
	SPE	CIFI		СТ			PROPOSED PRODUCT				
		ls n	o longer ava	ilable				Will reduce construction time			
		ls u	nable to me	et project sche	edule			Will result in cost savings of			
		I Is unsuitable for the designated application			n	\$	to Project				
		Car	not interface	e with adjacen	t materials			Is for supplier's convenience			
		ls n	ot compatibl	e with adjacer	nt materials			Is for subcontractor's convenie	ence		
	Cannot provide the specified warrantyCannot be constructed as indicated					Other:					
							_				
		Car	not be obtai	ined due to on	e or more of	re of the following:					
			Strike		Bankrupt	cy of m	y of manufacturer or supplier				
			Lockout		Similar oo	ccurren	ice (explain below)			
3.	SUF	POR		A Contraction of the second se							
		Drawings, specifications, product data, performance data, test data, and any other neces to facilitate review of the Substitution Request are attached.						ecessary information			
		San	nple is attac	hed		Samp	ole w	ill be sent if requested			
4.	QU	ALIT)	(COMPARI	SON							
	Prov	Provide all necessary side-by-side comparative data as required to facilitate review of Subs						stitution Request:			
				SPECIFIED F	PRODUCT			PROPOSED PRODUCT			
	Mar	nufact	urer:								
		alog N									

Vendor: Variations:	
Vanations.	(Add Additional Sheets If Necessary)
Local Distributo	r or Supplier:
Maintenance Se	ervice Available: 🛛 Yes 🗆 No
Spare Parts So	urce:
Warranty: □	
PREVIOUS INS	TALLATIONS
Identification of	at least three (3) similar projects on which proposed substitution was us
PROJECT #1 Project:	
Address:	
Architect:	
Owner:	
Contractor:	
Date Installed:	
PROJECT #2	
Project:	
Address:	
Architect:	
Owner:	
Contractor:	
Date Installed:	
PROJECT #3	
Project:	
Address:	
Architect:	
Owner:	

5.

Contractor:

Date Installed:

6. EFFECT OF SUBSTITUTION

Proposed substitution affects other work or trades:
No
Yes (if yes, explain)

Proposed substitution requires dimensional revisions or redesign of architectural, structural, M-E-P, life safety, or other work:

- 🗆 No
- Yes (if yes, attach data explaining revisions)

7. STATEMENT OF CONFORMANCE OF REQUEST TO CONTRACT REQUIREMENTS

Contractor and Subcontractor have investigated the proposed substitution and hereby represent that:

- A. They have personally investigated the proposed substitution and believe that it is equal to or superior in all respects to specified product, except as stated above;
- B. The proposed substitution is in compliance with applicable codes and ordinances;
- C. The proposed substitution will provide same warranty as specified for specified product;
- D. They will coordinate the incorporation of the proposed substitution into the Work, and will include modifications to the Work as required to fully integrate the substitution;
- E. They have included complete cost data and implications of the substitution (attached);
- F. They will pay any redesign fees incurred by the Architect or any of the Design Professional's consultants, and any special inspection costs incurred by the Owner, caused by the use of this product;
- G. They waive all future claims for added cost or time to the Contract related to the substitution, or that become known after substitution is accepted.
- H. The Design Professional's approval, if granted, will be based upon reliance upon data submitted and the opinion, knowledge, information, and belief of the Design Professional at the time decision is rendered and Addendum is issued; and that Design Professional's approval therefore is interim in nature and subject to reevaluation and reconsideration as additional data, materials, workmanship, and coordination with other work are observed and reviewed.

Contractor:				
	(Name of Contractor)			
Date:	By:			
Subcontractor:	(Name of Subcontractor)			
Date:	Ву:			
Note: Unresponsive or inc	omplete requests will be rejected and returned without review.			

8. DESIGN PROFESSIONAL'S REVIEW AND ACTION

- □ Substitution is accepted.
- Substitution is accepted, with the following comments: _______

□ Resubmit Substitution Request:

Provide more information in the following areas: ______

- Provide proposal indicating amount of savings / credit to Owner
- Bidding Contractor shall sign Bidder's Statement of Conformance
- Bidding Subcontractor shall sign Bidder's Statement of Conformance
- □ Substitution is not accepted:
 - □ Substitution Request received too late.
 - □ Substitution Request received directly from subcontractor or supplier.
 - □ Substitution Request not submitted in accordance with requirements.
 - □ Substitution Request Form is not properly executed.
 - □ Substitution Request does not indicate what item is being proposed.
 - □ Insufficient information submitted to facilitate proper evaluation.
 - Proposed product does not appear to comply with specified requirements.
 - Proposed product will require substantial revisions to Contract Documents.
- By: _____
- Date:

Design Professional has relied upon the information provided by the Contractor, and makes no claim as to the accuracy, completeness, or validity of such information. If an accepted substitution is later found to be not in compliance with the Contract Documents, Contractor shall provide the specified product.

9. OWNER'S REVIEW AND ACTION

- □ Substitution is accepted for items not involving additional costs.
- □ Substitution is not accepted.

By:

(Owner's Construction Manager)

Date: _____

END OF FORM

SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for handling and processing Contract modifications.
- B. Related Sections:
 - 1. Division 01 Section 016000, "Product Requirements" for administrative procedures for handling requests for substitutions made after Contract award.

1.3 MINOR CHANGES IN THE WORK

A. Design Professional will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710, "Architect's Supplemental Instructions." or Architect's Bulletin form.

1.4 CHANGE ORDER REQUESTS

- A. Owner/Design Professional-Initiated Change Order Requests: will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
 - 1. Change Order Requests issued by Owner/Design Professional are not instructions either to stop work in progress or to execute the proposed change.
 - 2. Within time specified in Change Order Request after receipt of Change Order Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
 - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include costs of labor and supervision directly attributable to the change.
 - d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship.
 - e. Quotation Form: Use Change Order Request (COR) form. Contractor shall complete the COR Cost Analysis form and the Sub-Contractor shall submit the Sub-Contractor Cost Analysis form with supporting documentation and cost breakdown by line item, or other form approved by Owner.
- B. Contractor-Initiated Change Orders: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Owner/Architect.
 - 1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
 - 2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - 3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - 4. Include costs of labor and supervision directly attributable to the change.
 - 5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 - 6. Comply with requirements in Division 01 Section 012500, "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
 - 7. Change Order Request Form: Use Owner's standard Change Order Request form as approved by Owner and Design Professional.

1.5 ADMINISTRATIVE CHANGE ORDERS

- A. Allowance Adjustment: Refer to Division 01, Section 012100, "Allowances" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect actual costs of allowances.
- B. Unit Price Adjustment: Refer to Division 01 Section 012200, "Unit Prices" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect measured scope of unit price work.

1.6 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Change Order Request, Owner will prepare and issue a Change Order on attached form for signatures of Owner, Design Professional and Contractor.

1.7 CONSTRUCTION CHANGE DIRECTIVE

- A. Work Change Directive: Owner may issue a Construction Change Directive on attached form. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
 - 1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Work Change Directive.
 - 1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

CONSTRUCTION CHANGE ORDER

UNT SYSTEM

Construction Agreement JOC Job Order

JO Date:

FROM OWNER: University of North Texas System 1155 Union Circle #311040 Denton, TX 76203

TO CONTRACTOR: (Name and Address)

A/E NAME: PROJECT/CONTRACT NO .: CONTRACT DATE: PROJECT NAME:

CHANGE ORDER NO .:

CIP PROJECT NO .:

DATE:

PO NO.:

The Agreement is changed as follows:			
		Tota	al \$ -
All Services provided per attached are hereb	by incorporated by reference for all purposes.		
The original Agreement, Early Release Pack	kages, and/or GMP Amendment Sum:		
The net change by previously authorized C	hange Orders:		
The Agreement Sum prior to this Change C	Order:		\$ -
The Agreement Sum will be increased by t	his Change Order in the amount of		\$-
New Agreement Sum including this Chang	ge Order:		\$-
The TIME of the project has increased by		days	
The date of SUBSTANTIAL COMPLETION as	of the date of this Change Order is		
Or if services are being provided after SUB	STANTIAL COMPLETION		
The completion date of the services provid	led in this Change Order will be		
NOT VALID UNTIL SIGNED BY THE A/E, CO	NTRACTOR AND OWNER		
		University of N	orth Texas System
A/E (Firm Name)	CONTRACTOR (Firm Name)	OWNER	
By (Signature)	By (Signature)	By (Signature)	
Name (Typed or Printed Name)	Name (Typed or Printed Name)		
-			
Title	Title	Title	
Date	Date	Date	

Construction Change Directive



FROM OWNER:

CONSTRUCTION CHANGE DIRECTIVE NUMBER:

University of North Texas (System or Institution) 1155 Union Circle #311040 Denton, Texas 76203

DATE ISSUED:

TO CONTRACTOR: (Name and Address)

PROJECT NAME: AGREEMENT DATE: CIP PROJECT NUMBER PURCHASE ORDER NUMBER:

The following change in the Contract Documents is approved by the Owner and the Work is authorized to proceed accordingly:

Additional Days Required	Calendar Days	Not to Exceed Cost	\$-

When the Owner and Contractor agree upon the exact adjustment in the Contract Price and/or the Contract Time for a change in the Work directed by this Construction Change Directive, such agreement shall be the subject of a Change Order.

The Change Order shall include all outstanding Construction Change Directives that the contractor would like to include on an application for payment.

A Change Order must be executed before the Contractor is allowed to add the Work described above on an application for payment.

Owner

University of North Texas (System or Institution Name)

BY (Signature)

[Authorized Signatory Name] [Authorized Signatory Title]

Date

BY (Signature)

[Authorized Signatory Name] [Authorized Signatory Title]

SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract including General and Supplementary Conditions and other Division 01 Specifications Sections apply to this Section.

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Sections include the following:
 - 1. Division 01 Section 012600 for administrative procedures for handling changes to the Contract.
 - 2. Division 01 Section 013200 for administrative requirements governing preparation and submittal of Contractor's Construction Schedule and Submittal Schedule.
 - 3. Division 00 Section 007000 University of North Texas System Uniform General Conditions and Supplementary General Conditions 2022, Amended.

1.3 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Application for Payment. The Schedule of Values is a form provided by Owner to Contractor

1.4 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule
 - 1. Correlate line items in the Schedule of Values with other required administrative forms and schedules including the following:
 - a. Application for Payment form with Continuation Sheets
 - b. Submittal Schedule
 - c. Contractor's Construction Schedule
 - 2. Submit the Schedule of Values to Architect at earliest possible date but no later than seven calendar days before the date scheduled for submittal of initial Application for Payment.
 - 3. Sub schedules: Where the Work is separated into phases requiring separately phased payments, provide sub-schedules indicating values correlated with each phase of payment.
- B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. Provide at least one line item for each Specification Section.
 - 1. Identification: Include the following Project identification on the Schedule of Values:
 - a. Project name and location
 - b. Name of Architect
 - c. Architect's project number
 - d. Contractor's name and address
 - e. Date of submittal
 - 2. The Schedule of Values is formatted using CSI Divisions. (see form instructions)
 - 3. Draft Submittals: Submit in same format as final payment application
 - 4. Arrange the Schedule of Values in tabular form with separate sections to indicate the following for each item listed:
 - a. Related Specification Section or Division
 - b. Change Orders (numbers) that affect value
 - c. Dollar value
 - 1) Percentage of the Contract Sum to nearest one-tenth percent adjusted to total 100 percent.
 - 5. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Owner/Architect will review Contractor's Schedule of Values and approve upon receipt of sufficient detail as deemed satisfactory to Owner/Architect.
 - 6. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored but not yet installed.
 - a. Differentiate between items stored on-site and items stored off-site. Include evidence of insurance and storage in bonded warehousing for materials stored off-site.

- b. For major items provide separate line items for materials and labor based on CSI Master Format Division. Major items include but not limited to:
 - Division 01 General Requirements
 - Division 02 Existing Conditions
 - Division 03 Concrete
 - Division 04 Masonry
 - Division 05 Metals
 - Division 06 Wood, Plastics, Composites
 - Division 07 Thermal and Moisture Protection
 - Division 08 Openings
 - Division 09 Finishes
 - Division 10 Specialties
 - Division 11 Equipment
 - Division 12 Furnishings
 - Division 13 Special Construction
 - Division 14 Conveying Equipment
 - Division 21 Fire Suppression
 - Division 22 Plumbing
 - Division 23 Heating, Ventilating, and Air Conditioning (HVAC)
 - Division 25 Integrated Automation
 - Division 26 Electrical
 - Division 27 Communications
 - Division 28 Electronic Safety and Security
 - Division 31 Earthwork
 - Division 32 Exterior Improvements
- 7. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost.
- 8. In addition to line item costs of Sections in Division 02 thru 32, furnish line item costs for each item of the following general administrative and procedural cost items.
 - a. Bonds
 - b. Insurance
 - c. Mobilization
 - d. Field Superintendence
 - e. Temporary Facilities
 - f. Trench Safety
 - g. Clean-up and Disposal
 - h. Project Close Out
 - i. Final Cleaning
 - j. Demobilization
 - k. Overhead and General Conditions
 - I. Contractor's Fee
- 9. Plumbing, HVAC, Electrical and Life Safety work shall be broken down in accordance with the following subcategories as a minimum:
 - a. Fire Protection:
 - b. Plumbing:
 - c. Heating, Ventilating and Air Conditioning (HVAC):
 - d. Electrical:
 - e. Fire Detection and Alarm:
- 10. Schedule Updating: Update and resubmit the Schedule of Values before the next Application for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT

A. Electronically deliver in a format approved by Owner after the Design Professional has certified the Payment Application Payment processing will start as soon as we receive and date stamp the payment. In return the Contractor will be given a receipt that will be initialed and a photocopy will be provided to the Contractor.

- B. B. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.
 - 1. Initial Application for Payment, Application for Payment at time of Substantial Completion and Final Application for Payment involve additional requirements.
- C. Payment Application Times: Progress payment is due once a month.
- D. Payment Application Forms: Use Application for Payment form to be furnished by Owner.
- E. Application Preparation: Complete every entry on form. Application to be Notarized by a Notary and executed by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
 - 1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.
 - 2. Include amounts of Change Order issued before the last day of construction period covered by application.
 - 3. Include supporting documentation including subcontractor and supplier invoices.
- F. Transmittal: Prepare one copy with original signatures and original notary of each Application for Payment by a method ensuring receipt within 24-hours. The copy shall include waivers of lien, schedule updates, contractor's executive summary and similar attachments.
 - 1. Transmit each package with a transmittal form listing attachments and recording appropriate information about application including subcontractor supplemental documentation and required general conditions documents.
- G. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from subcontractors, sub-subcontractors and suppliers for construction period covered by the previous application.
 - 1. Submit partial lien waivers on each item for amount requested in previous applications after deduction for retainage of each item.
 - 2. When an application shows completion of an item submit final or full lien waivers.
 - 3. Owner reserves the right to designate which entities involved in the Work must submit lien waivers.
 - 4. Submit final Application for Payment with, or proceeded by, final lien waivers from every entity
 - involved with performance of the Work covered by the application that is lawfully entitled to a lien.Waiver Forms: Submit waivers of lien on forms executed in a manner acceptable to Owner.
- H. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment.
 - 1. Include the following:
 - a. List of subcontractors
 - b. Schedule of Values
 - c. Contractor's Construction Schedule (preliminary if not final)
 - d. Products list
 - e. Submittal Schedule (preliminary if not final)
 - f. List of Contractor's staff assignments
 - g. List of Contractor's principal consultants
 - h. Initial progress report
 - i. Report of preconstruction conference
 - j. Certificates of insurance and insurance policies
 - k. Performance and payment bonds
 - I. Data needed to acquire Owner's insurance
- I. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
 - 1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum
 - 2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- J. Final Payment Application: Submit Final Application for Payment within thirty (30) days of Substantial Completion along with releases and supporting documentation not previously submitted and accepted including, but not limited to, the following:
 - 1. Evidence of completion of Project closeout requirements
 - 2. Insurance certificate for products and completed operations where required and proof taxes, fees and similar obligations were paid

- 3. Updated final statement accounting for final changes to the Contract Sum
- 4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims"
- 5. AIA Document G706A, "Contractor's Affidavit of Release of Liens"
- 6. AIA Document G707, "Consent of Surety to Final Payment"
- 7. Evidence that claims have been settled
- K. Electronic Fund Transfer (EFT): Vendors are encouraged to utilize EFT for the distribution of all future payments. To sign up for EFT, complete the EFT Agreement (Supplier) at, https://www.untsystem.edu/sites/default/files/forms/procurement/supplier_eft_form_revised.pdf. Once established, all future payments will be made by EFT. When an EFT payment is made, an email will be sent to the email address you specify on the EFT agreement form. If you have any questions, please contact the Business Service Center at bsc@untsystem.edu or 940-369-5500.
- PART 2 PRODUCTS (Not Used)
- PART 3 EXECUTION (Not Used)

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. General project coordination procedures
 - 2. Administrative and supervisory personnel
 - 3. Coordination drawings
 - 4. Requests for Information (RFIs)
 - 5. Project Web site
 - 6. Project meetings
- B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.

1.3 DEFINITIONS

A. RFI: Request from Contractor seeking information from each other during construction.

1.4 COORDINATION

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations included in different Sections that depend on each other for proper installation, connection, and operation.
 - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 - 2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
 - 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
 - 1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
 - 1. Preparation of Contractor's construction schedule, continually updated, and in a format acceptable to Owner
 - 2. Preparation of the schedule of values
 - 3. Installation and removal of temporary facilities and controls
 - 4. Delivery and processing of submittals
 - 5. Progress meetings
 - 6. Pre-Installation conferences
 - 7. Project closeout activities
 - 8. Startup and adjustment of systems
 - 9. Project closeout activities

1.5 COORDINATION DRAWINGS

- A. Coordination Drawings, General: Prepare coordination drawings in accordance with requirements in individual Sections, where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
 - 1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:

- a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
- b. Coordinate the addition of trade-specific information to the coordination drawings by multiple contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
- c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
- d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
- e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
- f. Indicate required installation sequences.
- g. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Design Professional indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
- B. Coordination Drawing Organization: Organize coordination drawings as follows:
 - 1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire protection, fire alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
 - 2. Plenum Space: Indicate sub-framing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
 - 3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire protection, fire alarm, and electrical equipment.
 - 4. Structural Penetrations: Indicate penetrations and openings required for all disciplines, including fire protection requirements.
 - 5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
 - 6. Mechanical and Plumbing Work: Show the following:
 - a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems
 - b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment
 - c. Fire-rated enclosures around ductwork
 - 7. Electrical Work: Show the following:
 - a. Runs of vertical and horizontal conduit 1¹/₄ -inch diameter and larger
 - b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire alarm locations
 - c. Panel board, switchboard, switchgear, transformer, busway, generator, and motor control center locations
 - d. Location of pull boxes and junction boxes, dimensioned from column center lines
 - Fire Protection System: Show the following:
 - a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.
 - 9. Review: Design Professional will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are the Contractor's responsibility. If the Design Professional determines that the coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, the Design Professional will so inform the Contractor (copy the Owner), who shall make changes as directed and resubmit.
 - 10. Coordination Drawing Prints: Prepare coordination drawing prints in accordance with requirements of Division 01 Section 013300, "Submittal Procedures".
- C. Coordination Digital Data Files: Prepare coordination digital data files in accordance with the following requirements:
 - 1. File Preparation Format: Same digital data software program, version, and operating system as the original Drawings.
 - 2. File Preparation Format: DWG, Version, operating in Microsoft Windows operating system.

8.

- 3. File Submittal Format: Submit or post coordination drawing files using Portable Data File (PDF) format.
- Design Professional will furnish Contractor one set of digital data files of the Drawings for use in preparing coordination digital data files. Refer to Division 01 Section 013300, "Submittal Procedures", for digital data file requirements.
 - a. Design Professional makes no representations as to the accuracy or completeness of digital data files as they relate to the Drawings.
 - b. Digital Data Software Program: The Drawings are available in
 - c. Contractor shall execute a data licensing agreement in a form agreeable to the Design Professional.

1.6 CHANGE KEY PERSONNEL

- A. Change Key Personnel Names: Changes to key personnel originally stated in the bid response must include a revised list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and email addresses. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.
 - 1. Post copies of list in project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.
 - 2. Key personnel must be same as those proposed in the bid response unless changes are authorized in writing from the Associate Vice Chancellor for System Facilities prior to their first day on the project.

1.7 REQUESTS FOR INFORMATION (RFIs)

- A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI. All RFIs should be sent directly to the Design Professional via email or posted to project collaboration site (if one is being utilized). The Design Professional will redistribute to the appropriate reviewer.
 - 1. Design Professional will return RFIs submitted to Design Professional by other entities controlled by Contractor with no response.
 - 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
 - 1. Project name
 - 2. Project number
 - 3. Date
 - 4. Name of Contractor
 - 5. Name of Design Professional
 - 6. RFI number, numbered sequentially
 - 7. RFI subject
 - 8. RFI Question
 - 9. Specification Section number and title and related paragraphs, as appropriate
 - 10. Drawing number and detail references, as appropriate
 - 11. Field dimensions and conditions, as appropriate
 - 12. Contractor's suggested resolution. If Contractor's solution(s) impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 - 13. Contractor's signature
 - 14. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
 - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. RFI Forms: Software-generated form with substantially the same content as indicated above, acceptable to Design Professional. RFIs should be emailed to Design Professional with the following format standards. 1) RFI should include RFI number in subject line of email along with brief description. 2) Body of email should include question or description of RFI and suggestion. Sketches or other necessary documents should be attached to email in PDF format.

- D. Design Professional's Action: Design Professional will review each RFI, determine action required, and respond. Allow seven (7) business days for Design Professional's response for each RFI. RFIs received by Design Professional after 1:00 p.m. will be considered as received the following working day.
 - 1. The following RFIs will be returned without action:
 - a. Requests for approval of submittals
 - b. Requests for approval of substitutions
 - c. Requests for coordination information already indicated in the Contract Documents
 - d. Requests for adjustments in the Contract Time or the Contract Sum
 - e. Requests for interpretation of Design Professional's actions on submittals
 - f. Incomplete RFIs or inaccurately prepared RFIs
 - 2. Design Professional's action may include a request for additional information, in which case Design Professional's time for response will date from time of receipt of additional information.
 - 3. Design Professional's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 01 Section 012600, "Contract Modification Procedures".
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Design Professional in writing within ten (10) days of receipt of the RFI response.
- E. On receipt of Design Professional's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Design Professional within seven days if Contractor disagrees with response.
- F. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. log with not less than the following:
 - 1. RFI Log Date
 - 2. Project name
 - 3. Name and address of Contractor
 - 4. Name and address of Design Professional and Construction Manager
 - 5. RFI number including RFIs that were dropped and not submitted
 - 6. RFI description
 - 7. Date the RFI was submitted
 - 8. Request Date
 - 9. Date Design Professional's and Construction Manager's response was received
 - 10. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate
 - 11. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate

1.8 PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.
 - 1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Design Professional of scheduled meeting dates and times.
 - 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees in advance of meeting.
 - 3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Design Professional, within three (3) days of the meeting.
- B. Pre-construction Conference: Schedule and conduct a pre-construction conference before starting construction, at a time convenient to Owner and Design Professional, but no later than fifteen (15) days after notice to proceed.
 - 1. Conduct the conference to review responsibilities and personnel assignments.
 - Attendees: Authorized representatives of Owner, Owner's Commissioning Authority, Construction Manager, Design Professional, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 - 3. Agenda: Distribute the agenda to all invited attendees in advance of meeting. Discuss items of significance that could affect progress, including the following:
 - a. Tentative construction schedule
 - b. Phasing

- c. Critical work sequencing and long-lead items
- d. Designation of key personnel and their duties
- e. Lines of communications
- f. Procedures for processing field decisions and Change Orders
- g. Procedures for RFIs
- h. Procedures for testing and inspecting
- i. Procedures for processing Applications for Payment
- j. Distribution of the Contract Documents
- k. Submittal procedures
- I. Sustainable design requirements
- m. Preparation of record documents
- n. Use of the premises[and existing building]
- o. Work restrictions
- p. Working hours
- q. Owner's occupancy requirements
- r. Responsibility for temporary facilities and controls
- s. Procedures for moisture and mold control
- t. Procedures for disruptions and shutdowns
- u. Construction waste management and recycling
- v. Parking availability
- w. Office, work, and storage areas
- x. Equipment deliveries and priorities
- y. First aid
- z. Security
- aa. Progress cleaning
- bb. Commissioning requirements/coordination
- 4. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes within three (3) days of meeting date.
- C. Pre-Installation Conferences: Conduct a pre-installation conference at Project site before each construction activity that requires coordination with other construction.
 - 1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Design Professional of scheduled meeting dates.
 - 2. Agenda: Distribute the agenda to all invited attendees in advance of meeting. Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. Contract Documents
 - b. Options
 - c. Related RFIs
 - d. Related Change Orders
 - e. Purchases
 - f. Deliveries
 - g. Submittals
 - h. Review of mockups
 - i. Possible conflicts
 - j. Compatibility problems
 - k. Time schedules
 - I. Weather limitations
 - m. Manufacturer's written recommendations
 - n. Warranty requirements
 - o. Compatibility of materials
 - p. Acceptability of substrates
 - q. Temporary facilities and controls
 - r. Space and access limitations
 - s. Regulations of authorities having jurisdiction
 - t. Testing and inspecting requirements
 - u. Installation procedures
 - v. Coordination with other work
 - w. Required performance results
 - x. Protection of adjacent work

- Protection of construction and personnel
- 3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
- 4. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes within three (3) days of meeting date.
- 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Project Closeout Conference: Schedule and conduct Project closeout conference, at a time convenient to Owner and Design Professional, but no later than 14 days prior to the scheduled date of Substantial Completion.
 - 1. Conduct the conference to review requirements and responsibilities related to Project closeout.
 - 2. Attendees: Authorized representatives of Owner, Design Professional, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 - 3. Agenda: Distribute the agenda to all invited attendees in advance of meeting. Discuss items of significance that could affect or delay Project closeout, including the following:
 - a. Preparation of record documents
 - b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance
 - c. Submittal of written warranties
 - d. Requirements for preparing sustainable design documentation
 - e. Requirements for preparing operations and maintenance data
 - f. Requirements for demonstration and training
 - g. Preparation of Contractor's punch list
 - h. Procedures for processing Applications for Payment at Substantial Completion and for final payment
 - i. Submittal procedures
 - j. Coordination of separate contracts
 - k. Owner's partial occupancy requirements
 - I. Installation of Owner's furniture, fixtures, and equipment
 - m. Responsibility for removing temporary facilities and controls
 - 4. Minutes: Entity conducting meeting will record and distribute meeting minutes within three (3) days of meeting date.
- E. Progress Meetings: Conduct progress meetings at agreed upon intervals.
 - 1. Coordinate dates of meetings with preparation of payment requests.
 - 2. Attendees: In addition to representatives of Owner, Owner's Commissioning authority, Construction Manager, and Design Professional, each contractor, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 - 3. Agenda: Distribute the agenda to all invited attendees in advance of meeting. Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - 1) Review schedule for next period.
 - b. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements
 - 2) Sequence of operations
 - 3) Status of submittals
 - 4) Deliveries
 - 5) Off-site fabrication
 - 6) Access
 - 7) Site utilization
 - 8) Temporary facilities and controls

- 9) Progress cleaning
- 10) Quality and work standards
- 11) Status of correction of deficient items
- 12) Field observations
- 13) Status of RFIs
- 14) Status of proposal requests
- 15) Pending changes
- 16) Status of Change Orders
- 17) Pending claims and disputes
- 18) Documentation of information for payment requests
- 19) Recommendations of construction feasibility
- 20) Safety precautions and programs
- 4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information within three (3) days of meeting date.
 - a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.
- F. Coordination Meetings: Conduct project coordination meetings at regular intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and pre-installation conferences.
 - Attendees: In addition to representatives of Owner and Design Professional, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meetings shall be familiar with Project and authorized to conclude matters relating to the Work.
 - 2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to combined Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - b. Schedule Updating: Revise combined Contractor's construction schedule after each coordination meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
 - c. Review present and future needs of each contractor present, including the following:
 - 1) Interface requirements
 - 2) Sequence of operations
 - 3) Status of submittals
 - 4) Deliveries
 - 5) Off-site fabrication
 - 6) Access
 - 7) Site utilization
 - 8) Temporary facilities and controls
 - 9) Work hours
 - 10) Hazards and risks
 - 11) Progress cleaning
 - 12) Quality and work standards
 - 13) Change Orders
 - 3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting, within three (3) days of meeting date.
 - 4. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes within three (3) days of meeting date.
- G. Meetings Requested by Owner: While not necessarily coinciding with dates of other meetings, Owner reserves the right to call and conduct meetings with project participants as the need arises.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
 - 1. Contractor's Work Progress Schedule
 - 2. Daily construction reports
 - 3. Material location reports
 - 4. Field condition reports
 - 5. Special reports

1.3 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and/or controlling the construction project. Activities included in a construction schedule that consume time and resources.
 - 1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
 - 2. Predecessor Activity: An activity that precedes another activity in the network.
 - 3. Successor Activity: An activity that follows another activity in the network.
- B. Baseline Schedule: The initial time schedule prepared by Contractor for Owner's information and acceptance that conveys Contractor's and Subcontractors' activities (including coordination and review activities required in the Contract Documents to be performed by Design Professional and Owner), durations, and sequence of work related to the entire Project to the extent required by the Contract Documents. The schedule clearly demonstrates the Longest Path of activities, durations, and necessary predecessor conditions that drive the end date of the schedule. The Baseline Schedule shall not exceed the time limit current under the Contract Documents.
- C. Longest Path: The sequence of directly related activities that comprise the longest continuous chain of activities from the start of the first activity to the finish of the last activity. The activities represent critical path plus float plus historical weather days. Each activity in the Longest Path is critical and directly related in that it prevents its successor from being scheduled earlier than it is.
- D. Event: The starting or ending point of an activity.
- E. Work Progress Schedule: The continually updated time schedule prepared and monitored by the Contractor that coordinates and integrates activities of the Project, including Contractor's services, Design Professional's services, the work of other consultants, suppliers, and Owner's activities with the anticipated construction schedules for other contractors. The WPS accurately indicates all necessary and appropriate revisions including a longest path impact analysis, as required by the conditions of the Work and the Project while maintaining a concise comparison to the Baseline Schedule.
- F. Float: The period of time a task can be delayed without delaying Substantial Completion date.

1.4 INFORMATIONAL SUBMITTALS

A. Format for Submittals: Submit required submittals in the following format:

- 1. PDF electronic file.
- B. Contractor's Baseline Schedule: Initial Baseline Schedule due with Guaranteed Maximum Price in a Construction Manager-At-Risk and with the Proposal Response in a CSP, of size required to display entire schedule for entire construction period. The Baseline Schedule shall become the comparison to the actual conditions throughout the Contract duration and become part of the Contractor's Work Progress Schedule.
 - 1. Submit a working electronic copy of schedule, using software indicated, and labeled to comply with requirements for submittals. Include type of schedule (baseline or updated) and date on label.
- C. WPS Reports: Concurrent with WPS schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, original duration, and remaining duration in calendar days.

- 1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.
- 2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity.
- 3. Earnings Report: Compilation of Contractor's total earnings from commencement of the Work until most recent Application for Payment.
- D. Material Location Reports: Submit at prior to application for payment
- E. Field Condition Reports: Submit at time of discovery of differing conditions
- F. Special Reports: Submit at time of unusual event

1.5 QUALITY ASSURANCE

A. Scheduling Consultant Qualifications: An experienced specialist in WPS scheduling and reporting, with capability of producing WPS reports and diagrams within twenty-four (24) hours of Design Professional's request.

1.6 COORDINATION

- A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.
- B. Coordinate Contractor's construction schedule with the schedule of values, submittal schedule, progress reports, payment requests, and other required schedules and reports.
 - 1. Secure time commitments for performing critical elements of the Work from entities involved.
 - 2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 CONTRACTOR'S WORK PROGRESS SCHEDULE, GENERAL

- A. Time Frame: Extend schedule from date established for commencement of the Work to date of Final Completion.
 - 1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- B. Activities: Treat each story or separate area as a separate numbered activity for each principal element of the Work. Comply with the following:
 - 1. Procurement Activities: Include procurement process activities for long lead items (as identified by Contractor) and major items, requiring a cycle of more than sixty (60) days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
 - 2. Submittal Review Time: Include review and resubmittal times indicated in Division 01 Section 013300, "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
 - 3. Startup and Testing Time: Include not less than fifteen (15) days for startup and testing.
 - 4. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Design Professional's administrative procedures necessary for certification of Substantial Completion.
 - 5. Punch List and Final Completion: Include not more than thirty (30) days for punch list and final completion.
- C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
 - 1. Phasing: Arrange list of activities on schedule by phase.
 - 2. Work under More Than One Contract: Include a separate activity for each contract.
 - 3. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
 - 4. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Division 01 Section 011000, "Summary". Delivery dates indicated stipulate the earliest possible delivery date.
 - 5. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Division 01 Section 011000, "Summary". Delivery dates indicated stipulate the earliest possible delivery date.
 - 6. Work Restrictions: Show the effect of the following items on the schedule:

- a. Coordination with existing conditions
- b. Limitations of continued occupancies
- c. Uninterruptible services
- d. Partial occupancy before Substantial Completion
- e. Use of premises restrictions
- f. Lead time for future construction
- g. Seasonal variations
- h. Environmental control
- 7. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
 - a. Subcontract awards
 - b. Submittals
 - c. Purchases
 - d. Mockups
 - e. Fabrication
 - f. Sample testing
 - g. Deliveries
 - h. Installation
 - i. Tests and inspections
 - j. Adjusting
 - k. Curing
 - I. Startup and placement into final use and operation
- 8. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
 - a. Structural completion
 - b. Permanent space enclosure
 - c. Completion of mechanical installation
 - d. Completion of electrical installation
 - e. Substantial Completion
- D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion.
- E. Cost Correlation: At the head of schedule, provide a cost correlation line, indicating planned and actual costs. On the line, show dollar volume of the Work performed as of dates used for preparation of payment requests.
 - 1. Refer to Division 01 Section 012900, "Payment Procedures" for cost reporting and payment procedures.
- F. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
 - 1. Unresolved issues
 - 2. Unanswered RFIs
 - 3. Rejected or unreturned submittals
 - 4. Notations on returned submittals
- G. Recovery Schedule: When periodic update indicates the Work is fourteen (14) or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required for compliance, and date by which recovery will be accomplished.
- H. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules. Confirm acceptability of software with Owner. Contractor is responsible for all costs associated with licensing and training of the software.
- I. Schedule shall be updated with the weekly OAC meeting and must include current details for all activities.

2.2 CONTRACTOR'S WORK PROGRESS SCHEDULE (WPS SCHEDULE)

A. General: Contractor shall submit for review and approval a Baseline Schedule that will indicate starting and completing dates of various aspects required to complete the work using the Longest Path. The Baseline Schedule shall become the comparison to the actual conditions throughout the contract and become a part of the Work Progress Schedule.

- B. Contractor's Work Progress Schedule (WPS) shall coordinate and integrate the services and activities of Contractor, Design Professional and Owner, other consultants/suppliers, subcontractors and requirements of governmental entities. The WPS is due within twenty-one (21) days after the effective date of Notice to Proceed.
- C. Contractor shall be responsible to:
 - Conduct educational workshops to train and inform key Project personnel, including subcontractors' personnel and Owner's Representative, in proper methods of providing data and using WPS information.
 - 2. Establish procedures for monitoring and updating WPS and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
 - 3. Use "one workday" as the unit of time for individual activities. Indicate nonworking days and holidays incorporated into the schedule in order to correlate with Contract Time.
- D. WPS Preparation: Prepare a list of all activities required to complete the Work.
 - 1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:
 - a. Preparation and processing of submittals
 - b. Mobilization and demobilization
 - c. Purchase of materials
 - d. Delivery
 - e. Fabrication
 - f. Utility interruptions
 - g. Installation
 - h. Work by Owner that may affect or be affected by Contractor's activities
 - i. Testing
 - j. Punch list and final completion
 - k. Activities occurring following final completion
 - 2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
 - 3. Processing: Process data to produce output data on a computer drawn, time scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the WPS within the limitations of the Contract Time.
 - 4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.
 - a. Sub-networks on separate sheets are permissible for activities clearly off the critical path.
- E. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time impact analysis to demonstrate the effect of the proposed change on the overall project schedule.
- F. Initial Issue of Schedule: Prepare initial schedule from a sorted activity list indicating straight "early start". Identify critical activities. Prepare tabulated reports showing the following:
 - 1. Contractor or subcontractor and the Work or activity
 - 2. Description of activity
 - 3. Principal events of activity
 - 4. Immediate preceding and succeeding activities
 - 5. Activity duration in workdays
- G. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:
 - 1. Identification of activities that have changed
 - 2. Changes in activity durations in workdays
 - 3. Changes in the critical path
 - 4. Changes in total float time
 - 5. Changes in the Contract Time
 - 6. Show relationship between activities on initial and updated schedule.

2.3 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report record the following information concerning events at Project site:
 - 1. List of subcontractors at Project site
 - 2. List of separate contractors at Project site

- 3. Approximate count of personnel at Project site
- 4. Equipment at Project site
- 5. Material deliveries
- 6. High and low temperatures and general weather conditions, including presence of rain or snow
- 7. Accidents
- 8. Meetings and significant decisions
- 9. Unusual events (refer to special reports)
- 10. Stoppages, delays, shortages, and losses
- 11. Meter readings and similar recordings
- 12. Emergency procedures
- 13. Orders and requests of authorities having jurisdiction
- 14. Change Orders received and implemented
- 15. Construction Change Directives received and implemented
- 16. Services connected and disconnected
- 17. Equipment or system tests and startups
- 18. Partial completions and occupancies
- 19. Substantial Completions authorized
- B. Material Location Reports: Monthly prepare and submit a comprehensive list of materials delivered to and stored at Project site. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site.
- C. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents prepare and submit, to the Design Professional, a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.
- D. Executive Summary Reports: Provided monthly with Payment Applications. Provides highlight details, schedule summary, and other information pertinent to Owner, including, but not limited to the following:
 - 1. Table of contents, simple project schedule clearly indicating benchmark dates, a narrative stating the current status of construction, a list of construction concerns, a look at what is coming up, potential change order log, and progress photo's.

2.4 SPECIAL REPORTS

- A. General: Submit special reports directly to Owner within one (1) day of an occurrence. Distribute copies of report to parties affected by the occurrence.
- B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

PART 3 - EXECUTION

3.1 CONTRACTOR'S WORK PROGRESS SCHEDULE

- A. Scheduling Consultant: Engage a consultant to provide planning, evaluation, and reporting using WPS scheduling.
 - 1. In-House Option: Owner may waive the requirement to retain a consultant if Contractor employs skilled personnel with experience in WPS scheduling and reporting techniques. Submit qualifications.
 - 2. Meetings: Scheduling consultant shall attend all meetings related to Project progress, alleged delays, and time impact.
- B. Contractor's WPS Updating: Update and submit the WPS with the OAC meeting minutes to reflect actual construction progress and activities.
 - 1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
 - 2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
 - 3. As the Work progresses, indicate final completion percentage for each activity.
- C. Distribution: Distribute copies of approved schedule to Design Professional, Owner, commissioning agent, and other parties identified by Contractor with a need-to-know schedule responsibility.
 - 1. Post copies in Project meeting rooms and temporary field offices.

2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

SECTION 013233 - PHOTOGRAPHIC DOCUMENTATION

PART1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Pre-construction photographs
 - 2. Periodic construction photographs
 - 3. Final completion construction photographs
 - 4. Owner may elect to retain an independent firm to photographically document the progress of the work. Work of this firm shall not diminish or replace responsibilities of the Contractor for documentation required by this section. Contractor to cooperate fully with independent photographer.

1.3 UNIT PRICES

Α.

A. Basis for Bids: Base number of construction photographs on average of twenty (20) photographs per week over the duration of Project.

1.4 INFORMATIONAL SUBMITTALS

- Digital Photographs: Submit image files within three days of taking photographs.
 - 1. Digital Camera: Minimum sensor resolution of 8 megapixels.
 - 2. Format: Minimum 1600 by 1200 pixels, 400 dpi minimum, in unaltered original files, with same aspect ratio as the sensor, un-cropped, date and time stamped, in folder named by date of photograph, accompanied by key plan file.
 - Identification: Provide the following information with each image description in file metadata tag:
 a. Name of Project
 - b. Name of Design Professional
 - c. Name of Contractor
 - d. Date photograph was taken
 - e. Description of location, direction (by compass point), and elevation or story of construction

1.5 COORDINATION

A. Auxiliary Services: Cooperate with photographer and provide auxiliary services requested, including access to Project site and use of temporary facilities.

1.6 USAGE RIGHTS

A. Obtain and transfer copyright usage rights from photographer to Owner for unlimited reproduction of photographic documentation.

PART 2 - PRODUCTS

2.1 PHOTOGRAPHIC MEDIA

A. Digital Images: Provide images in JPG format, produced by a digital camera with minimum sensor size of 8 megapixels, and at an image resolution of not less than 1600 by 1200 pixels and 400 dpi.

PART 3 - EXECUTION

3.1 CONSTRUCTION PHOTOGRAPHS

- A. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.
 - 1. Maintain key plan with each set of construction photographs that identifies each photographic location.
- B. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image editing software.
 - 1. Date and Time: Include date and time in file name for each image.

- 2. Field Office Images: Maintain one set of images accessible in the field office at Project site, available at all times for reference. Identify images in the same manner as those submitted to Architect.
- C. Pre-construction Photographs: Before commencement of excavation, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Architect.
 - 1. Flag construction limits before taking construction photographs
 - 2. Take twenty (20) photographs to show existing conditions adjacent to property before starting the Work
 - 3. Take twenty (20) photographs of existing buildings either on or adjoining property to accurately record physical conditions at start of construction
 - 4. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.
- D. Periodic Construction Photographs: Take twenty (20) photographs monthly (unless otherwise directed), coinciding with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.

SECTION 013300 - SUBMITTAL PROCEDURES

PART1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

1.3 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Design Professional's responsive action. Action submittals are those submittals indicated in individual Specification Sections as action submittals.
- B. Informational Submittals: Written and graphic information and physical samples that do not require Design Professional's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as informational submittals.
- C. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.
- D. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.4 ACTION SUBMITTALS

- A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or modifications to submittals noted by the Design Professional and additional time for handling and reviewing submittals required by those corrections.
 - 1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
 - 2. Initial Submittal: Submit concurrently with start-up construction schedule. Include submittals required during the first sixty (60) days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead-time for manufacture or fabrication.
 - 3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.
 - a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.
 - 4. Format: Arrange the following information in a tabular format:
 - a. Scheduled date for first submittal
 - b. Specification Section number and title
 - c. Submittal category: Action, informational
 - d. Name of subcontractor
 - e. Description of the Work covered
 - f. Scheduled date for Design Professional's final release or approval
 - g. Scheduled dates for purchasing
 - h. Scheduled dates for installation
 - i. Activity or event number

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Design Professional's Digital Data Files: Design Professional will provide electronic copies of CAD Drawings for Contractor's use in preparing coordination submittals.

- 1. Design Professional will furnish Contractor one (1) set of drawing files for use in preparing Shop Drawings and Project record drawings.
- 2. Design Professional makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
- 3. Digital Drawing Software Program: The Contract Drawings are available in Revit and CAD software.
- 4. Contractor shall execute a data licensing agreement in the form of Agreement included in Project Manual.
- 5. CAD files will by furnished for each appropriate discipline.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are approved by Design Professional.
 - 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 - 4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - 5. Design Professional reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Design Professional's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals. Submittals received after 1:00 pm will be considered to have been received the following day.
 - Allow ten (10) business days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Design Professional will advise Contractor when a submittal being processed must be delayed for coordination. Allow fifteen (15) business days for review time for large or complex submittals will require additional review time. The following are examples but not limited to such submittals, Millwork, Curtain Wall, Structural Steel, Doors, Frames, Hardware (total opening).
 - 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 - 3. Resubmittal Review: Allow ten (10) business days for review of each resubmittal.
 - Sequential Review: Where sequential review of submittals by Design Professional's consultants, Owner, or other parties is indicated, allow fifteen (15) business days for initial review of each submittal.
- D. Identification and Information: Place a permanent label or title block on each copy submittal item for identification.
 - 1. On large format Shop Drawings, Contractor shall stamp each individual page as well as the reviewer's stamp.
 - 2. Indicate name of firm or entity that prepared each submittal on label or title block.
 - 3. Provide a space approximately 6-inches by 8-inches) on label or beside title block to record Contractor's review and approval markings and action taken by Design Professional.
 - 4. Include the following information for processing and recording action taken:
 - a. Project name

1)

- b. Date
- c. Name of Design Professional
- d. Name of Contractor
- e. Name of subcontractor
- f. Name of supplier
- g. Name of manufacturer
 - Submittal number or other unique identifier, including revision identifier
 - Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).
- i. Number and title of appropriate Specification Section
- j. Drawing number and detail references, as appropriate
- k. Location(s) where product is to be installed, as appropriate

h.

- I. Other necessary identification
- E. Identification and Information: Identify and incorporate information in each electronic submittal file as follows:
 - 1. Assemble complete submittal package into a single indexed file with links enabling navigation to each item.
 - 2. Name file with submittal number or other unique identifier, including revision identifier.
 - a. For typical projects that do not require separate submittals for different buildings or sub the submittal file name shall use Specification Section number followed by a dash and then a sequential number. Resubmittals shall include an numerical suffix after another dash. Include brief description of submittal after sequential number or resubmittal suffix. (e.g., 061000-001-0 Rough Carpentry).
 - b. For complex projects that require project identifier for separate buildings within a project or require individual submittals to be submitted by multiple subcontractors, the submittal file name shall follow the following: Specification Section number followed by a decimal point and then a sequential number. Resubmittals shall include an alphabetic suffix after another decimal point. Project Identifier should follow in parentheses (e.g., 061000-001-0 (LNHS) Rough Carpentry).
 - 3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Design Professional.
 - 4. Include the following information on an inserted cover sheet:
 - a. Project name
 - b. Date
 - c. Name and address of Design Professional
 - d. Name of Contractor
 - e. Name of firm or entity that prepared submittal
 - f. Name of subcontractor
 - g. Name of supplier
 - h. Name of manufacturer
 - i. Number and title of appropriate Specification Section
 - j. Drawing number and detail references, as appropriate
 - k. Location(s) where product is to be installed, as appropriate
 - I. Related physical samples submitted directly
 - m. Other necessary identification
 - 5. Include the following information as keywords in the electronic file metadata:
 - a. Project name
 - b. Number and title of appropriate Specification Section
 - c. Manufacturer name
 - d. Product name
- F. Options: Identify options requiring selection by the Design Professional.
- G. Deviations: Identify deviations from the Contract Documents on submittals.
- H. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Design Professional observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
 - 1. Submit one (1) copy of submittal to concurrent reviewer in addition to specified number of copies to Design Professional.
- I. Transmittal: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Design Professional will return submittals, without review, received from sources other than Contractor.
 - 1. Transmittal Form: Use standard contractor form as approved by Design Professional Owner.
 - 2. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Design Professional on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.
- J. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
 - 1. Note date and content of previous submittal.
 - 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
 - 3. Include all submitted information from previous submittal in resubmittal, to form a comprehensive document for Design Professional's review.

- 4. Resubmit submittals until they are marked with 'Reviewed', 'Furnish as Corrected' notation from Design Professional's action stamp, or with approval notation from alternate reviewer
- K. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- L. Use for Construction: Use only final submittals that are marked with 'Reviewed', 'Furnish as Corrected' notation from Design Professional's action stamp, or with approval notation from alternate reviewer.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

- A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
 - 1. Email or upload electronic submittals as PDF electronic files directly to Design Professional's Info Exchange Folder specifically established for Project.
 - a. Design Professional will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
 - 2. Action Submittals: For large format drawings and submittals (larger than 11x17), submit PDF file plus two (2) hard copies. For smaller format drawings and submittals (11x17 or less), provide only PDF file. Design Professional will return only the marked-up PDF.
 - 3. Informational Submittals: Submit two paper copies of each submittal, unless otherwise indicated. Design Professional will not return copies.
 - 4. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Division 01 Section 017700, "Closeout Procedures".
 - 5. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
 - a. Provide a digital signature with digital certificate on electronically submitted certificates and certifications where indicated.
 - b. Provide a notarized statement on original paper copy certificates and certifications where indicated.
 - 6. Test and Inspection Reports Submittals: Comply with requirements specified in Division 01 Section 014000, "Quality Requirements".
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
 - 1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
 - 2. Mark each copy of each submittal to show which products and options are applicable.
 - 3. Include the following information, as applicable:
 - a. Manufacturer's catalog cuts
 - b. Manufacturer's product specifications
 - c. Standard color charts
 - d. Statement of compliance with specified referenced standards
 - e. Testing by recognized testing agency
 - f. Application of testing agency labels and seals
 - g. Notation of coordination requirements
 - h. Availability and delivery time information
 - 4. For equipment, include the following in addition to the above, as applicable:
 - a. Wiring diagrams showing factory-installed wiring
 - b. Printed performance curves
 - c. Operational range diagrams
 - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings
 - 5. Submit Product Data before or concurrent with Samples.
 - 6. Submit Product Data in the following format:
 - a. PDF electronic file
- C. Shop Drawings: Prepare Project specific information, drawn accurately to scale.
 - 1. Submittals containing reproduction of Contract Drawings are not considered Shop Drawings and will be returned without action. Any delay due to such rejection will not be grounds for an extension of Contract Time.

- 2. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Identification of products
 - b. Schedules
 - c. Compliance with specified standards
 - d. Notation of coordination requirements
 - e. Notation of dimensions established by field measurement
 - f. Relationship and attachment to adjoining construction clearly indicated
 - g. Seal and signature of professional engineer if specified
- 3. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.
- 4. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8 ½ -inches by 11-inches but no larger than 30-inches by 42-inches.
- 5. Submit Shop Drawings in the following format:
- 6. For large format drawings and submittals (larger than 11 x 17), submit PDF file plus two (2) hard copies. For smaller format drawings and submittals (11x17 or less), provide only PDF file. Design Professional will return only the marked-up PDF.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
 - 1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 - 2. Identification: Attach label on unexposed side of Samples that includes the following:
 - a. Generic description of Sample
 - b. Product name and name of manufacturer
 - c. Sample source
 - d. Number and title of applicable Specification Section
 - 3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
 - 4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit three (3) full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Design Professional will return submittal with options selected.
 - 5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - a. Number of Samples: Submit sets of Samples. Design Professional will retain one sample set; remainder will be returned. Mark up and retain one returned Sample set as a Project record sample.
 - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
 - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.
- E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
 - 1. Type of product. Include unique identifier for each product indicated in the Contract Documents.
 - 2. Manufacturer and product name, and model number if applicable.
 - 3. Number and name of room or space
 - 4. Location within room or space

- 5. Submit product schedule in the following format: a. PDF electronic file
- F. Contractor's Construction Schedule: Comply with requirements specified in Division 01 Section 013200, "Construction Progress Documentation".
- G. Application for Payment: Comply with requirements specified in Division 01 Section 012900, "Payment Procedures".
- H. Schedule of Values: Comply with requirements specified in Division 01 Section 012900, "Payment Procedures".
- I. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Use CSI Form 1.5A. Include the following information in tabular form:
 - 1. Name, address, and telephone number of entity performing subcontract or supplying products.
 - 2. Number and title of related Specification Section(s) covered by subcontract.
 - 3. Drawing number and detail references, as appropriate, covered by subcontract.
 - 4. Submit subcontract list in the following format:
 - a. PDF electronic file
- J. Coordination Drawings: Comply with requirements specified in Division 01 Section 013100, "Project Management and Coordination".
- K. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of Design Professionals and owners, and other information specified.
- L. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on American Welding Society (AWS) forms. Include names of firms and personnel certified.
- M. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- N. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- O. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- P. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- Q. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- R. Product Test Reports: Submit written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- S. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
 - 1. Name of evaluation organization
 - 2. Date of evaluation
 - 3. Time period when report is in effect
 - 4. Product and manufacturers' names
 - 5. Description of product
 - 6. Test procedures and results
 - 7. Limitations of use

- T. Schedule of Tests and Inspections: Comply with requirements specified in Division 01 Section 014000, "Quality Requirements".
- U. Pre-construction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- V. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- W. Field Test Reports: Submit reports indicating and interpreting results of field tests either performed during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- X. Maintenance Data: Comply with requirements specified in Division 01 Section 017823, "Operation and Maintenance Data".
- Y. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions, other performance and design criteria, and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

2.2 DELEGATED DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Design Professional.
- B. Delegated Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file and three (3) paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Design Professional.
- B. Project Closeout and Maintenance/Material Submittals: Refer to requirements in Division 01 Section 017700, "Closeout Procedures".
- C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 DESIGN PROFESSIONAL'S ACTION

- A. General: Design Professional will not review submittals that do not bear Contractor's approval stamp and will return them without action.
- B. Action Submittals: Design Professional will review each submittal, make marks to indicate corrections or modifications required, and return it. Design Professional will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action, as follows:
 - 1. UNT "Reviewed" is the same as SmithGroup "Approved"
 - 2. UNT "Revise and Resubmit" is the same as SmithGroup "Approve as Noted Resubmit"
 - 3. Rejected
 - 4. UNT "Furnish As Corrected" is the same as SmithGroup "Approved as Noted"
 - 5. UNT "No Action Taken" is the same as SmithGroup "For Information Only Received"

- C. Informational Submittals: Design Professional will review each submittal and will not return it, or will return it if it does not comply with requirements. Design Professional will forward each submittal to appropriate party.
- D. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Design Professional.
- E. Incomplete submittals are not acceptable, will be considered non-responsive, and will be returned without review.
- F. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

SMITHGROUP

ELECTRONIC DATA/DIGITAL FILE USER AGREEMENT

SG Project Title: University of North Texas Music Jazz Practice Labs SG Project Number: 13746

This Agreement is entered into between SmithGroup, Inc. ("SmithGroup") and the Owner, or a Consultant, Contractor (of any tier) or Supplier ("User") relating to the use and access to Electronic Data/Digital Files ("Files"), including, but not limited to, Revit and AutoCAD files. The User desires to have access to such Files for use in connection with the Project, and in consideration for allowing such access, agrees as follows:

The Files were not created or intended for direct use as construction documentation by anyone, and that after the Files are provided they can become digitally corrupted without detection, can be modified without the knowledge of SmithGroup and/or its consultants, may not be readable by the User by third parties due to file format incompatibilities, and may be modified by SmithGroup, its consultants or others after the Files are transferred, any of which circumstances could cause damage or loss to the User. The User understands and acknowledges that these risks are inherent with any use of the Files and that the use of the Files may not result in the detection of all potential conflicts between elements during actual construction of a project and may not accurately reflect quantities, surface areas or volumes necessary to complete or estimate the cost of the Work.

The User further understands that the Files are works in progress. The signed and sealed original plans, specifications and other documents constitute the Contract Documents for the Project. These Files are not Contract Documents and may be subject to manipulation beyond the control of SmithGroup. Therefore, SmithGroup cannot verify that the Files accurately or completely reflect actual construction or field conditions. The User must satisfy themselves as to the level of accuracy and completeness of the Files for their needs. In addition, the User understands that the changes made during design, bidding, negotiation and construction may not be incorporated in the Files.

The User acknowledges that the transfer of the Files shall not constitute the sale of goods; and SmithGroup and its consultants make NO WARRANTY, EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR **ANY PURPOSE, INCLUDING "SPEARIN" TYPE WARRANTIES, IN CONNECTION WITH THE SERVICE OF PROVIDING** DIGITAL MODEL FILES, OR THAT THE DIGITAL MODEL FILES WILL BE USEABLE OR ACCURATE, WHICH WARRANTIES AND REPRESENTATIONS ARE EXPRESSLY DISCLAIMED.

The User covenants not to sue and agrees to indemnify and hold harmless SmithGroup from any costs (including attorneys' fees and court costs), claims or causes of action, be it tort, breach of contract, or otherwise that result from the User's use of the Files or anyone using the Files by or through the User, and waives all claims for consequential and/or liquidated damages against SmithGroup.

Except to the extent expressly set forth in another written Agreement, SmithGroup retains all intellectual property rights to the Files. The providing of the Files by SmithGroup is not to be construed in any manner to be in derogation of any reserved or intellectual property rights.

SmithGroup, Inc:

Print Name/Title:

{User Name}:

By:_____

Ву: _____

Print Name/Title:

Date:_____

Date:_____

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SECTION 013516 - ALTERATION PROJECT PROCEDURES

PART1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes:
 - 1. Products and installation for patching and extending Work within construction areas of existing facilities.
 - 2. Providing transition and adjustments
 - 3. Repair of damaged surfaces and finishes
- B. Related Sections include the following:
 - 1. Division 01 Section 015000 "Temporary Facilities and Controls" for construction of temporary fire-rated partitions to separate existing occupied areas from construction areas.

1.3 OCCUPANCY, ACCESS, AND PROTECTION

- A. Entire existing facility or any portion thereof will be occupied during progress of construction for conduct of normal operations. Phase Work in accordance with Section 011000, "Summary".
- B. Cooperate with Owner in scheduling operations to minimize conflict and to permit continuous usage. Perform work not to interfere with operations of occupied areas.
- C. Existing facilities will remain in full operation during execution of this Work. Exercise every precaution to ensure safety and protection for existing facilities, occupants, merchandise, pedestrians, and vehicles. The following must meet required codes and accessibility requirements.
 - 1. Maintain safe access and egress at all times for occupants, pedestrians, and vehicles.
 - 2. Provide protection to prevent damage to facilities, merchandise, and vehicles from dust, water, weather, and other similar harmful elements. Refer to Section 015000, "Temporary Facilities and Controls" for additional requirements.
 - 3. Maintain exiting from facilities to provide safe passage complying with applicable codes.

1.4 SCHEDULING OF WORK

- A. Make arrangements with Owner and schedule Work to avoid interference with normal operations of occupied areas. Submit schedule and summary of applicable Work within occupied areas and obtain Owner approval not less than two (2) days prior to commencement of such Work.
 - 1. Requests for use of certain existing loading docks, passage ways, and other similar spaces within areas outside limits of construction operations will be limited to day-by-day basis and must be approved in advance by Owner.
- B. Coordinate access and scheduling of Work within tenant areas with Owner.

1.5 TORCH-CUTTING AND WELDING PROCEDURES

- A. Notify Owner in advance of torch-cutting and welding operations performed within occupied areas; obtain approval prior to proceeding with such operations.
 - 1. Neither open-flame torch-cutting, welding nor arc-welding are allowed without having secured appropriate permit from Fire Marshal or authority having jurisdiction.
 - 2. Keep portable fire extinguisher of appropriate class within reach during welding or torch-cutting operations.
 - 3. Screen arc-welding from vision of passersby.
- B. Maintain a "Fire Watch" for minimum of sixty (60) minutes after completion of each torch-cutting and welding operation.

1.6 UTILITY SERVICE OUTAGES

- A. Keep utility and service outages to minimum and perform only after written approval of Owner is received.
 - 1. Requests for outages will not be considered unless they include an identification of areas which will be affected by proposed outage.
 - 2. Schedule outages for times other than normal business hours.
 - 3. Make requests for outages minimum of five (5) calendar days in advance of proposed outage.

B. Contractor: Responsible for investigating utility and service lines to determine effect of outage upon building operations outside of limit of operations. Obtain approval in advance from Owner to execute investigations.

1.7 KEYS

- A. When necessary to perform Work, Owner will issue keys to existing mechanical/electrical equipment spaces.
- B. Return keys at end of warranty period.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Type and Quality of Existing Products: Use products or types of construction that exist in structure, as needed to patch, extend, or match existing Work.
 - 1. Generally, Contract Documents do not define products or standards of workmanship present in existing construction.
 - 2. Determine by inspecting and testing products where necessary, referring to existing work as quality standard.
- B. New Materials: Comply with Specifications for each product involved.
 1. Match existing products and work for patching existing work.
- C. Materials for Temporary Fire-Rated Partitions: Comply with provisions of Division 01 Section 015000 "Temporary Facilities and Controls".
- D. Salvaged Materials: Salvage sufficient quantities of cut or removed material to replace damaged Work of existing construction, when material is not readily obtainable on current market.
 - 1. Store salvaged items in dry, secure place on site.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Comply with provisions of Division 01 Section 017300, "Execution".
 - 1. Responsible for verifying existing conditions to determine that all areas meet constructability and are ready for alteration and remodeling.
- B. Discrepancies: Verify dimensions and elevations indicated in layout of existing work.
 - 1. Prior to commencing work, carefully compare and check Contract Documents for discrepancies in locations or elevations of work to be executed.
 - 2. Refer discrepancies among Drawings and existing conditions to Design Professional for adjustment before work affected is performed.

3.2 PREPARATION

- A. Construct temporary fire-rated partitions to separate existing occupied areas from construction and alteration areas. Comply with provisions of Division 01 Section 015000, "Temporary Facilities and Controls".
- B. Cut, move, or remove items as necessary for access to alteration and renovation Work.
 - 1. Remove unsuitable material not marked for salvage, such as rotted wood, corroded metals, deteriorated masonry and concrete, and other deteriorated materials. Replace materials as specified for finished Work.
 - 2. Remove debris and abandoned items from area and from concealed spaces.
- C. Cutting and Removal: Perform cutting and removal work to remove minimum necessary, and in manner to avoid damage to adjacent work. Cut finish surfaces such as masonry, tile, plaster, or metals by methods to terminate surfaces in straight line at natural point of division.
- D. Prepare surfaces and remove surface finishes as necessary to provide for proper installation of new materials and finishes.
- E. Close openings in exterior surfaces to protect existing Work from weather and extremes of temperature and humidity. Insulate ductwork and piping to prevent condensation in exposed areas.

F. Provide temporary barriers and closures to control operations to prevent spread of dust to occupied portions of building; refer to Division 01 Section 015000, "Temporary Facilities and Controls".

3.3 INSTALLATION

- A. Coordinate Work of alterations and renovations to expedite completion and to accommodate Owner occupancy.
- B. Remove, cut, and patch Work in manner to minimize damage and to provide means of restoring products and finishes to specified condition.
 - 1. Refinish visible existing surfaces to remain in renovated rooms and spaces, to specified condition for each material, with neat transition to adjacent finishes.
- C. Install products as specified in individual Specification sections.
- D. Where new Work abuts or aligns with existing, perform smooth and even transition to match existing adjacent surface in texture and appearance.
 - 1. When finished surfaces are cut so that smooth transition with new Work is not possible, terminate existing surface along straight line at natural line of division and request instructions from Design Professional as to method of making transition.

3.4 ADJUSTMENTS

- A. Where removal of partitions or walls results in adjacent spaces becoming one, rework floors, walls, and ceilings to provide smooth plane without breaks, steps, or soffits.
- B. Trim existing doors as necessary to clear new floor finish. Refinish trim as required.
- C. Fit Work at penetrations of surfaces as specified in Division 01 Section 017300, "Execution".
- D. Patch or replace portions of existing surfaces which are damaged, lifted, discolored, or showing other imperfections. Repair substrate prior to application of finishes.

3.5 FINISHES

- A. Finish new surfaces as specified in individual Specification sections.
- B. Finish patches to produce uniform finish and texture over entire area. When finish cannot be matched, refinish entire surface to nearest intersections.

3.6 CLEANING

- A. Comply with Division 01 Section 017700, "Closeout Procedures". Thoroughly clean areas and spaces affected by Work. Completely remove paint, mortar, oils, putty and items of similar nature.
- B. Clean Owner occupied areas daily. Clean spillage, overspray, and heavy collection of dust in Owner occupied areas immediately.

SECTION 014000 - QUALITY REQUIREMENTS

PART1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specific quality assurance and control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality assurance and control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality assurance and control services required by Design Professional, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
- C. Related Sections:
 - 1. Divisions 02 through 32 Sections for specific test and inspection requirements.

1.3 DEFINITIONS

- A. Quality Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Design Professional.
- C. Mockups: Full size physical assemblies that are constructed onsite. Mockups are constructed to verify selections made under sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.
 - 1. Room Mockups: Mockups of typical interior spaces complete with wall, floor, and ceiling finishes, doors, windows, millwork, casework, specialties, furnishings and equipment, and lighting.
- D. Pre-construction Testing: Tests and inspections performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.
- E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- F. Source Quality Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.
- G. Field Quality Control Testing: Tests and inspections that are performed onsite for installation of the Work and for completed Work.
- H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

- 1. Use of trade specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade or trades.
- J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 CONFLICTING REQUIREMENTS

- A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Design Professional and Owner for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Design Professional for a decision before proceeding.

1.5 ACTION SUBMITTALS

- A. Shop Drawings: For integrated interior mockups, provide plans, sections, and elevations, indicating materials and size of mockup construction.
 - 1. Indicate manufacturer and model number of individual components.
 - 2. Provide axonometric drawings for conditions difficult to illustrate in two (2) dimensions.

1.6 INFORMATIONAL SUBMITTALS

- A. Contractor's Quality Control Plan: For quality assurance and quality control activities and responsibilities.
- B. Contractor's Quality Control Manager Qualifications: For supervisory personnel.
- C. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- D. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
 - 1. Specification Section number and title.
 - 2. Entity responsible for performing tests and inspections
 - 3. Description of test and inspection
 - 4. Identification of applicable standards
 - 5. Identification of test and inspection methods
 - 6. Number of tests and inspections required
 - 7. Time schedule or timespan for tests and inspections
 - 8. Requirements for obtaining samples
 - 9. Unique characteristics of each quality control service

1.7 CONTRACTOR'S QUALITY CONTROL PLAN

- A. Quality Control Plan, General: Submit quality control plan within ten (10) days of Notice to Proceed, and not less than five (5) days prior to pre-construction conference. Submit in format acceptable to Design Professional. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality assurance and quality control responsibilities. Coordinate with Contractor's construction schedule.
- B. Quality Control Personnel Qualifications: Engage qualified full-time personnel trained and experienced in managing and executing quality assurance and quality control procedures similar in nature and extent to those required for Project.
 - 1. Project quality control manager may also serve as Project superintendent.
- C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.
- D. Testing and Inspection: Include in quality control plan a comprehensive schedule of Work requiring testing or inspection, including the following:

- 1. Contractor performed tests and inspections including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor's elected tests and inspections.
- 2. Special inspections required by authorities having jurisdiction and indicated on the "Statement of Special Inspections".
- 3. Owner performed tests and inspections indicated in the Contract Documents including tests and inspections indicated to be performed by the Commissioning Authority, if applicable.
- E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring work into compliance with standards of workmanship established by Contract requirements and approved mockups.
- F. Monitoring and Documentation: Maintain testing and inspection reports including log of approved and rejected results. Include work Design Professional has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

1.8 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
 - 1. Date of issue
 - 2. Project title and number
 - 3. Name, address, and telephone number of testing agency
 - 4. Dates and locations of samples and tests or inspections
 - 5. Names of individuals making tests and inspections
 - 6. Description of the Work and test and inspection method
 - 7. Identification of product and Specification Section
 - 8. Complete test or inspection data
 - 9. Test and inspection results and an interpretation of test results
 - 10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
 - 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 - 12. Name and signature of laboratory inspector
 - 13. Recommendations on retesting and re-inspecting
- B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
 - 1. Name, address, and telephone number of technical representative making report.
 - 2. Statement on condition of substrates and their acceptability for installation of product.
 - 3. Statement that products at Project site comply with requirements.
 - 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 - 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 - 6. Statement whether conditions, products, and installation will affect warranty.
 - 7. Other required items indicated in individual Specification Sections.
- C. Factory Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory authorized service representative's tests and inspections specified in other Sections. Include the following:
 - 1. Name, address, and telephone number of factory authorized service representative making report.
 - 2. Statement that equipment complies with requirements.
 - 3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 - 4. Statement whether conditions, products, and installation will affect warranty.
 - 5. Other required items indicated in individual Specification Sections.
- D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.9 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or products that are similar to those indicated for this Project in material, design, and extent.
- F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
 - 1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
- G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
 - 1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
 - 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. Factory Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- J. Pre-construction Testing: Where testing agency is indicated to perform pre-construction testing for compliance with specified requirements for performance and test methods, comply with the following:
 1. Contractor responsibilities include the following:
 - a. Provide test specimens representative of proposed products and construction.
 - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 - c. Provide sizes and configurations of test assemblies, mockups to adequately demonstrate capability of products to comply with performance requirements.
 - d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
 - e. When testing is complete, remove test specimens, assemblies, mockups; do not reuse products on Project.
 - 2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality assurance service to Design Professional, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
- K. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
 - 1. Build mockups in location and of size indicated or, if not indicated, as directed by Design Professional.

- 2. Notify Design Professional five (5) business days in advance of dates and times when mockups will be constructed.
- 3. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed during the construction at the Project.
- 4. Demonstrate the proposed range of aesthetic effects and workmanship.
- 5. Obtain Design Professional's approval of mockups before starting work, fabrication, or construction. a. Allow seven (7) days for initial review and each re-review of each mockup.
- 6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
- 7. Demolish and remove mockups when directed, unless otherwise indicated.
- L. Integrated Interior Mockups: Construct integrated interior mockup in accordance with approved Shop Drawings. Coordinate installation of interior materials and products for which mockups are required in individual specification sections, along with supporting materials.
- M. Room Mockups: Construction room mockups incorporating required materials and assemblies, finished in accordance with requirements. Provide required lighting and additional lighting where required to enable Design Professional to evaluate quality of the Work. Provide room mockups to the follow room:
- N. Jazz Lab Room 282

1.10 QUALITY CONTROL

- A. Owner Responsibilities: Where quality control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
 - 1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
 - 2. Costs for retesting and re-inspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality control activities required to verify that the Work complies with requirements, whether specified or not.
 - 1. Unless otherwise indicated, provide quality control services specified and those required by authorities having jurisdiction. Perform quality control services required of Contractor by authorities having jurisdiction, whether specified or not.
 - 2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality control services.
 - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 - 3. Notify testing agencies at least 24-hours in advance of time when Work that requires testing or inspecting will be performed.
 - 4. Where quality control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality control service.
 - 5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 - 6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Manufacturer's Field Services: Where indicated, engage a factory authorized service representative to inspect field assembled components and equipment installation, including service connections. Report results in writing as specified in Division 01 Section 013000, "Submittal Procedures".
- D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in pre-installation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- E. Re-testing/Re-inspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality control services, including retesting and re-inspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- F. Testing Agency Responsibilities: Cooperate with Design Professional and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

- 1. Notify Design Professional and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
- 2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
- 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
- 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
- 5. Does not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
- 6. Do not perform any duties of Contractor.
- G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
 - 1. Access to the Work
 - 2. Incidental labor and facilities necessary to facilitate tests and inspections
 - 3. Adequate quantities of representative samples of materials that require testing and inspecting Assist agency in obtaining samples
 - 4. Facilities for storage and field curing of test samples
 - 5. Delivery of samples to testing agencies
 - 6. Preliminary design mix proposed for use for material mixes that require control by testing agency
 - 7. Security and protection for samples and for testing and inspecting equipment at Project site
- H. Coordination: Coordinate sequence of activities to accommodate required quality assurance and control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
 - 1. Schedule times for tests, inspections, obtaining samples, and similar activities.

1.11 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Conducted by a qualified testing agency as required by authorities having jurisdiction, as indicated in individual Specification Sections, and as follows:
 - 1. Verifying that manufacturer maintains detailed fabrication and quality control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
 - 2. Notifying Owner, Design Professional and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
 - 3. Submitting a certified written report of each test, inspection, and similar quality-control service to Design Professional with copy to Contractor and to authorities having jurisdiction.
 - 4. Submitting a final report of special tests and inspections at Substantial Completion, this includes a list of unresolved deficiencies.
 - 5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
 - 6. Retesting and re-inspecting corrected work

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

- A. Prepare a record of tests and inspections. Include the following:
 - 1. Date test or inspection was conducted
 - 2. Description of the Work tested or inspected
 - 3. Date test or inspection results were transmitted to Design Professional
 - 4. Identification of testing agency or special inspector conducting test or inspection
- B. Maintain log at Project site. Post changes and modifications as they occur. Provide access to test and inspection log for Design Professional's reference during normal working hours.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

- 1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Division 01 Section 017300, "Execution".
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality control services.

UNT SYSTEM REGULATORY REQUIREMENTS SECTION 014100

PART1- GENERAL

1.1 SUMMARY

3.

- A. Design and construction codes applicable to UNT System projects are as follows:
 - 1. National Fire Protection Association (NFPA)
 - a. 2018 edition NFPA 1 Fire Code
 - b. 2013 edition NFPA 13 Standard for the installation of [Fire] Sprinkler Systems
 - c. 2013 edition NFPA 13R Standard for the installation of [Fire] Sprinklers in Low-Rise Residential Buildings
 - d. 2013 edition NFPA 14 Standards for the Installation of Standpipe and Hose Systems
 - e. 2013 edition NFPA 20 Standard for the Installation of Stationary Pumps for Fire Protection
 - f. 2013 edition NFPA 24 Standard for the Installation of Private Fire Service Mains and Their Appurtenances
 - g. 2017 edition NFPA 70 National Electric Code
 - h. 2013 edition NFPA 72 National Fire Alarm Signaling Code
 - i. 2018 edition NFPA 101 Life Safety Code
 - 2. International Building Code Conference (ICC)
 - a. 2018 edition International Building Code,
 - b. 2018 edition International Mechanical Code,
 - c. 2018 edition International Plumbing Code,
 - d. 2018 edition International Fire Code,
 - Including Municipal fire code amendments of the city₁ where the building is being constructed, <u>pertaining only to the following</u>, shall be used in the project design and construction:
 - a) water supply for fire suppression;
 - b) fire hydrant number and locations;
 - c) fire department access to the building;
 - d) KNOX® key access boxes contact UNT System Fire Marshal for specifics;
 - e) fire department connections (FDC & its location);
 - f) fire sprinkler and standpipe systems;
 - g) fire detection & alarm systems;
 - h) elevator stretcher requirements*;
 - i) communication coverage;
 - j) other emergency equipment requirements.
 - e. 2018 edition International Fuel Gas Code
 - f. 2018 edition International Energy Conservation Code
 - Design & Construction Guidelines The University of North Texas
 - a. (access the UNT Facilities Resources webpage at <u>http://facilities.unt.edu/resources</u>. "Under Projects & Renovations", click on the "Design Guidelines UNT" hyperlink)
 - b. Questions regarding the Design & Construction Guidelines The University of North Texas are to be emailed to: Peter.Palacios@unt.edu
 - 4. Accessibility Standards
 - **a.** Texas Accessibility Standards (2012 TAS). (Elimination of Architectural Barriers Texas Government Code, Chapter 469. Administered by the Texas Department of Licensing and Regulation. Effective March 15, 2012).
 - 5. Energy Conservation Design Standards for New Construction and Major Renovation₂ Projects:
 - a. 2015 edition International Energy Conservation Code (IECC);
 - b. Low-Rise Residential Buildings₃ -- use Residential Section of 2015 edition IECC.
 - 6. Water Conservation Standards
- ¹ Respectively: City of Denton, TX; City of Ft. Worth, TX.; City of Dallas, TX; City of Frisco, TX

² Major Renovation Projects: For the purposes of this subchapter, a major renovation project is a building renovation or improvement where the implementation cost associated with energy or water efficiency improvements is \$2 million or more, based on the initial engineering cost estimate. <u>34 Tex. Admin. Code §19.33</u>. **Source Note**: The provisions of this §19.33 adopted to be effective August 13, 2002, 27 TexReg 7174; amended to be effective September 28, 2011, 36 TexReg 6303; amended to be effective April 7, 2016, 41 TexReg 2495.

³ Low-Rise <u>Residential</u> Building: <u>Residential</u> buildings not more than three stories in height above grade that includes sleeping accommodations and a separate means of egress, and where the occupants are primarily permanent in nature (30 or more days in occupancy).

"Water Conservation Design Standards for State Buildings and Institutions of Higher Education Facilities" prepared by SECO, dated April 2016, as the water conservation design standards for any new construction or major renovation project. Download available at: https://comptroller.texas.gov/programs/seco/code/

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

SECTION 014200 - REFERENCES

PART1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey Design Professional's action on Contractor's submittals, applications, and requests, "approved" is limited to Design Professional's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by Design Professional. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
- D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.3 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
- C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
 - 1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.4 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations" or in Columbia Books' "National Trade & Professional Associations of the United States."
- B. Following are acronyms used by Owner in the Contract Documents:
- C. A/E: Architect/Engineer
- D. AHJ: Authority Having Jurisdiction
- E. BOR: Board of Regents

F.	CCD:	Construction Change Directive
G.	CCL:	Construction Cost Limitation
Н.	CMAR:	Construction Manager at Risk
I.	CSP:	Competitive Sealed Proposal
J.	DD:	Design Development
K.	FPE:	Fire Protection Engineer
L.	GCs:	General Conditions
M.	GMP:	Guaranteed Maximum Price
N.	GSF:	Gross Square Feet
Ο.	HSP:	HUB Subcontractor Plan
Ρ.	HUB:	Historically Underutilized Business
Q.	LA:	Landscape Architect
R.	LDs:	Liquidated Damages
S.	NASF:	Net Assignable Square Feet
Т.	NTP:	Notice to Proceed
U.	OAC:	Owner/Architect/Contractor
V.	OCM:	Owner's Construction Manager
W.	ODR:	Owner's Designated Representative
Х.	PAR:	Progress Assessment Report
Υ.	PE:	Professional Engineer
Z.	PM:	Project Manager
AA.	RID:	Registered Interior Designer
BB.	R&R:	Repair and Rehabilitation
CC.	SD:	Schematic Design
DD.	SDs:	Schematic Design Drawings
EE.	UGC/SGC:	Uniform General Conditions/Supplemental General Conditions

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

1.3 USE CHARGES

- A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's own forces, Design Professional, testing agencies, and authorities having jurisdiction.
- B. Sewer Service: Owner will pay sewer service use charges for sewer usage by all entities for construction operations.
- C. Water Service: Owner will pay water service use charges for water used by all entities for construction operations.
- D. Electric Power Service: Owner will pay electric power service use charges for electricity used by all entities for construction operations.

1.4 INFORMATIONAL SUBMITTALS

- A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.
- B. Erosion- and Sedimentation-Control Plan: Show compliance with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.
- C. Moisture-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage, including delivery, handling, and storage provisions for materials subject to water absorption or water damage, discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water damaged Work.
 - 1. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
- D. Dust-Control and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust-control and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Identify further options if proposed measures are later determined to be inadequate. Include the following:
 - 1. Locations of dust-control partitions at each phase of the work
 - 2. HVAC system isolation schematic drawing
 - 3. Location of proposed air filtration system discharge
 - 4. Other dust-control measures
 - 5. Waste management plan
 - 6. Comply with other requirements on a per Campus basis

1.5 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.
- C. Accessible Temporary Egress: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines.

1.6 **PROJECT CONDITIONS**

A. Temporary Use of Permanent Facilities: Engage installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Chain-Link Fencing: Minimum 2-inch, 0.148-inchthick, galvanized steel, chain-link fabric fencing; minimum 6-feet high with galvanized steel pipe posts; minimum 2³/₆-inchOD line posts and 2⁷/₆-inch OD corner and pull posts, with 1⁵/₆-inch OD top rails.
- B. Portable Chain-Link Fencing: Minimum 2-inch, 0.148-inch-thick, galvanized steel, chain-link fabric fencing; minimum 6-feet high with galvanized steel pipe posts; minimum 2³/₂-inchOD line posts and 2⁷/₂-inch OD corner and pull posts, with 1⁵/₂-inch OD top and bottom rails. Provide galvanized steel bases for supporting posts.
- C. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mils minimum thickness, with flame-spread rating of 15 or less per ASTM E 84.
- D. Dust Control Adhesive-Surface Walk-off Mats: Provide mats minimum 36 by 60 inches.
- E. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

2.2 TEMPORARY FACILITIES

- A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Design Professional, Construction Manager, and construction personnel office activities and to accommodate project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:
 - 1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
 - 2. Conference room of sufficient size to accommodate meetings of 10 individuals. Provide electrical power service and 120-V ac duplex receptacles, with not less than 1 receptacle on each wall. Furnish room with conference table, chairs, and 4-foot square tack and marker boards.
 - 3. Drinking water and private toilet.
 - 4. Coffee machine and supplies.
 - 5. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F.
 - 6. Lighting fixtures capable of maintaining average illumination of 20 FC at desk height.
- C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
 - 1. Store combustible materials apart from building.

2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
 - 1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
 - 2. Heating Units: Listed and labeled for type of fuel being consumed, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
 - Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return air grille in system and remove at end of construction and clean HVAC system as required in Division 01 Section 017700 "Closeout Procedures".

C. Air Filtration Units: HEPA primary and secondary filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
 1. Locate facilities to limit site disturbance as specified in Division 01 Section 011000, "Summarv."
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
 - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
 1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.
- C. [Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.]
- D. [Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.]
- E. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- F. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
- G. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.
 - 1. Prior to commencing work, isolate the HVAC system in area where work is to be performed in accordance with approved coordination drawings.
 - a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
 - b. Maintain negative air pressure within work area using HEPA-equipped air filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.
 - 2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust containment devices.
 - 3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.
- H. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
 - 1. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.
- I. [Electric Power Service: Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.]
- J. [Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
 - 1. Install electric power service overhead, unless otherwise indicated.

- 2. Connect temporary service to Owner's existing power source, as directed by Owner.]
- K. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
 - 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
- L. Telephone:

C.

- M. Post a list of important telephone numbers.
 - 1. Police and fire departments
 - 2. Ambulance service
 - 3. Contractor's home office
 - 4. Architect's office
 - 5. Engineers' offices
 - 6. Owner's office
 - 7. Principal subcontractors' field and home offices
 - 8. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.

3.3 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
 - 1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30-feet of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
 - 2. Maintain support facilities until Design Professional schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
- B. Temporary Use of Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.
 - 1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
 - 2. Prepare subgrade and install sub-base and base for temporary roads and paved areas according to Division 31 Section [Insert Section number], "Earth Moving".
 - 3. Recondition base after temporary use, including removing contaminated material, re-grading, proof rolling, compacting, and testing.
 - Traffic Controls: Comply with requirements of authorities having jurisdiction.
 - 1. Protect existing site improvements to remain including curbs, pavement, and utilities.
 - 2. Maintain access for fire-fighting equipment and access to fire hydrants.
- D. Parking: Use designated areas of Owner's existing parking areas for construction personnel.
- E. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
 - 1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties nor endanger permanent Work or temporary facilities.
 - 2. Remove snow and ice as required to minimize accumulations.
- F. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
 - 1. Identification Signs: Provide Project identification signs as indicated on Drawings.
 - 2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
 - a. Provide temporary, directional signs for construction personnel and visitors.
 - 3. Maintain and touchup signs so they are legible at all times.
- G. Waste Disposal Facilities: Comply with requirements specified in Division 01 Section 017419, "Construction Waste Management and Disposal."
- H. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
 - 1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
- I. Temporary Elevator Use: Refer to Division 14 Sections for temporary use of new elevators.

- J. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.
- K. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
 - 1. Comply with work restrictions specified in Division 01 Section 011000, "Summary."
- B. Temporary Erosion and Sedimentation Control: Comply with requirements of 2003 EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent and requirements specified in Division 31 Section [Insert Section number], "Site Clearing."
- C. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- D. Tree and Plant Protection: Comply with requirements specified in Division 01 Section 015639, "Temporary Tree and Plant Protection."
- E. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Obtain extended warranty for Owner. Perform control operations lawfully, using environmentally safe materials.
- F. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.
 - 1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
 - 2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner.
- G. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each workday.
- H. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- I. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.
- J. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weather-tight enclosure for building exterior.
 - 1. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.
- K. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner from fumes and noise.
 - 1. Construct dustproof partitions with gypsum wallboard with joints taped on occupied side, and fire-retardant plywood on construction operations side.
 - 2. Construct dustproof partitions with two layers of 6-mil sheet on each side. Cover floor with two layers of 6-milpolyethylene sheet, extending sheets 18 inches up the sidewalls. Overlap and tape full length of joints. Cover floor with fire-retardant treated plywood.
 - a. Construct vestibule and airlock at each entrance through temporary partition with not less than 48-inches between doors. Maintain water-dampened foot mats in vestibule.
 - 3. Where fire-resistance-rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
 - 4. Insulate partitions to control noise transmission to occupied areas.
 - 5. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.

- 6. Protect air-handling equipment.
- 7. Provide walk-off mats at each entrance through temporary partition.
- L. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.
 - 1. Prohibit smoking in construction areas.
 - 2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
 - Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
 - 4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.5 MOISTURE CONTROL

- A. Contractor's Moisture-Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.
- B. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
 - 1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
 - 2. Use permanent HVAC system to control humidity.
 - 3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
 - a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for forty-eight (48) hours are considered defective.
 - Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record daily readings over a forty-eight (48) hour period. Identify materials containing moisture levels higher than allowed. Report findings in writing to Design Professional.
 - c. Remove materials that can not be completely restored to their manufactured moisture level within forty-eight (48) hours.
- C. Refer to Section 015300, Mold Prevention Measures, for additional requirements.

3.6 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
 - 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a twenty-four (24) hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Operate Project-identification-sign lighting daily from dusk until 12:00 midnight.
- D. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- E. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 - 1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
 - At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 01 Section 017700, "Closeout Procedures."

SECTION 015300 - MOLD PREVENTION MEASURES

PART1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes: Administrative and procedural requirements to help prevent mold contamination in construction. This section is in addition to requirements contained in Division 01 Section 015000, "Temporary Facilities and Controls".

1.3 SUBMITTALS

- A. Reports: Submit reports required in this Section, including but not limited to the following:
 - 1. Sightings of existing mold
 - 2. Moisture contents of materials
 - 3. Exterior sealant cracks, damage, and deterioration

1.4 QUALITY ASSURANCE

A. Pre-construction Meeting: Review requirements of this Section at Pre-construction Meeting.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.
- B. Do not bring finish materials into building until building is in a conditioned state. Protect finish materials stored within building. Stage materials off the floor and cover with waterproof covering. Examples of these materials include, but are not limited to, insulation, gypsum products, wall coverings, carpet, ceiling tile, wood products, etc.
- C. Remove from Project site damaged materials or materials that have become wet. Do not install such materials.

1.6 PROJECT CONDITIONS

- A. Perform daily visual inspections of existing building for existing mold. Report sightings of mold to Architect.
- B. Ventilation:
 - 1. Verify that existing HVAC system is providing positive pressure in building.
 - 2. Provide adequate air circulation and ventilation during demolition phase(s).
 - 3. Seal off return air ducts and diffusers to prevent construction dust and moisture from entering occupied areas and HVAC system.
- C. Maintain clean project site, free from hazards, garbage, and debris.
- D. Eating, drinking, and smoking are not permitted within building.
- E. Cover stored and installed ductwork and installed duct openings with plastic to prevent dust, debris, and moisture from entering ductwork. Repair damaged plastic barrier.
- F. Monitor humidity and temperature for conformance to installation requirements defined by material and equipment manufacturers.
- G. Check moisture content of gypsum board prior to applying finishes. Record findings.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 INSTALLATION

A. Floor Drains: Cover floor drains with tape during construction to keep construction debris from blocking drain. Clean out floor drain lines to mains prior to Substantial Completion.

- B. Cavity Conditions: Clean and inspect cavity conditions prior to covering, sealing, or restricting access. Vacuum-clean cavity spaces prior to covering or enclosing.
- C. Plumbing: Pressure test plumbing piping identified as insulated on Project prior to installation of insulation.
- D. Sealants: Inspect exterior sealants for cracks, damage, or deterioration. Record findings and forward to Architect.
- E. HVAC Equipment (Permanent HVAC Equipment Used for Temporary Conditioning of Building During Construction Phases): Change filters and clean ductwork interior to remove dirt, dust, debris, and moisture buildup prior to turning Project over to Owner.

3.2 ADJUSTING

A. Remove damaged materials or materials that have become wet. Replace with new materials.

3.3 DEMONSTRATION

- A. Train and educate Owner's maintenance personnel on use of building systems. Explain how improper operation and shutting down systems during off periods can create mold problems.
- B. Schedule with Owner a review of building for mold problems at 1-year warranty walk-through. Inspect exterior sealants and masonry joints for cracks and other damage or deterioration where water can penetrate building envelope.
- C. Explain to Owner the need for Owner to establish annual building review for mold.

SECTION 015720 - INDOOR AIR QUALITY PLAN DURING CONSTRUCTION

PART1- GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Requirements to develop and utilize an indoor air quality plan for the construction operation.
 - 2. A sample plan applicable to all interior construction and trades.
 - 3. Reference:
 - a. "IAQ Guidelines for Occupied Buildings under Construction", 2008 Edition, by the Sheet Metal and Air Conditioning Contractors National Association, Inc.

1.2 TRAINING

A. Contractor shall provide copies of the plan and training to all subcontractors and appropriate personnel.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 EXECUTION

- A. Contractor shall utilize a plan to protect the indoor environments from contamination during construction and finish out similar to the following plan.
- B. Contractor shall enforce and verify compliance by all personnel and subcontractors.
- C. Contractor shall take pictures of the related construction operations to verify conformance to each section of the plan. These pictures will be provided to the Architect. A minimum of eighteen (18) pictures (six (6) pictures taken on three (3) separate occasions) will be submitted.

3.2 INDOOR AIR QUALITY PLAN DURING CONSTRUCTION OPERATIONS

- A. Introduction
 - 1. This plan outlines the processes required to assure acceptable air quality. Elements of the program include:
 - a. HVAC Protection and Containing the work area
 - b. Source Control and Modifying HVAC Operation and Reducing Emissions
 - c. Pathway Interruptions
 - d. Intensifying Housekeeping
 - e. Scheduling or Relocation of Occupants

3.3 THESE REQUIREMENTS APPLY TO ALL PARTIES INVOLVED IN DESIGN, CONSTRUCTION, AND BUILDING MOVE IN:

A. CONTAMINANTS

- 1. Air contaminants include many different materials. These may include: gases, vapors, chemicals, mold/fungus, pathogens, allergens, particulates and radiation. Eliminating all of these is not possible but reducing the introduction and distribution of these contaminants is possible and desirable. The programs outlined in the following pages are intended to reduce contaminants and provide as clean a building as possible for the residents.
- 2. The following sections outline procedures and precautions to reduce building contamination and meet the requirements for a healthy environment.

B. CONSTRUCTION OPERATIONS

- 1. HVAC PROTECTION: The air conditioning system is the distribution method for air and potential contaminants throughout the building. Keeping the system clean is a necessity.
 - a. All air handling equipment, spiral and fabricated ducts and accessories shall be kept clean during transportation, storage and assembly.
 - b. All lined, spiral and assembled ducts shall be wrapped and protected from dirt and water during transportation and storage.
 - c. All insulation and lined duct shall be kept dry at all times. Any insulation that has become wet shall be removed and replaced.
 - d. Fiberglass duct board in the air handlers and bases shall be kept dry and clean. Exposed fiberglass subject to erosion shall be coated with a sealer to prevent the entry of raw fiberglass into the air stream.

- 1) Water will not be allowed to stand on any mechanical equipment.
- e. All open ends of installed duct and equipment shall be covered and sealed to prevent the entry of dirt.
- f. All zone boxes shall be wrapped and sealed from dirt and water before installation. Installed zone boxes shall have the openings sealed until permanently connected to the ductwork.
- g. All dampers and attenuators into open chases and ducts shall be covered to reduce dirt entry.
- h. The air handlers shall not be started without MERV 8 filtration in place. Upon system activation, install sheet media on all return openings and filters in zone box plenum openings. These filters must be monitored and changed as necessary to prevent the entry of dirt into the system. The temporary media shall be removed after building flush out and before occupancy.
- i. The return air system should not be used during sheet rock installation, sanding or painting operations.
- j. The building should be kept under a positive pressure as much as possible.
- k. Chase dampers shall be kept closed until the system is activated.
- I. Complete the initial mechanical checklists at system startup.
- m. Replace final filters with new filters before flush out or occupancy per design requirements.
- 2. SOURCE CONTROL
 - a. No smoking or tobacco materials shall be allowed on all campuses.
 - b. No gasoline or fuel-fired equipment shall be used inside any enclosed building.
 - c. Wet processes within the building shall be kept to a minimum.
 - d. All chase and wallboard materials shall be protected from water. All damaged materials shall be removed and replaced.
 - e. Use low-emission materials and chemicals.
 - f. All cleaning involving chemicals shall be performed outside the building wherever possible.
 - g. All carpet materials shall be unrolled or unboxed and aired out in a well-ventilated warehouse for a minimum of three days before installation.
 - h. All modular furniture shall be aired out in a well-ventilated warehouse for seven days before entry into the building.
 - i. Trash shall be cleaned up and removed daily to the appropriate recycle container.
 - j. Any mold growth shall be treated according to the procedures shown in the New York City Department of Health "Guidelines on Assessment and Remediation of Fungi in Indoor Environments".
 - k. Clean the inside of all walls at the base track to remove excess materials and dirt with a vacuum cleaner before enclosing the wall. This is particularly critical on walls with plumbing or water piping included.
 - I. HEPA vacuum all concrete floors before installation of floor covering materials.No obvious mold or chemical contamination shall be enclosed, hidden or painted.
- 3. PATHWAY INTERRUPTION
 - a. Dust-producing operations shall be exhausted to the outside to the extent possible.
 - b. The air handler shall supply conditioned air to the floors. Floors with heavy dust or chemical operations shall be exhausted to the outside.
 - c. During rain or high-humidity conditions, the air supply coming from the coils shall be cooled to 55° F or the air handler stopped to prevent moist air entry into the building. Exhaust fans shall not draw moist air into the building. It is preferable to have little airflow to moist air entering the building.
 - d. Return air dampers and openings shall be covered with filter media during operations that may contaminate the system.
 - e. During activities producing airborne particulates in occupied buildings undergoing renovation, dust producing activities such as, but not limited to, demolition, sanding, buffing, and welding, the Contractor will provide commercial high volume air scrubbers at the rate of 1 per 7000 square feet, operate them continuously, and service them per the manufacturer, including high-efficiency particulate arrestance (HEPA) filter replacement.
- 4. HOUSEKEEPING
 - a. Food or food residues shall be properly disposed after meals or breaks.
 - b. Once the building is enclosed with finishes applied, keep dirt entry to a minimum with walk off mats at all entrances. Clean the mats at least daily.
 - c. All sweeping shall be done with dust reducing wax-based sweeping compounds.
 - d. All materials shall be kept clean and stored neatly on dunnage or pallets as required by the manufacturer.

- e. Coils, fans, and air handler chambers, including return air chambers, shall be inspected and cleaned if required before start up, final testing and commissioning, and air testing.
- f. All workers shall utilize the proper personal protective equipment per OSHA standards during any operation involving chemicals and dust production.
- g. No food, drink, or smoking shall be allowed within the building after the building is enclosed.
- 5. SCHEDULING
 - a. Complete all dust producing and chemical operations before the installation of "sink" materials such as carpet and ceiling tile.
 - b. Complete the HVAC control system sufficient to allow the operation of the supply and exhaust systems to control pressurization and contaminants.
 - c. Group contaminating operations where possible to maximize exhaust use.

SECTION 016000 - PRODUCT REQUIREMENTS

PART1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

1.3 DEFINITIONS

- A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material", "equipment", "system", and terms of similar intent.
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, which is current as of date of the Contract Documents.
 - 2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
 - 3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product", including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.4 ACTION SUBMITTALS

- A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
 - 2. Design Professional's Action: If necessary, Design Professional will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Design Professional will notify Contractor of approval or rejection of proposed comparable product request within fifteen (15) days of receipt of request, or seven (7) days of receipt of additional information or documentation, whichever is later.
 - a. Form of Approval: As specified in Division 01 Section 013300, "Submittal Procedures".
 - b. Use product specified if Design Professional does not issue a decision on use of a comparable product request within time allocated.
- B. Basis-of-Design Product Specification Submittal: Comply with requirements in Division 01 Section 013300, "Submittal Procedures". Show compliance with requirements.

1.5 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.
- B. Delivery and Handling:
 - 1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.

- 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
- 3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
- 4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.
- C. Storage:
 - 1. Store products to allow for inspection and measurement of quantity or counting of units.
 - 2. Store materials in a manner that will not endanger Project structure.
 - 3. Store products that are subject to damage by the elements under cover in a weather-tight enclosure above ground, with ventilation adequate to prevent condensation.
 - 4. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
 - 5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
 - 6. Protect stored products from damage and liquids from freezing.
 - 7. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.7 **PRODUCT WARRANTIES**

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
 - 1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
 - 2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
 - 1. Manufacturer's Standard Form: Modified to include Project specific information and properly executed.
 - 2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
 - 3. Refer to Divisions 02 through 49. Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Division 01 Section 017700, "Closeout Procedures".

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
 - 1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
 - 2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 - 3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
 - 4. Where products are accompanied by the term "as selected", Design Professional will make selection.
 - 5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
 - 6. Or Equal: For products specified by name and accompanied by the term "or equal", or "or approved equal", or "or approved", comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.
- B. Product Selection Procedures:

- 1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
- 2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
- 3. Products:
 - a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered, unless otherwise indicated.
 - b. Non-restricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.
- 4. Manufacturers:
 - a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered, unless otherwise indicated.
 - b. Non-restricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.
- 5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.
- C. Visual Matching Specification: Where Specifications require "match Design Professional's sample", provide a product that complies with requirements and matches Design Professional's sample. Design Professional's decision will be final on whether a proposed product matches.
 - 1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Division 01 Section 012500, "Substitution Procedures" for proposal of product.
- D. Visual Selection Specification: Where Specifications include the phrase "as selected by Design Professional from manufacturer's full range" or similar phrase, select a product that complies with requirements. Design Professional will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

- A. Conditions for Consideration: Design Professional will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Design Professional may return requests without action, except to record noncompliance with these requirements:
 - 1. Evidence that the proposed product does not require revisions to the Contract Documents, it is consistent with the Contract Documents, will produce the indicated results, and that it is compatible with other portions of the Work.
 - 2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 - 3. Evidence that proposed product provides specified warranty.
 - 4. List of similar installations for completed projects with project names and addresses and names and addresses of Design Professionals and owners, if requested.
 - 5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

SECTION 017300 - EXECUTION

PART1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout
 - 2. Field engineering and surveying
 - 3. Installation of the Work
 - 4. Cutting and patching
 - 5. Coordination of Owner installed products
 - 6. Progress cleaning
 - 7. Starting and adjusting
 - 8. Protection of installed construction
 - 9. Correction of the Work

1.3 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.
- B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.4 QUALITY ASSURANCE

- A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
 - 1. Structural Elements: When cutting and patching structural elements, notify Design Professional of locations and details of cutting and await directions from the Design Professional before proceeding. Shore, brace, and support structural element during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
 - 2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that result in increased maintenance or decreased operational life or safety. Operational elements include the following:
 - a. Primary operational systems and equipment
 - b. Fire separation assemblies
 - c. Air or smoke barriers
 - d. Fire-suppression systems
 - e. Mechanical systems piping and ducts
 - f. Control systems
 - g. Communication systems
 - h. Conveying systems
 - i. Electrical wiring systems
 - j. Operating systems of special construction
 - 3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, which results in reducing their capacity to perform as intended, or that result in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:
 - a. Water, moisture, or vapor barriers
 - b. Membranes and flashings
 - c. Equipment supports
 - d. Piping, ductwork, vessels, and equipment
 - e. Noise- and vibration-control elements and systems
 - 4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Design Professional's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

- B. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.
- C. Manufacturer's Installation Instructions: Obtain and maintain onsite manufacturer's written recommendations and instructions for installation of products and equipment.

1.5 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
- B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
 - 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to the Design Professional for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 - 1. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
 - a. Description of the Work
 - b. List of detrimental conditions, including substrates
 - c. List of unacceptable installation tolerances
 - d. Recommended corrections
 - 2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 - 3. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 - 4. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 - 5. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of the Contractor, submit a request for information to Design Professional according to requirements in Division 01 Section 013100, "Project Management and Coordination".

3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Design Professional promptly.
- B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.
- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels.
- E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Design Professional.

3.4 FIELD ENGINEERING

- A. Identification: Owner will identify existing benchmarks, control points, and property corners.
- B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
 - Do not change or relocate existing benchmarks or control points without prior written approval of Owner and Design Professional. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Design Professional before proceeding.
 - 2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.
- C. Benchmarks: Establish, construct and maintain a minimum of two permanent benchmarks on Project site, referenced to Owner's established geographic coordinate system. Benchmarks will function as both horizontal and vertical benchmarks. A registered professional land surveyor must establish the new benchmarks to meet specifications of National Geodetic Survey (NGS) Class RT1 surveys per the latest version of the User Guidelines for Single Base Real Time GNSS Positioning publication. New and re-set benchmarks will comply with the guidelines specified by Appendix B of the Bench Mark Reset Procedures document published by the NGS agency.
 - 1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
 - 2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
 - 3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.
- D. Mapping As-built Conditions: Once inspected and approved by Owner, all underground utility locations will be mapped using GPS mapping equipment to decimeter precision or better, prior to backfill, to collect geospatial data on as-built conditions. Any work covered prior to mapping will be required to be uncovered at no cost or schedule impact to the project. Consult with Owner for guidelines on how to collect the geospatial data and what information needs to be recorded about each utility feature. This information will be incorporated into the project record drawings to indicate the horizontal and vertical location of facilities, easements and improvements, as built.

3.5 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 - 1. Make vertical work plumb and make horizontal work level.
 - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 - 3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Tools and Equipment: Do not use tools or equipment that produces harmful noise levels.
- F. Templates: Obtain and distribute to the parties involved templates for work specified to be factory-prepared and field-installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- G. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
 - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Design Professional.
 - 2. Allow for building movement, including thermal expansion and contraction.
 - 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- H. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 CUTTING AND PATCHING

- A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- C. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching in accordance with requirements of Division 01 Section 011000, "Summary".
- D. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned; bypass such services/systems before cutting to prevent interruption to occupied areas.
- E. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 - 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 - 4. Excavating and Backfilling: Comply with requirements in applicable Division 31 Sections where required by cutting and patching operations.
 - 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 - 6. Proceed with patching after construction operations requiring cutting are complete.

- F. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
 - 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
 - Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
 a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
 - b. Restore damaged pipe covering to its original condition.
 - 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
 - 4. Ceilings: Patch, repair, or re-hang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
 - 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weather-tight condition.
- G. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 OWNER-INSTALLED PRODUCTS

- A. Site Access: Provide access to Project site for Owner's construction personnel.
- B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.
 - 1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
 - 2. Pre-installation Conferences: Include Owner's construction personnel at pre-installation conferences covering portions of the Work that are to receive Owner's work. Attend pre-installation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

3.8 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
 - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 - 2. Do not hold waste materials more than seven (7) days during normal weather or three (3) days if the temperature is expected to rise above 80° F.
 - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
 - a. Utilize containers intended for holding waste materials of type to be stored.
 - 4. Coordinate progress cleaning for joint-use areas where more than one installer has worked.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 - 1. Remove liquid spills promptly.
 - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Division 01 Section 015000, "Temporary Facilities and Controls" and Division 01 Section 017419, "Construction Waste Management and Disposal".
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to assure that no part of the construction completed or in progress is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.9 STARTING AND ADJUSTING

- A. Coordinate startup and adjusting of equipment and operating components with requirements in Division 01 Section 019113, "General Commissioning Requirements".
- B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- E. Manufacturer's Field Service: Comply with qualification requirements in Division 01 Section 014000, "Quality Requirements".

3.10 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.11 CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes.
 - 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Restore permanent facilities used during construction to their specified condition.
- C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
- E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

SECTION 017700 - CLOSEOUT PROCEDURES

PART1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Substantial Completion procedures
 - 2. Final completion procedures
 - 3. Warranties
 - 4. Final cleaning

1.3 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete with request.
 - 1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
 - 2. Advise Owner of pending insurance changeover requirements.
 - 3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 - 4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 - 5. Prepare and submit Project Record Documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
 - 6. Deliver attic stock and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
 - 7. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
 - 8. Complete startup testing of systems.
 - 9. Submit test/adjust/balance records.
 - 10. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 - 11. Advise Owner of changeover in heat and other utilities.
 - 12. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
 - 13. Complete final cleaning requirements, including touchup painting.
 - 14. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.
 - 1. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.
 - 2. Results of completed inspection will form the basis of requirements for final completion.

1.4 FINAL COMPLETION

- A. Preliminary Procedures: Before requesting final inspection for determining final completion, complete the following:
 - 1. Submit a final Application for Payment according to Division 01 Section 012900, "Payment Procedures".
 - 2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
 - 3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
 - 4. Submit pest-control final inspection report and warranty.

- 5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.
- B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
 - 1. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected. Include cost for re-inspection based on incomplete work of the Contractor.

1.5 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction. Use CSI Form 14.1A attached or form provide by Contractor and approved by Owner and Architect.
 - 1. Organize list of spaces in sequential order, starting with exterior areas first.
 - 2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
 - 3. Include the following information at the top of each page:
 - a. Project name
 - b. Date
 - c. Name of Architect
 - d. Name of Contractor
 - e. Page number
 - 4. Submit list of incomplete items in the following format:
 - a. PDF electronic file

1.6 WARRANTIES

- A. Submittal Time: Submit written warranties for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.
- B. Partial Occupancy: Submit properly executed warranties within fifteen (15) days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
- C. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
- D. Provide additional copies of each warranty to include in operation and maintenance manuals. Included digital copies of each warranty within appropriate division of operations and maintenance manuals.
- E. After final assembly, scan entire warranty binder into PDF format and deliver to Owner. Deliver entire closeout package to owner in PDF format on a thumb drive.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.
 - 1. Use cleaning products that meet Green Seal GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

- 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
 - Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - e. Remove snow and ice to provide safe access to building.
 - f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - g. Remove debris and surface dust from limited-access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - h. Sweep concrete floors clean in unoccupied spaces.
 - i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
 - j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - k. Remove labels that are not permanent.
 - I. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
 - 1) Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates.
 - m. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - n. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
 - o. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - p. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - q. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter upon inspection.
 - 1) Clean HVAC system in compliance with NADCA Standard ACR-2013.
 - r. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
 - s. Leave Project clean and ready for occupancy.
- C. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid Project of rodents, insects, and other pests. Prepare a report.
- D. Construction Waste Disposal: Comply with waste disposal requirements in Division 01 Section 017419, "Construction Waste Management and Disposal".

SECTION 017823 - OPERATION AND MAINTENANCE DATA

PART1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
 - 1. Operation and maintenance documentation directory
 - 2. Emergency manuals
 - 3. Operation manuals for systems, subsystems, and equipment
 - 4. Product maintenance manuals
 - 5. Systems and equipment maintenance manuals

1.3 DEFINITIONS

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 CLOSEOUT SUBMITTALS

- A. Manual Content: Operations and maintenance manual content is specified in individual specification sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
 - 1. Where applicable, clarify and update reviewed manual content to correspond to modifications and field conditions.
- B. Format: Submit operations and maintenance manuals in the following format:
 - 1. PDF electronic file. Assemble each manual into a composite electronically-indexed file. Submit on digital media acceptable to Design Professional.
 - 2. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically-linked operation and maintenance directory.
 - 3. Enable inserted reviewer comments on draft submittals.
 - 4. One (1) paper copy. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves. Design Professional will return.
- C. Initial Manual Submittal: Submit draft copy of each manual to Owner and Design Professional at least thirty (30) days before commencing demonstration and training. Design Professional, Owner, and Commissioning Agent will comment on whether general scope and content of manual are acceptable.
- D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least fifteen (15) days before commencing demonstration and training. Design Professional and Commissioning Agent will return copy with comments.
 - Correct or modify each manual to comply with Design Professional's and Commissioning Agent's comments. Submit copies of each corrected manual within fifteen (15) days of receipt of Design Professional's and Commissioning Agent's comments and prior to commencing demonstration and training.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

- A. Organization: Include a section in the directory for each of the following:
 - 1. List of documents
 - 2. List of systems
 - 3. List of equipment
 - 4. Table of contents
- B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
- C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of a system, list alphabetically in separate list.

- D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.
- E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4-2008, "Preparation of Operating and Maintenance Documentation for Building Systems".

2.2 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

- A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
 - 1. Title page
 - 2. Table of contents
 - 3. Manual contents
- B. Title Page: Include the following information:
 - 1. Subject matter included in manual
 - 2. Name and address of Project
 - 3. Name and address of Owner
 - 4. Date of submittal
 - 5. Name and contact information for Contractor
 - 6. Name and contact information for Construction Manager
 - 7. Name and contact information for Design Professional
 - 8. Name and contact information for Commissioning Agent
 - 9. Names and contact information for major consultants to the Design Professional that designed the systems contained in the manuals.
 - 10. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
 - 1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
- E. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
 - 1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
 - 2. File Names and Bookmarks: Enable bookmarking of individual documents based upon file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily-navigated file tree. Configure electronic manual to display bookmark panel upon opening file.
- F. Manuals, Paper Copy: Submit manuals in the form of hard-copy, bound, and labeled volumes.
 - 1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf or post-type binders, in thickness necessary to accommodate contents, sized to hold 8½ by 11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
 - a. If two (2) or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
 - Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL", Project title or name and subject matter of contents. Indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.

- 2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
- 3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
- 4. Supplementary Text: Prepared on 8½ by 11-inch bond paper.
- 5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
 - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
 - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 EMERGENCY MANUALS

- A. Content: Organize manual into a separate section for each of the following:
 - 1. Type of emergency
 - 2. Emergency instructions
 - 3. Emergency procedures
- B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
 - 1. Fire
 - 2. Flood
 - 3. Gas leak
 - 4. Water leak
 - 5. Power failure
 - 6. Water outage
 - 7. System, subsystem, or equipment failure
- C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
- D. Emergency Procedures: Include the following, as applicable:
 - 1. Instructions on stopping
 - 2. Shutdown instructions for each type of emergency
 - 3. Operating instructions for conditions outside normal operating limits
 - 4. Required sequences for electric or electronic systems
 - 5. Special operating instructions and procedures

2.4 OPERATION MANUALS

- A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
 - 1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
 - 2. Performance and design criteria if Contractor is delegated design responsibility.
 - 3. Operating standards
 - 4. Operating procedures
 - 5. Operating logs
 - 6. Wiring diagrams
 - 7. Control diagrams
 - 8. Piped system diagrams
 - 9. Precautions against improper use
 - 10. License requirements including inspection and renewal dates
- B. Descriptions: Include the following:
 - 1. Product name and model number. Use designations for products indicated on Contract Documents.
 - 2. Manufacturer's name
 - 3. Equipment identification with serial number of each component
 - 4. Equipment function
 - 5. Operating characteristics

C.

- 6. Limiting conditions
- 7. Performance curves
- 8. Engineering data and tests
- 9. Complete nomenclature and number of replacement parts
- Operating Procedures: Include the following, as applicable:
- 1. Startup procedures
 - 2. Equipment or system break-in procedures
 - 3. Routine and normal operating instructions
 - 4. Regulation and control procedures
 - 5. Instructions on stopping
 - 6. Normal shutdown instructions
 - 7. Seasonal and weekend operating instructions
 - 8. Required sequences for electric or electronic systems
 - 9. Special operating instructions and procedures
- D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.5 PRODUCT MAINTENANCE MANUALS

- A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- B. Source Information: List each product included in manual identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- C. Product Information: Include the following, as applicable:
 - 1. Product name and model number
 - 2. Manufacturer's name
 - 3. Color, pattern, and texture
 - 4. Material and chemical composition
 - 5. Reordering information for specially manufactured products
- D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
 - 1. Inspection procedures
 - 2. Types of cleaning agents to be used and methods of cleaning
 - 3. List of cleaning agents and methods of cleaning detrimental to product
 - 4. Schedule for routine cleaning and maintenance
 - 5. Repair instructions
- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
 - 1. Include procedures to follow and required notifications for warranty claims

2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

- A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.
- B. Source Information: List each system, subsystem, and piece of equipment included in manual identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
 - 1. Standard maintenance instructions and bulletins

- 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly
- 3. Identification and nomenclature of parts and components
- 4. List of items recommended to be stocked as spare parts
- D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
 - 1. Test and inspection instructions
 - 2. Troubleshooting guide
 - 3. Precautions against improper maintenance
 - 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - 5. Aligning, adjusting, and checking instructions
 - 6. Demonstration and training video recording, if available
- E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
 - 1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
 - 2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
- F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
- H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
 - 1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION AND DELIVERY

- A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.
- B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
- C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
 - 1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
 - 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
 - 1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
- F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
 - 1. Do not use original project record documents as part of operation and maintenance manuals.

- 2. Comply with requirements of newly prepared record Drawings in Division 01 Section 017839, "Project Record Documents".
- G. Comply with Division 01 Section 017700, "Closeout Procedures" for schedule for submitting operation and maintenance documentation.
- H. Include transmittal with all deliveries to Owner. Request receipt confirmation.

SECTION 017839 - PROJECT RECORD DOCUMENTS

PART1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for project record documents, including the following:
 - 1. Record Drawings
 - 2. Record Specifications
 - 3. Record Product Data
 - 4. Miscellaneous record submittals

1.3 DEFINITIONS

A. Geospatial Data: Data or information that identifies the geographic location of features and boundaries in relation to the Owner's coordinate system.

1.4 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit copies of record Drawings as follows:
 - a. Initial Submittal: Submit one (1) paper copy and PDF electronic files of marked-up record prints and one (1) set of plots from corrected record digital data files. Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
 - b. Final Submittal: Submit one (1) paper copy, PDF electronic files, CADD and BIM of marked-up record prints, one (1) set of record digital data files, and three (3) sets of record digital data file plots. Plot each drawing file, whether or not changes and additional information were recorded.
 - c. Architect will amend record CADD files for submission to Owner at completion of project.
- B. Record Specifications: Submit one (1) paper copy and one (1) PDF copy of Project's Specifications, including addenda and contract modifications.
- C. Record Product Data: Submit one (1) paper copy, one (1) PDF copy of each submittal, and one (1) CoBIE format.
 - 1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.
- D. Miscellaneous Record Submittals: Refer to other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit one (1) paper copy of each submittal.
- E. Reports: Submit written report indicating items incorporated in Project record documents concurrent with progress of the Work, including modifications, concealed conditions, field changes, product selections, and other notations incorporated.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

- A. Record Prints: Maintain one (1) set of marked-up paper copies of the Contract Drawings and Shop Drawings.
 - Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
 - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later
 - b. Accurately record information in an acceptable drawing technique
 - c. Record data as soon as possible after obtaining it
 - d. Record and check the markup before enclosing concealed installations

2.

- e. Cross-reference record prints to corresponding archive photographic documentation
- Content: Types of items requiring marking include, but are not limited to, the following:
- a. Dimensional changes to Drawings
- b. Revisions to details shown on Drawings
- c. Depths of foundations below first floor
- d. Locations and depths of underground utilities
- e. Revisions to routing of piping and conduits
- f. Revisions to electrical circuitry
- g. Actual equipment locations
- h. Duct size and routing
- i. Locations of concealed internal utilities
- j. Changes made by Change Order or Construction Change Directive
- k. Changes made following Architect's written orders
- I. Details not on the original Contract Drawings
- m. Field records for variable and concealed conditions
- n. Record information on the Work that is shown only schematically
- 3. Mark the Contract Drawings and Shop Drawings completely and accurately. Utilize personnel proficient at recording graphic information in production of marked-up record prints.
- 4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
- 5. Mark important additional information that was either shown schematically or omitted from original Drawings.
- 6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:
 - 1. Format: Same digital data software program, version, and operating system as the original Contract Drawings.
 - 2. Format: As approved by Owner.
 - 3. Format: Annotated PDF electronic file with comment function enabled.
 - 4. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
 - 5. Refer instances of uncertainty to Architect through Construction Manager for resolution.
 - 6. Incorporate geospatial data collected during construction and installation to more accurately reflect as-built conditions.
- C. Newly-Prepared Record Drawings: Prepare new Drawings instead of preparing record Drawings where Architect determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.
 - 1. New Drawings may be required when a Change Order is issued as a result of accepting an alternate, substitution, or other modification.
 - 2. Consult Architect and Construction Manager for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. Integrate newly prepared record Drawings into record Drawing sets; comply with procedures for formatting, organizing, copying, binding, and submitting.
- D. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
 - 1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
 - 2. Format: Annotated PDF electronic file with comment function enabled.
 - 3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
 - 4. Identification: As follows:
 - a. Project name
 - b. Date
 - c. Designation "PROJECT RECORD DRAWINGS"
 - d. Name of Architect and Construction Manager
 - e. Name of Contractor

2.2 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
 - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 - 2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
 - 3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
 - 4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
 - 5. Note related Change Orders, record Product Data, and record Drawings where applicable.
- B. Format: Submit record Specifications as a scanned PDF electronic file of the marked up paper copy of Specifications.

2.3 RECORD PRODUCT DATA

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
 - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 - 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 - 3. Note related Change Orders, record Specifications, and record Drawings where applicable.
- B. Format: Submit record Specifications as a scanned PDF electronic file and CoBIE format of the marked up paper copy of Specifications.
 - 1. Include record Product Data directory organized by specification section number and title, electronically linked to each item of record Product Data.

2.4 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.
- B. Format: Submit record Specifications as a scanned PDF electronic file of the marked up paper copy of Specifications.
- C. Include miscellaneous record submittals directory organized by specification section number and title, electronically linked to each item of miscellaneous record submittals.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

- A. Recording: Maintain one (1) copy of each submittal during the construction period for project record document purposes. Post changes and modifications to project record documents as they occur; do not wait until the end of Project.
- B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's and Construction Manager's reference during normal working hours.

SECTION 017900 - DEMONSTRATION AND TRAINING

PART1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
 - 1. Demonstration of operation of systems, subsystems, and equipment
 - 2. Training in operation and maintenance of systems, subsystems, and equipment
- B. Related Sections:
 - 1. Divisions 02 through 32 Sections for specific requirements for demonstration and training for products in those Sections

1.3 INFORMATIONAL SUBMITTALS

- A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
 - 1. Indicate proposed training modules utilizing manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.
- B. Qualification Data: For facilitator
- C. Attendance Record: For each training module, submit list of participants and length of instruction time.
- D. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

1.4 QUALITY ASSURANCE

- A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
- B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Division 01 Section 014000, "Quality Requirements", experienced in operation and maintenance procedures and training.
- C. Pre-Instruction Conference: Conduct conference at Project site to comply with requirements in Division 01 Section 013100, "Project Management and Coordination". Review methods and procedures related to demonstration and training including, but not limited to, the following:
 - 1. Inspect and discuss locations and other facilities required for instruction.
 - 2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
 - 3. Review required content of instruction.
 - 4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

1.5 COORDINATION

- A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations.
- B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.
- C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Design Professional.

PART 2 - PRODUCTS

3.

4.

INSTRUCTION PROGRAM 2.1

- Program Structure: Develop an instruction program that includes individual training modules for each Α. system and for equipment not part of a system, as required by individual Specification Sections.
- Β. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module. include instruction for the following as applicable to the system, equipment, or component: 1.
 - Basis of System Design, Operational Requirements, and Criteria: Include the following:
 - a. System, subsystem, and equipment descriptions
 - Performance and design criteria if Contractor is delegated design responsibility b.
 - c. Operating standards
 - d. Regulatory requirements
 - Equipment function e.
 - Operating characteristics f.
 - Limiting conditions g.
 - Performance curves h.
 - 2. Documentation: Review the following items in detail:
 - Emergency manuals a.
 - b. Operations manuals
 - c. Maintenance manuals
 - d. Project record documents
 - Identification systems e.
 - Warranties and bonds f.
 - Maintenance service agreements and similar continuing commitments g.
 - Emergencies: Include the following, as applicable:
 - Instructions on meaning of warnings, trouble indications, and error messages a.
 - Instructions on stopping b.
 - Shutdown instructions for each type of emergency c.
 - d. Operating instructions for conditions outside of normal operating limits
 - Sequences for electric or electronic systems e.
 - Special operating instructions and procedures f.
 - Operations: Include the following, as applicable:
 - Startup procedures a.
 - Equipment or system break-in procedures b.
 - Routine and normal operating instructions c.
 - d. Regulation and control procedures
 - Control sequences e.
 - Safety procedures f.
 - Instructions on stopping g.
 - Normal shutdown instructions h.
 - Operating procedures for emergencies i.
 - Operating procedures for system, subsystem, or equipment failure j.
 - Seasonal and weekend operating instructions k.
 - Required sequences for electric or electronic systems Ι.
 - m. Special operating instructions and procedures
 - 5. Adjustments: Include the following:
 - a. Alignments
 - Checking adjustments b.
 - Noise and vibration adjustments c.
 - d. Economy and efficiency adjustments
 - Troubleshooting: Include the following: 6.
 - Diagnostic instructions a.
 - Test and inspection procedures b.
 - 7. Maintenance: Include the following:
 - a. Inspection procedures
 - Types of cleaning agents to be used and methods of cleaning b.
 - List of cleaning agents and methods of cleaning detrimental to product c.
 - d. Procedures for routine cleaning

- e. Procedures for preventive maintenance
- f. Procedures for routine maintenance
- g. Instruction on use of special tools
- 8. Repairs: Include the following:
 - a. Diagnosis instructions
 - b. Repair instructions
 - c. Disassembly; component removal, repair, and replacement; and reassembly instructions
 - d. Instructions for identifying parts and components
 - e. Review of spare parts needed for operation and maintenance

PART 3 - EXECUTION

3.1 PREPARATION

- A. Assemble educational materials necessary for instruction, including documentation and training modules. Assemble training modules into a training manual organized in coordination with requirements in Division 01 Section 017823, "Operations and Maintenance Data".
- B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

- A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.
- B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
- C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
 - 1. Schedule training with Owner, through Construction Manager, with at least seven days' advance notice.
- D. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a demonstration performance-based test.
- E. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

3.3 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

- A. General: Engage a qualified individual to record demonstration and training video recordings. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.
 - 1. At beginning of each training module, record each chart containing learning objective and lesson outline.
- B. Video: Provide minimum 640 x 480 video resolution converted to format file type acceptable to Owner, on electronic media.
 - 1. Electronic Media: Read-only format compact disc acceptable to Owner, with commercial-grade graphic label.
 - 2. File Hierarchy: Organize folder structure and file locations according to project manual table of contents. Provide complete screen-based menu.
 - 3. File Names: Utilize file names based upon name of equipment generally described in video segment, as identified in Project specifications.
 - 4. Contractor and Installer Contact File: Using appropriate software, create a file for inclusion on the Equipment Demonstration and Training DVD that describes the following for each Contractor involved on the Project, arranged according to Project table of contents:
 - a. Name of Contractor/Installer
 - b. Business address
 - c. Business phone number
 - d. Point of contact
 - e. E-mail address
- C. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to adequately cover area of demonstration and training. Display continuous running time.

- 1. Film training session(s) in segments not to exceed fifteen (15) minutes.
 - a. Produce segments to present a single significant piece of equipment per segment.
 - b. Organize segments with multiple pieces of equipment to follow order of Project Manual table of contents.
 - c. Where a training session on a particular piece of equipment exceeds fifteen (15) minutes, stop filming and pause training session. Begin training session again upon commencement of new filming segment.
- D. Light Levels: Verify light levels are adequate to properly light equipment. Verify equipment markings are clearly visible prior to recording.
 - 1. Furnish additional portable lighting as required.
- E. Narration: Describe scenes on video recording by audio narration by microphone while video recording is recorded. Include description of items being viewed.
- F. Transcript: Provide a transcript of the narration. Display images and running time captured from videotape opposite the corresponding narration segment.
- G. Pre-produced Video Recordings: Provide video recordings used as a component of training modules in same format as recordings of live training.

SECTION 019113 - GENERAL COMMISSIONING REQUIREMENTS

PART1- GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.
- B. OPR and BoD documentation are included by reference for information only.

1.2 SUMMARY

A. Section includes general requirements that apply to implementation of commissioning without regard to specific systems, assemblies, or components.

1.3 DEFINITIONS

- A. BoD: Basis of Design. A document that records concepts, calculations, decisions, and product selections used to meet the OPR and to satisfy applicable regulatory requirements, standards, and guidelines. The document includes both narrative descriptions and lists of individual items that support the design process.
- B. Commissioning Plan: A document that outlines the organization, schedule, allocation of resources, and documentation requirements of the commissioning process.
- C. CxA: Commissioning Authority.
- D. OPR: Owner's Project Requirements. A document that details the functional requirements of a project and the expectations of how it will be used and operated. These include Project goals, measurable performance criteria, cost considerations, benchmarks, success criteria, and supporting information.
- E. Systems, Subsystems, Equipment, and Components: Where these terms are used together or separately, they shall mean "as-built" systems, subsystems, equipment, and components.

1.4 COMMISSIONING TEAM

- A. Members Appointed by Contractor(s): Individuals, each having the authority to act on behalf of the entity he or she represents, explicitly organized to implement the commissioning process through coordinated action. The commissioning team shall consist of, but not be limited to, representatives of each Contractor, including Project superintendent and subcontractors, installers, suppliers, and specialists deemed appropriate by the CxA.
- B. Members Appointed by Owner:
 - 1. CxA: The designated person, company, or entity that plans, schedules, and coordinates the commissioning team to implement the commissioning process. Owner will engage the CxA under a separate contract.
 - 2. Representatives of the facility user and operation and maintenance personnel.
 - 3. Architect and engineering design professionals.

1.5 OWNER'S RESPONSIBILITIES

- A. Provide the OPR documentation to the Design Professional, CxA and Contractor for information and use.
- B. Assign operation and maintenance personnel and schedule them to participate in commissioning team activities.
- C. Provide the BoD documentation, prepared by Design Professional and approved by Owner, to the CxA and Contractor for use in developing the commissioning plan, systems manual, and operation and maintenance training plan.

1.6 CONTRACTOR'S RESPONSIBILITIES

- A. Contractor shall assign representatives with expertise and authority to act on its behalf and shall schedule them to participate in and perform commissioning process activities including, but not limited to, the following:
 - 1. Evaluate performance deficiencies identified in test reports and, in collaboration with entity responsible for system and equipment installation, recommend corrective action.
 - 2. Cooperate with the CxA for resolution of issues recorded in the Issues Log.
 - 3. Attend commissioning team meetings held on a monthly basis.

- 4. Integrate and coordinate commissioning process activities with construction schedule.
- 5. Review and accept construction checklists provided by the CxA.
- 6. Complete electronic construction checklists as Work is completed and provide to the CxA.
- 7. Review and accept commissioning process test procedures provided by the CxA.
- 8. Complete commissioning process test procedures.

1.7 CxA'S RESPONSIBILITIES

- A. Organize and lead the commissioning team
- B. Provide commissioning plan
- C. Convene commissioning team meetings
- D. Provide Project-specific construction checklists and commissioning process test procedures.
- E. Verify the execution of commissioning process activities using random sampling. The sampling rate may vary from 1 to 100 percent. Verification will include, but is not limited to, equipment submittals, construction checklists, training, operating and maintenance data, tests, and test reports to verify compliance with the OPR. When a random sample does not meet the requirement, the CxA will report the failure in the Issues Log.
- F. Prepare and maintain the Issues Log
- G. Prepare and maintain completed construction checklist log
- H. Witness systems, assemblies, equipment, and component startup
- I. Compile test data, inspection reports, and certificates; include them in the systems manual and commissioning process report.
- PART 2 PRODUCTS (Not Used)
- PART 3 EXECUTION (Not Used)

SECTION 020413 - COMMON SUBMITTAL REQUIREMENTS FOR EXISTING CONDITIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes supplementary administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals specific to the work of this Division.
- B. Related Requirements:
 - 1. Division 01 submittal requirements.

1.2 DEFINITIONS

- A. Contractor: Refers to an entity in direct Contract with the Owner to furnish and/or perform any portion of the Work of the Contract, including but not limited to a Construction Manager.
 - 1. Contractor shall review and approve Product Submittals prior to fowarding them to the Architect.
- B. Product Submittals: In general, Product Submittals show characteristics of the proposed construction in one of the following forms:
 - 1. Shop Drawings.
 - 2. Product Data.
 - 3. Samples.
- C. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
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- E. Submittal Review Sheet: Specific form required to accompany each submittal. Obtain Submittal Review Sheet from the SmithGroup Project Manager.

1.3 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Requirements specified for submittals are intended to provide efficient handling, while permitting review responsibilities to be carried out.
- B. Avoidable Resubmittals: The first two reviews of each specified submittal will be processed without cost to the Contractor. After the second review, the Owner may charge the Contractor for the cost of such additional processing, unless the processing results from approved Change Orders causing revisions to previously approved submittals.
- C. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 - 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 - 4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architectreserve the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- D. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
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- 2. When a large volume of submittal materials is scheduled, additional review time may be required. Similarly, a particular submittal may require review completion in less than the agreed normal time. Due to variations in submittal volume and processing needs, agreed review time is not intended to apply to extreme conditions.
- 3. Resubmittal Review: Allow 10 business days for review of each resubmittal.
- 4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 15 business days for initial review of each submittal.
- E. Maintain at the Project Site ready access to the latest reviewed Shop Drawings and Product Data, and one set of samples.

1.4 DELEGATED-DESIGN SERVICES

A. Definitions:

- 1. Delegated Design: A portion or component of the Work identified by the Contract Documents to be designed by the Contractor, or an entity assigned by the Contractor, to satisfy performance and design criteria specified in the Contract Documents for that portion or component.
- 2. Registered Design Professional: Design professional, assigned by the Contractor, who is responsible for providing the delegated design work, and for certifying that the work is in compliance with the specified performance requirements and design criteria. Design professional shall be legally qualified to practice in jurisdiction where Project is located and shall be experienced in providing delegated design services of the kind indicated. Delegated design services are defined as those performed for installation of the system, assembly or product that are similar in material, design, and extent to those indicated for this Project.
- B. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- C. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Combine with Submittal Review Sheet before submitting to Architect .
- B. Project Closeout and Maintenance Material Submittals: See requirements in Division 01.
- C. Be responsible for quantities, weights, and dimensions to be confirmed and correlated at the site; for information that pertains solely to the fabrication processes and to the means, methods, techniques, sequences, and procedures of construction; and for coordination of the work of every trade, supplier, and subcontractor.
- D. Be responsible for each submittal to be in conformance with information given and the design intent expressed in the Contract Documents.
- E. Provide with each submittal specific written notice of any variation from the requirements of the Contract Documents by causing a specific notation to be made on the Submittal Review Sheet and Submittal Transmittal.

3.2 ARCHITECT'S AND GENERAL CONTRACTOR'S ACTION

- A. General: Architect will not review submittals that do not include the Submittal Review Sheet.
- B. Action Submittals: Architect's staff and consultants will review the submittal, and mark the Submittal Review Sheet with an action code. The code meanings are described below.

- C. Additional codes may be provided within comments or as an electronic submittal review stamp and shall be used in help indicating return of partial submittals.
- D. The Final Review Code on the Submittal Review Sheet prevails and governs the action of the overall submittal.
- E. Review Code meanings are as follows:
 - 1. Action Codes Permitting Use:
 - a. When an action code permitting use is assigned to a submittal, it does not authorize work that does not comply with the requirements of the Contract Documents. Acceptance of the Work will depend on compliance.
 - b. Code AP Approved: The Work covered by the submittal item may proceed, provided it complies with Contract Document requirements.
 - c. Code AN Approved as Noted: The Work covered by the submittal item may proceed, provided it complies with the Architect's notations and Contract Document requirements.
 - d. Code AN-R Approved as Noted Resubmit: Do not deliver or install the related work until the resubmittal has received Code AP or AN. However, fabrication and other off-site work covered by the submittal item may proceed, at the Contractor's risk, provided it complies with the Architect's notations and Contract Document requirements.
 - 2. Action Code Prohibiting Use:
 - a. Action Code REJ Not Approved: The Work covered by the submittal item, including purchasing, fabrication, delivery, and other activity, shall not proceed. Revise the submittal item or prepare a new item in accordance with the Architect's notations. Resubmit the corrected or new item without delay; do not permit submittal items marked "Not Approved" to be used. Work incorporating such items will be rejected.
 - 3. Action Code for Items Not Required:
 - a. Action Code X Not Requested by Contract Documents: The submittal item is not called for by the Contract Documents and is being returned unreviewed by the Architect except to the extent necessary to determine its status.
- F. Informational Submittals: For Architect's information only. Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
 - 1. Action Code for Information Only:
 - a. Action Code INF Information Only Received: The submittal item is not called for a return with a reviewed action code by the Contract Documents and is being returned un-reviewed by the Architect except to the extent necessary to determine its status.
- G. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- H. Incomplete submittals are not acceptable, will be considered non-responsive, and will be returned without review.
- I. Architect will return without review or discard submittals received from sources other than the Contractor.
- J. Submittals not required by the Contract Documents may be returned by the Architect without action.
 - 1. Do not submit Material Safety Data Sheets. They will be returned without review.

3.3 SUBMITTAL TRANSMITTAL REQUIREMENTS

- A. Submittal Transmittal shall be a PDF file in electronic format. It is recommended, to expedite the submittal review, the electronic form be emailed for review to the Architect as early as possible.
 - 1. Submittal Numbering: See below.
 - 2. Contact Information: Full Name, Phone Number and Email Address.
- B. Submittal Definition
 - 1. Each submittal consists of items from only ONE Specifications section.
 - 2. Complete Submittal: If ALL the items required by the Specifications section are listed on one Submittal Form (including continuation sheet), it is a complete submittal.
 - 3. Partial Submittals: If it is necessary to divide the required items of a given Specifications section into two or more submittals to meet schedule or handling requirements, the separate submittals are partial submittals. All partial submittals have the same submittal number, and are differentiated by sequential P-numbers (see below).
 - 4. All items in each submittal, whether complete or partial, will be processed together: Individual items will not be 'broken out' for special handling. Arrange submittals accordingly.

C. Submittal Numbering

- 1. Number submittals as described below to assist tracking.
- 2. Number each submittal in the format nnnnn-nn.
 - a. The 6-digit number is the number of the section that requires the submittal. For example, 044200.
 - b. The 2-digit number is based on the numerical sequence of submittals from that section. In other words, for each section, the first submittal is 01, the second is 02, and so on. The 2-digit number does not change for partial or re-submittals, so that the submittal can be tracked.
 - c. P-Number for Partial Submittals: Number each partial submittal in the pee space, beginning with P1, and increasing by one for each partial submittal of that submittal. If the submittal is a complete submittal, leave the P space blank.
 - d. R-Number for Re-submittals: Number each re-submittal in the arr space, beginning with R1, and increasing by one for each re-submittal of that submittal. Do not include an R-Number for the initial submittal.
 - e. Examples:
 - 1) Initial Complete Submittal: 044200-01. First Re-Submittal: 044200-01-R1.
 - 2) Initial Partial Submittal: 044200-01-P1. Second Partial Submittal: 0044200-01-P2. First Re-submittal of Second Partial Submittal: 044200-R1-P2.

3.4 SUBMITTAL REVIEW SHEET REQUIREMENTS

- A. Provide Submittal Review Sheet in PDF format. Submit as the page after the Submittal Transmittal.
- B. When attached, the Submittal Review Sheet shall not obscure information contained in the submittal.
- C. Do not edit any of the information contained within the Submittal Review Sheet except as follows:
 1. Submittal Number: See Submittal Numbering in Submittal Transmittal Requirements paragraph.
- D. The Contractor shall submit the PDF file in a manner that will allow editing of the Submittal Review Sheet fields by SmithGroup and its consultants.

SECTION 024119 - SELECTIVE STRUCTURE DEMOLITION

PART1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Demolition and removal of selected portions of building or structure.
 - 2. Demolition and removal of selected site elements.
 - 3. Salvage of existing items to be reused or recycled.

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction, including associated attachments, supports, bracing, etc., and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.
- B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse.
- C. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.
- D. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.
- B. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.5 PREINSTALLATION MEETINGS

- A. Predemolition Conference: Conduct conference at Project site.
 - 1. Inspect and discuss condition of construction to be selectively demolished.
 - 2. Review structural load limitations of existing structure.
 - 3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
 - 5. Review areas where existing construction is to remain and requires protection.

1.6 INFORMATIONAL SUBMITTALS

- A. Proposed Protection Measures: Submit report, including drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and, for noise control. Indicate proposed locations and construction of barriers.
- B. Inventory: Submit a list of items to be removed and salvaged and deliver to Owner prior to start of demolition.
- C. Predemolition Photographs or Video: Submit before Work begins.

1.7 CLOSEOUT SUBMITTALS

- A. Inventory: Submit a list of items that have been removed and salvaged.
- B. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.8 FIELD CONDITIONS

- A. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- B. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

- C. Hazardous Materials: Hazardous materials are present in buildings and structures to be selectively demolished. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.
 - 1. Hazardous material remediation is specified elsewhere in the Contract Documents.
 - 2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
- D. Storage or sale of removed items or materials on-site is not permitted.
- E. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - 1. Maintain fire-protection facilities in service during selective demolition operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- C. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.
- D. Perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.
- E. Survey of Existing Conditions: Record existing conditions by use of measured drawings, preconstruction photographs and templates.
 - 1. Inventory and record the condition of items to be removed and salvaged. Provide photographs of conditions that might be misconstrued as damage caused by salvage operations.
 - 2. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
 - 1. Arrange to shut off indicated utilities with utility companies.
 - 2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
 - 3. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated to be removed.
 - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 - b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
 - c. Equipment to Be Removed: Disconnect and cap services and remove equipment.

- d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
- e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
- f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
- g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material.

3.3 PREPARATION

- A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Comply with requirements for access and protection specified in Division 01 section addressing "Temporary Facilities and Controls."
- B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 - 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 - 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
 - 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
 - 4. Cover and protect furniture, furnishings, and equipment that have not been removed.
 - 5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Division 01 section addressing "Temporary Facilities and Controls."
- C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
 1. Strengthen or add new supports when required during progress of selective demolition.

3.4 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
 - 1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
 - 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
 - 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 - 4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
 - 5. Maintain adequate ventilation when using cutting torches.
 - 6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 - 7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
 - 8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 - 9. Dispose of demolished items and materials promptly.
- B. Removed and Salvaged Items:

- 1. Clean salvaged items.
- 2. Pack or crate items after cleaning. Identify contents of containers.
- 3. Store items in a secure area until delivery to Owner.
- 4. Transport items to Owner's storage area designated by Owner.
- 5. Protect items from damage during transport and storage.
- C. Removed and Reinstalled Items:
 - 1. Clean and repair items to functional condition adequate for intended reuse.
 - 2. Pack or crate items after cleaning and repairing. Identify contents of containers.
 - 3. Protect items from damage during transport and storage.
 - 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, then remove concrete between saw cuts.
- B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.
- C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.
- D. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings."

3.6 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site.
 - 1. Do not allow demolished materials to accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning: Do not burn demolished materials.
- C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.7 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

SECTION 040413 - COMMON SUBMITTAL REQUIREMENTS FOR MASONRY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes supplementary administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals specific to the work of this Division.
- B. Related Requirements:
 - 1. Division 01 submittal requirements.

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 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
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 - 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 - 4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architectreserve the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- D. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
 - 1. Initial Review: Allow 10 business days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required.

- 2. When a large volume of submittal materials is scheduled, additional review time may be required. Similarly, a particular submittal may require review completion in less than the agreed normal time. Due to variations in submittal volume and processing needs, agreed review time is not intended to apply to extreme conditions.
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- E. Maintain at the Project Site ready access to the latest reviewed Shop Drawings and Product Data, and one set of samples.

1.4 DELEGATED-DESIGN SERVICES

A. Definitions:

- 1. Delegated Design: A portion or component of the Work identified by the Contract Documents to be designed by the Contractor, or an entity assigned by the Contractor, to satisfy performance and design criteria specified in the Contract Documents for that portion or component.
- 2. Registered Design Professional: Design professional, assigned by the Contractor, who is responsible for providing the delegated design work, and for certifying that the work is in compliance with the specified performance requirements and design criteria. Design professional shall be legally qualified to practice in jurisdiction where Project is located and shall be experienced in providing delegated design services of the kind indicated. Delegated design services are defined as those performed for installation of the system, assembly or product that are similar in material, design, and extent to those indicated for this Project.
- B. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- C. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Combine with Submittal Review Sheet before submitting to Architect .
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- E. Review Code meanings are as follows:
 - 1. Action Codes Permitting Use:
 - a. When an action code permitting use is assigned to a submittal, it does not authorize work that does not comply with the requirements of the Contract Documents. Acceptance of the Work will depend on compliance.
 - b. Code AP Approved: The Work covered by the submittal item may proceed, provided it complies with Contract Document requirements.
 - c. Code AN Approved as Noted: The Work covered by the submittal item may proceed, provided it complies with the Architect's notations and Contract Document requirements.
 - d. Code AN-R Approved as Noted Resubmit: Do not deliver or install the related work until the resubmittal has received Code AP or AN. However, fabrication and other off-site work covered by the submittal item may proceed, at the Contractor's risk, provided it complies with the Architect's notations and Contract Document requirements.
 - 2. Action Code Prohibiting Use:
 - a. Action Code REJ Not Approved: The Work covered by the submittal item, including purchasing, fabrication, delivery, and other activity, shall not proceed. Revise the submittal item or prepare a new item in accordance with the Architect's notations. Resubmit the corrected or new item without delay; do not permit submittal items marked "Not Approved" to be used. Work incorporating such items will be rejected.
 - 3. Action Code for Items Not Required:
 - a. Action Code X Not Requested by Contract Documents: The submittal item is not called for by the Contract Documents and is being returned unreviewed by the Architect except to the extent necessary to determine its status.
- F. Informational Submittals: For Architect's information only. Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
 - 1. Action Code for Information Only:
 - a. Action Code INF Information Only Received: The submittal item is not called for a return with a reviewed action code by the Contract Documents and is being returned un-reviewed by the Architect except to the extent necessary to determine its status.
- G. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- H. Incomplete submittals are not acceptable, will be considered non-responsive, and will be returned without review.
- I. Architect will return without review or discard submittals received from sources other than the Contractor.
- J. Submittals not required by the Contract Documents may be returned by the Architect without action.
 - 1. Do not submit Material Safety Data Sheets. They will be returned without review.

3.3 SUBMITTAL TRANSMITTAL REQUIREMENTS

- A. Submittal Transmittal shall be a PDF file in electronic format. It is recommended, to expedite the submittal review, the electronic form be emailed for review to the Architect as early as possible.
 - 1. Submittal Numbering: See below.
 - 2. Contact Information: Full Name, Phone Number and Email Address.
- B. Submittal Definition
 - 1. Each submittal consists of items from only ONE Specifications section.
 - 2. Complete Submittal: If ALL the items required by the Specifications section are listed on one Submittal Form (including continuation sheet), it is a complete submittal.
 - 3. Partial Submittals: If it is necessary to divide the required items of a given Specifications section into two or more submittals to meet schedule or handling requirements, the separate submittals are partial submittals. All partial submittals have the same submittal number, and are differentiated by sequential P-numbers (see below).
 - 4. All items in each submittal, whether complete or partial, will be processed together: Individual items will not be 'broken out' for special handling. Arrange submittals accordingly.

C. Submittal Numbering

- 1. Number submittals as described below to assist tracking.
- 2. Number each submittal in the format nnnnn-nn.
 - a. The 6-digit number is the number of the section that requires the submittal. For example, 044200.
 - b. The 2-digit number is based on the numerical sequence of submittals from that section. In other words, for each section, the first submittal is 01, the second is 02, and so on. The 2-digit number does not change for partial or re-submittals, so that the submittal can be tracked.
 - c. P-Number for Partial Submittals: Number each partial submittal in the pee space, beginning with P1, and increasing by one for each partial submittal of that submittal. If the submittal is a complete submittal, leave the P space blank.
 - d. R-Number for Re-submittals: Number each re-submittal in the arr space, beginning with R1, and increasing by one for each re-submittal of that submittal. Do not include an R-Number for the initial submittal.
 - e. Examples:
 - 1) Initial Complete Submittal: 044200-01. First Re-Submittal: 044200-01-R1.
 - 2) Initial Partial Submittal: 044200-01-P1. Second Partial Submittal: 0044200-01-P2. First Re-submittal of Second Partial Submittal: 044200-R1-P2.

3.4 SUBMITTAL REVIEW SHEET REQUIREMENTS

- A. Provide Submittal Review Sheet in PDF format. Submit as the page after the Submittal Transmittal.
- B. When attached, the Submittal Review Sheet shall not obscure information contained in the submittal.
- C. Do not edit any of the information contained within the Submittal Review Sheet except as follows:
 1. Submittal Number: See Submittal Numbering in Submittal Transmittal Requirements paragraph.
- D. The Contractor shall submit the PDF file in a manner that will allow editing of the Submittal Review Sheet fields by SmithGroup and its consultants.

SECTION 042200 - CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Concrete masonry units.
 - 2. Mortar and grout.
 - 3. Steel reinforcing bars.
 - 4. Masonry-joint reinforcement.
 - 5. Miscellaneous masonry accessories.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For the following:
 - 1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
 - 2. Reinforcing Steel: Detail bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315.

1.4 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For each type and size of the following:
 - 1. Masonry units.
 - a. Include material test reports substantiating compliance with requirements.
 - 2. Cementitious materials. Include name of manufacturer, brand name, and type.
 - 3. Mortar admixtures.
 - 4. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
 - 5. Grout mixes. Include description of type and proportions of ingredients.
 - 6. Reinforcing bars.
 - 7. Joint reinforcement.
 - 8. Anchors, ties, and metal accessories.
- B. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
 - Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91/C 91M for air content.
 - 2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.
- C. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- D. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.
- E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.6 FIELD CONDITIONS

A. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

- 1. Protect sills, ledges, and projections from mortar droppings.
- 2. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
- 3. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar onto completed masonry.
- B. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.
 - 1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.
- C. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

PART 2 - PRODUCTS

C.

2.1 MANUFACTURERS

- A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.
- B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

2.2 UNIT MASONRY, GENERAL

- A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6 except as modified by requirements in the Contract Documents.
- B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work and will be within 20 feet vertically and horizontally of a walking surface.
 - Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.
 Where fire-resistance-rated construction is indicated, units shall be listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction.

2.3 CONCRETE MASONRY UNITS

- A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
 - 1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
 - 2. Provide square-edged units for outside corners unless otherwise indicated.
- B. CMUs: ASTM C 90.
 - 1. Size (Width): Manufactured to dimensions 3/8 inch less-than-nominal dimensions.

2.4 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C 150/C 150/M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
 1. Alkali content shall not be more than 0.1 percent when tested according to ASTM C 114.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
- D. Aggregate for Mortar: ASTM C 144.
 - 1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
 - 2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
- E. Aggregate for Grout: ASTM C 404.

F. Water: Potable.

2.5 REINFORCEMENT

- Α. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60.
- Β. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Units are formed from 0.148-inch steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated. 1.
 - Products: Subject to compliance with requirements, provide one of the following:
 - Heckmann Building Products Inc.: No. 376 Rebar Positioner. а
 - Hohmann & Barnard, Inc.; #RB or #RB-Twin Rebar Positioner. h
 - Wire-Bond; O-Ring or Double O-Ring Rebar Positioner. C.
- C. Masonry-Joint Reinforcement, General: Ladder type complying with ASTM A 951/A 951M.
 - Interior Walls: Hot-dip galvanized carbon steel. 1.
 - Wire Size for Side Rods: 0.148-inch diameter. 2.
 - Wire Size for Cross Rods: 0.148-inch diameter. 3.
 - Spacing of Cross Rods: Not more than 16 inches o.c. 4.
 - 5. Provide in lengths of not less than 10 feet.

2.6 **TIES AND ANCHORS**

- Α. General: Ties and anchors shall extend at least 1-1/2 inches into masonry but with at least a 5/8-inch cover on outside face.
- Materials: Provide ties and anchors specified in this article that are made from materials that comply with Β. the following unless otherwise indicated:
 - Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M, with ASTM A 153/A 153M, Class B-2 1. coating.
 - 2. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, with ASTM A 153/A 153M, Class B coating.
 - Steel Plates, Shapes, and Bars: ASTM A 36/A 36M. 3.
- C. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
 - 1. Anchor Section for Welding to Steel Frame: Crimped 1/4-inch- diameter, hot-dip galvanized steel wire.
 - Tie Section: Triangular-shaped wire tie made from 0.187-inch- diameter, hot-dip galvanized steel 2. wire.
- D. Adjustable Anchors for Connecting to Concrete: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
 - Connector Section: Dovetail tabs for inserting into dovetail slots in concrete and attached to tie 1. section; formed from 0.060-inch- thick steel sheet, galvanized after fabrication.
 - 0.064-inch- thick, galvanized-steel sheet may be used at interior walls unless otherwise a. indicated.
 - 2. Tie Section: Triangular-shaped wire tie made from 0.187-inch- diameter, hot-dip galvanized steel wire.
- Ε. Partition Top Anchors: 0.105-inch- thick metal plate with a 3/8-inch- diameter metal rod 6 inches long welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in and out of tube. Fabricate from steel, hot-dip galvanized after fabrication.
- F. Rigid Anchors: Fabricate from steel bars 1-1/2 inches wide by 1/4 inch thick by 24 inches long, with ends turned up 2 inches or with cross pins unless otherwise indicated.
 - 1. Corrosion Protection: Hot-dip galvanized to comply with ASTM A 153/A 153M.

MISCELLANEOUS MASONRY ACCESSORIES 2.7

- Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to Α. 35 percent: of width and thickness indicated: formulated from neoprene urethane or.
- Β. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 or PVC, complying with ASTM D 2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

C. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D 226/D 226M, Type I (No. 15 asphalt felt).

2.8 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
 - 1. Do not use calcium chloride in mortar or grout.
 - 2. Use portland cement-lime.
- B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
- C. Mortar for Unit Masonry: Comply with ASTM C 270, Property Specification. Provide the following types of mortar for applications stated unless another type is indicated or needed to provide required compressive strength of masonry.
 - 1. For interior nonload-bearing partitions, Type O or type N.
- D. Grout for Unit Masonry: Comply with ASTM C 476.
 - 1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.
 - 2. Proportion grout in accordance with ASTM C 476, Table 1 or paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 2000 psi.
 - 3. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143/C 143M.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 - 1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
 - 2. Verify that foundations are within tolerances specified.
 - 3. Verify that reinforcing dowels are properly placed.
 - 4. Verify that substrates are free of substances that would impair mortar bond.
- B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Build chases and recesses to accommodate items specified in this and other Sections.
- B. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match construction immediately adjacent to opening.
- C. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

3.3 TOLERANCES

- A. Dimensions and Locations of Elements:
 - 1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch or minus 1/4 inch.
 - 2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch.
 - 3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.
- B. Lines and Levels:
 - 1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet, or 1/2-inch maximum.

- 2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
- 3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.
- 4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
- 5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.
- 6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, or 1/2-inch maximum.
- 7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch.

C. Joints:

- 1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
- 2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
- 3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
- 4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch.

3.4 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.
- C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 4 inches. Bond and interlock each course of each wythe at corners. Do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.
- D. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.
- E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- F. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.
- G. Build nonload-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.
 - 1. Install compressible filler in joint between top of partition and underside of structure above.
 - 2. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors and push tubes down into grout to provide 1/2-inch clearance between end of anchor rod and end of tube. Space anchors 48 inches o.c. unless otherwise indicated.
 - 3. Wedge nonload-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.
 - 4. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Section 078443 "Joint Firestopping."

3.5 MORTAR BEDDING AND JOINTING

- A. Lay hollow CMUs as follows:
 - 1. Bed face shells in mortar and make head joints of depth equal to bed joints.
 - 2. Bed webs in mortar in all courses of piers, columns, and pilasters.
 - 3. Bed webs in mortar in grouted masonry, including starting course on footings.
 - 4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.

B. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

3.6 MASONRY-JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.
 - 1. Space reinforcement not more than 16 inches o.c.
 - 2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
 - 3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings in addition to continuous reinforcement.
- B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.
- C. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.7 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

- A. Anchor masonry to structural steel and concrete, where masonry abuts or faces structural steel or concrete, to comply with the following:
 - 1. Provide an open space not less than 1/2 inch wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
 - 2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
 - 3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

3.8 CONTROL AND EXPANSION JOINTS

- A. General: Install control- and expansion-joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.
- B. Form control joints in concrete masonry using one of the following methods:
 - 1. Fit bond-breaker strips into hollow contour in ends of CMUs on one side of control joint. Fill resultant core with grout, and rake out joints in exposed faces for application of sealant.
 - 2. Install preformed control-joint gaskets designed to fit standard sash block.
 - 3. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar, or rake out joint for application of sealant.
 - 4. Install temporary foam-plastic filler in head joints, and remove filler when unit masonry is complete for application of sealant.

3.9 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.
- B. Inspections: Special inspections according to Level B in TMS 402/ACI 530/ASCE 5.
 - 1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
 - 2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
 - 3. Place grout only after inspectors have verified proportions of site-prepared grout.
- C. Testing Prior to Construction: One set of tests.
- D. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.
- E. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.
- F. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for mortar air content and compressive strength.
- G. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.

3.10 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
- B. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- C. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
 - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 - Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
 - 3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
 - 4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
 - 5. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.

3.11 MASONRY WASTE DISPOSAL

- A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.
- B. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner's property.

SECTION 050413 - COMMON SUBMITTAL REQUIREMENTS FOR METALS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes supplementary administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals specific to the work of this Division.
- B. Related Requirements:
 - 1. Division 01 submittal requirements.

1.2 DEFINITIONS

- A. Contractor: Refers to an entity in direct Contract with the Owner to furnish and/or perform any portion of the Work of the Contract, including but not limited to a Construction Manager.
 - 1. Contractor shall review and approve Product Submittals prior to fowarding them to the Architect.
- B. Product Submittals: In general, Product Submittals show characteristics of the proposed construction in one of the following forms:
 - 1. Shop Drawings.
 - 2. Product Data.
 - 3. Samples.
- C. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- D. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."
- E. Submittal Review Sheet: Specific form required to accompany each submittal. Obtain Submittal Review Sheet from the SmithGroup Project Manager.

1.3 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Requirements specified for submittals are intended to provide efficient handling, while permitting review responsibilities to be carried out.
- B. Avoidable Resubmittals: The first two reviews of each specified submittal will be processed without cost to the Contractor. After the second review, the Owner may charge the Contractor for the cost of such additional processing, unless the processing results from approved Change Orders causing revisions to previously approved submittals.
- C. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 - 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 - 4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect reserve the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- D. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
 - 1. Initial Review: Allow 10 business days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required.

- 2. When a large volume of submittal materials is scheduled, additional review time may be required. Similarly, a particular submittal may require review completion in less than the agreed normal time. Due to variations in submittal volume and processing needs, agreed review time is not intended to apply to extreme conditions.
- 3. Resubmittal Review: Allow 10 business days for review of each resubmittal.
- 4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 15 business days for initial review of each submittal.
- E. Maintain at the Project Site ready access to the latest reviewed Shop Drawings and Product Data, and one set of samples.

1.4 DELEGATED-DESIGN SERVICES

A. Definitions:

- 1. Delegated Design: A portion or component of the Work identified by the Contract Documents to be designed by the Contractor, or an entity assigned by the Contractor, to satisfy performance and design criteria specified in the Contract Documents for that portion or component.
- 2. Registered Design Professional: Design professional, assigned by the Contractor, who is responsible for providing the delegated design work, and for certifying that the work is in compliance with the specified performance requirements and design criteria. Design professional shall be legally qualified to practice in jurisdiction where Project is located and shall be experienced in providing delegated design services of the kind indicated. Delegated design services are defined as those performed for installation of the system, assembly or product that are similar in material, design, and extent to those indicated for this Project.
- B. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- C. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Combine with Submittal Review Sheet before submitting to Architect .
- B. Project Closeout and Maintenance Material Submittals: See requirements in Division 01.
- C. Be responsible for quantities, weights, and dimensions to be confirmed and correlated at the site; for information that pertains solely to the fabrication processes and to the means, methods, techniques, sequences, and procedures of construction; and for coordination of the work of every trade, supplier, and subcontractor.
- D. Be responsible for each submittal to be in conformance with information given and the design intent expressed in the Contract Documents.
- E. Provide with each submittal specific written notice of any variation from the requirements of the Contract Documents by causing a specific notation to be made on the Submittal Review Sheet and Submittal Transmittal.

3.2 ARCHITECT'S AND GENERAL CONTRACTOR'S ACTION

- A. General: Architect will not review submittals that do not include the Submittal Review Sheet.
- B. Action Submittals: Architect's staff and consultants will review the submittal, and mark the Submittal Review Sheet with an action code. The code meanings are described below.

- C. Additional codes may be provided within comments or as an electronic submittal review stamp and shall be used in help indicating return of partial submittals.
- D. The Final Review Code on the Submittal Review Sheet prevails and governs the action of the overall submittal.
- E. Review Code meanings are as follows:
 - 1. Action Codes Permitting Use:
 - a. When an action code permitting use is assigned to a submittal, it does not authorize work that does not comply with the requirements of the Contract Documents. Acceptance of the Work will depend on compliance.
 - b. Code AP Approved: The Work covered by the submittal item may proceed, provided it complies with Contract Document requirements.
 - c. Code AN Approved as Noted: The Work covered by the submittal item may proceed, provided it complies with the Architect's notations and Contract Document requirements.
 - d. Code AN-R Approved as Noted Resubmit: Do not deliver or install the related work until the resubmittal has received Code AP or AN. However, fabrication and other off-site work covered by the submittal item may proceed, at the Contractor's risk, provided it complies with the Architect's notations and Contract Document requirements.
 - 2. Action Code Prohibiting Use:
 - a. Action Code REJ Not Approved: The Work covered by the submittal item, including purchasing, fabrication, delivery, and other activity, shall not proceed. Revise the submittal item or prepare a new item in accordance with the Architect's notations. Resubmit the corrected or new item without delay; do not permit submittal items marked "Not Approved" to be used. Work incorporating such items will be rejected.
 - 3. Action Code for Items Not Required:
 - a. Action Code X Not Requested by Contract Documents: The submittal item is not called for by the Contract Documents and is being returned unreviewed by the Architect except to the extent necessary to determine its status.
- F. Informational Submittals: For Architect's information only. Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect and Construction Manager will forward each submittal to appropriate party.
 - 1. Action Code for Information Only:
 - a. Action Code INF Information Only Received: The submittal item is not called for a return with a reviewed action code by the Contract Documents and is being returned un-reviewed by the Architect except to the extent necessary to determine its status.
- G. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- H. Incomplete submittals are not acceptable, will be considered non-responsive, and will be returned without review.
- I. Architect will return without review submittals received from sources other than the Contractor.
- J. Submittals not required by the Contract Documents may be returned by the Architect without action.
 - 1. Do not submit Material Safety Data Sheets. They will be returned without review.

3.3 SUBMITTAL TRANSMITTAL REQUIREMENTS

- A. Submittal Transmittal shall be a PDF file in electronic format. It is recommended, to expedite the submittal review, the electronic form be emailed for review to the Architect as early as possible.
 - 1. Submittal Numbering: See below.
 - 2. Contact Information: Full Name, Phone Number and Email Address.
- B. Submittal Definition
 - 1. Each submittal consists of items from only ONE Specifications section.
 - 2. Complete Submittal: If ALL the items required by the Specifications section are listed on one Submittal Form (including continuation sheet), it is a complete submittal.
 - 3. Partial Submittals: If it is necessary to divide the required items of a given Specifications section into two or more submittals to meet schedule or handling requirements, the separate submittals are partial submittals. All partial submittals have the same submittal number, and are differentiated by sequential P-numbers (see below).
 - 4. All items in each submittal, whether complete or partial, will be processed together: Individual items will not be 'broken out' for special handling. Arrange submittals accordingly.

C. Submittal Numbering

- 1. Number submittals as described below to assist tracking.
- 2. Number each submittal in the format nnnnn-nn.
 - a. The 6-digit number is the number of the section that requires the submittal. For example, 044200.
 - b. The 2-digit number is based on the numerical sequence of submittals from that section. In other words, for each section, the first submittal is 01, the second is 02, and so on. The 2-digit number does not change for partial or re-submittals, so that the submittal can be tracked.
 - c. P-Number for Partial Submittals: Number each partial submittal in the pee space, beginning with P1, and increasing by one for each partial submittal of that submittal. If the submittal is a complete submittal, leave the P space blank.
 - d. R-Number for Re-submittals: Number each re-submittal in the arr space, beginning with R1, and increasing by one for each re-submittal of that submittal. Do not include an R-Number for the initial submittal.
 - e. Examples:
 - 1) Initial Complete Submittal: 044200-01. First Re-Submittal: 044200-01-R1.
 - 2) Initial Partial Submittal: 044200-01-P1. Second Partial Submittal: 0044200-01-P2. First Re-submittal of Second Partial Submittal: 044200-R1-P2.

3.4 SUBMITTAL REVIEW SHEET REQUIREMENTS

- A. Provide Submittal Review Sheet in PDF format. Submit as the page after the Submittal Transmittal.
- B. When attached, the Submittal Review Sheet shall not obscure information contained in the submittal.
- C. Do not edit any of the information contained within the Submittal Review Sheet except as follows:
 1. Submittal Number: See Submittal Numbering in Submittal Transmittal Requirements paragraph.
- D. The Contractor shall submit the PDF file in a manner that will allow editing of the Submittal Review Sheet fields by SmithGroup and its consultants.

SECTION 055000 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Miscellaneous framing and supports.
 - 2. Steel framing and supports for countertops
 - 3. Interior non-load-bearing wall framing.
 - 4. Loose bearing and leveling plates.
 - 5. Miscellaneous steel trim.
 - 6. Loose bearing and leveling plates.
- B. Products furnished, but not installed, under this Section include the following:
 - 1. Steel weld plates and angles for casting into concrete for applications where they are not specified in other Sections.
 - 2. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.

1.2 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written instructions to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of metal fabrications that are anchored to or that receive other work. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.3 ACTION SUBMITTALS

- A. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
- B. Delegated-Design Submittal: Refer to Section 013573 "Delegated Design Requirements and Procedures" for delegated design submittal procedures and requirements.
 - 1. Provide delegated-design submittals for the following:
 - a. Steel support framing for wall screens specified in Section 064023 "Architectural Woodwork."

1.4 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel in accordance with the following welding codes:
 1. AWS D1.1/D1.1M, "Structural Welding Code Steel."
- B. Provide the following upon request:
 - 1. Certificates:
 - a. Welding certificates.
 - b. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
 - 2. Research Reports: For post-installed anchors.

1.5 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls, floor slabs, decks, and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a registered design professional, as defined in Section 50413 "Common Submittal Requirements for Metals" to design steel support framing.
 - 1. Material properties indicated in this Section shall be considered as minimum properties.

2.2 METALS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Steel Plates, Shapes, and Bars: ASTM A36/A36M.
- C. Steel Tubing: ASTM A500/A500M, cold-formed steel tubing.
- D. Steel Pipe: ASTM A53/A53M, Standard Weight unless otherwise indicated.
- E. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.
 1. Galvanized Steel: ASTM A653/A653M, commercial steel, Type B or structural steel, Grade 33, with G90 coating: minimarl 0.108-inch nominal thickness.
- F. Cast Iron: Either gray iron, ASTM A48/A48M, or malleable iron, ASTM A47/A47M, unless otherwise indicated.

2.3 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A; with hex nuts, ASTM A563; and, where indicated, flat washers.
- C. Anchor Bolts: ASTM F1554, Grade 36, of dimensions indicated; with nuts, ASTM A563; and, where indicated, flat washers.
 - 1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.
- D. Anchors, General: Capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing in accordance with ASTM E488/E488M, conducted by a qualified independent testing agency.
- E. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.
 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, unless otherwise indicated.

2.4 MISCELLANEOUS MATERIALS

- A. Shop Primers: Provide primers that comply with Section 099123 "Interior Painting."
- B. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- C. Shrinkage-Resistant Grout: Factory-packaged, nonmetallic, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.5 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work with accurate angles and surfaces and straight edges.
- E. Weld corners and seams continuously to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.

- 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
- G. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
- J. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

2.6 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.

2.7 MISCELLANEOUS STEEL TRIM

- A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.
- B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.
 - 1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.
- C. Galvanize and prime miscellaneous steel trim.

2.8 LOOSE BEARING AND LEVELING PLATES

- A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.
- B. Prime plates with primer specified in Section 099123 "Interior Painting" for interior locations.

2.9 STEEL WELD PLATES AND ANGLES

A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

2.10 GENERAL FINISH REQUIREMENTS

- A. Finish metal fabrications after assembly.
- B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.11 STEEL AND IRON FINISHES

- A. Preparation for Shop Priming Galvanized Items: After galvanizing, thoroughly clean galvanized surfaces of grease, dirt, oil, flux, and other foreign matter, and treat with metallic phosphate process.
- B. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.
 - 1. Shop prime with primers specified in Section 099123 "Interior Painting" indicated.
- C. Preparation for Shop Priming: Prepare surfaces to comply with requirements indicated below:
 - 1. Other Steel Items: SSPC-SP 3, "Power Tool Cleaning."

D. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: Comply with the following requirements:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

3.2 INSTALLATION OF MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.
- B. Install pipe columns on concrete footings with grouted baseplates. Position and grout column baseplates as specified in "Installation of Bearing and Leveling Plates" Article.
 - 1. Grout baseplates of columns supporting steel girders after girders are installed and leveled.

3.3 INSTALLATION OF MISCELLANEOUS STEEL TRIM

A. Anchor to concrete construction to comply with manufacturer's written instructions.

3.4 INSTALLATION OF LOOSE BEARING AND LEVELING PLATES

- A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.
- B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with shrinkage-resistant grout. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.5 REPAIRS

- A. Touchup Painting:
 - 1. Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - a. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.
 - 2. Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 099123 "Interior Painting."
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

SECTION 055113 - METAL PAN STAIRS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Steel stairs with concrete-filled treads.
 - 2. Steel tube and steel bar railings and guards attached to metal stairs.
 - 3. Steel tube handrails attached to walls adjacent to metal stairs.
 - 4. Steel tube guardrail at non-stair locations.

1.2 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written instructions to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorages for metal stairs, railings, and guards.
 - 1. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, blocking for attachment of wall-mounted handrails, and items with integral anchors, that are to be embedded in concrete or masonry.
 - 2. Deliver such items to Project site in time for installation.
- C. Coordinate locations of hanger rods and struts with other work so they do not encroach on required stair width and are within fire-resistance-rated stair enclosure.
- D. Schedule installation of railings and guards so wall attachments are made only to completed walls.
 1. Do not support railings and guards temporarily by any means that do not satisfy structural performance requirements.

1.3 ACTION SUBMITTALS

- Product Data: For metal pan stairs and the following:
 - 1. Shop primer products.
- B. Shop Drawings:

Α.

- 1. Include plans, elevations, sections, details, finish and attachments to other work.
- 2. Indicate sizes of metal sections, thickness of metals, profiles, holes, and field joints.
- 3. Indicate locations of anchors, weld plates, and blocking for attachment of wall-mounted handrails.
- C. Samples for Verification: For each type and finish of nosing.
- D. Delegated-Design Submittal: Refer to Section 050413 "Common Submittal Requirements for Metals" for delegated design submittal procedures and requirements.
 - 1. Provide delegated-design submittals for the following:
 - a. Stairs.
 - b. Railings and guards.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of products.
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code Steel."
 - 2. AWS D1.3/D1.3M, "Structural Welding Code Sheet Steel."
- C. Provide the following upon request:
 - 1. Welding certificates.
 - 2. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification.
 - 1. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers.
 - 2. Protect steel members and packaged materials from corrosion and deterioration.
 - 3. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures.

a. Repair or replace damaged materials or structures as directed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a registered design professional, registered in the State of Texas to design stairs, railings and guards, precast concrete treads, including attachment to building construction.
- B. Structural Performance of Stairs: Metal stairs withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 - 1. Uniform Load: 100 lbf/sq. ft..
 - 2. Concentrated Load: 300 lbf applied on an area of 4 sq. in..
 - 3. Uniform and concentrated loads need not be assumed to act concurrently.
 - 4. Stair Framing: Capable of withstanding stresses resulting from railing and guard loads in addition to loads specified above.
 - 5. Limit deflection of treads, platforms, and framing members to L/360 or 1/2 inch, whichever is less.
- C. Structural Performance of Railings and Guards: Railings and guards, including attachment to building construction, withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 - 1. Handrails and Top Rails of Guards:
 - a. Uniform load of 50 lbf/ft. applied in any direction.
 - b. Concentrated load of 200 lbf applied in any direction.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.
 - 2. Infill of Guards:
 - a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft..
 - b. Infill load and other loads need not be assumed to act concurrently.

2.2 METALS

- A. Metal Surfaces: Provide materials with smooth, flat surfaces unless otherwise indicated. For components exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Steel Plates, Shapes, and Bars: ASTM A36/A36M.
- C. Steel Tubing for Railings and Guards: ASTM A500/A500M (cold formed).
- D. Steel Pipe for Railings and Guards: ASTM A53/A53M, Type F or Type S, Grade A, Standard Weight, unless another grade and weight are required by structural loads.
- E. Uncoated, Cold-Rolled Steel Sheet: ASTM A1008/A1008M, either commercial steel, Type B, or structural steel, Grade 25, unless another grade is required by design loads; exposed.
- F. Uncoated, Hot-Rolled Steel Sheet: ASTM A1011/A1011M, either commercial steel, Type B, or structural steel, Grade 30, unless another grade is required by design loads.

2.3 ABRASIVE NOSINGS

- A. Extruded Units: Aluminum units with abrasive filler consisting of aluminum oxide, silicon carbide, or a combination of both, in an epoxy-resin binder. Fabricate units in lengths necessary to accurately fit openings or conditions.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Access Products ECOGLO.
 - b. American Safety Tread Co., Inc.
 - c. Amstep Products.
 - d. Armstrong Products, Inc.
 - e. Balco; a CSW Industrials Company; PC-150 (Basis-of-Design).
 - f. Granite State Casting Co.
 - g. Nystrom.
 - h. UPNOVR, Inc.
 - 2. Provide ribbed units, with abrasive filler strips projecting 1/16 inch above aluminum extrusion.
 - 3. Nosings, Square-Back Units: 1-3/8 inches wide, without lip.

- B. Provide anchors for embedding units in concrete, either integral or applied to units, as standard with manufacturer.
- C. Apply clear lacquer to concealed surfaces of extruded units set into concrete.

2.4 FASTENERS

- A. Fasteners for Anchoring Railings and Guards to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings and guards to other types of construction indicated and capable of withstanding design loads.
- B. Anchor Bolts: ASTM F1554, Grade 36, of dimensions indicated; with nuts, ASTM A563; and, where indicated, flat washers.
- C. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E488/E488M, conducted by a qualified independent testing agency.
 - 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, unless otherwise indicated.

2.5 MISCELLANEOUS MATERIALS

- A. Welding Electrodes: Comply with AWS requirements.
- B. Shop Primers: Provide primers that comply with Section 099123 "Interior Painting,"
- C. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M, factory-packaged, nonmetallic aggregate grout; recommended by manufacturer for interior use; noncorrosive and nonstaining; mixed with water to consistency suitable for application and a 30-minute working time.

2.6 PRECAST CONCRETE TREADS

- A. Concrete Materials and Properties: Comply with requirements in Section 033000 "Cast-in-Place Concrete" for normal-weight, ready-mixed concrete with a minimum 28-day compressive strength of 5000 psi and a total air content of not less than 4 percent or more than 6 percent.
- B. Reinforcement: Galvanized, welded-wire reinforcement, 2 by 2 inches by 0.062-inch- diameter steel wire; comply with ASTM A1064/A1064M, except for minimum wire size.

2.7 FABRICATION OF STEEL-FRAMED STAIRS

- A. NAAMM Stair Standard: Comply with NAAMM AMP 510, "Metal Stairs Manual," for Commercial Class, unless more stringent requirements are indicated.
- B. Stair Framing:

1.

- Stringers: Fabricate of steel channels or steel rectangular tubes.
 - a. Stringer Size: As required to comply with "Performance Requirements" Article.
 - b. Provide closures for exposed ends of channel and rectangular tube stringers.
 - c. Finish: Shop primed.
- 2. Platforms: Construct of steel channel or steel rectangular tube headers and miscellaneous framing members as required to comply with "Performance Requirements" Article.
 - a. Provide closures for exposed ends of channel and rectangular tube framing.
 - b. Finish: Shop primed.
- 3. Weld stringers to headers; weld framing members to stringers and headers.
- 4. Where stairs are enclosed by gypsum board shaft-wall assemblies, provide hanger rods or struts to support landings from floor construction above or below.
 - a. Locate hanger rods and struts where they do not encroach on required stair width and are within the fire-resistance-rated stair enclosure.
- 5. Where masonry walls support metal stairs, provide temporary supporting struts designed for erecting steel stair components before installing masonry.
- C. Metal Pan Stairs: Form risers, subtread pans, and subplatforms to configurations shown from steel sheet of thickness needed to comply with performance requirements, but not less than 0.067 inch.
 - 1. Steel Sheet, Uncoated: Cold or Hot-rolled steel sheet.
 - 2. Directly weld metal pans to stringers; locate welds on top of subtreads where they will be concealed by concrete fill. Do not weld risers to stringers.
 - 3. At Contractor's option, provide stair assemblies with metal pan subtreads filled with reinforced concrete during fabrication.

4. Provide subplatforms of configuration indicated or, if not indicated, the same as subtreads. Weld subplatforms to platform framing.

2.8 FABRICATION OF STAIR RAILINGS AND GUARDS

- A. Fabricate railings and guards to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of member, post spacings, wall bracket spacing, and anchorage, but not less than that needed to withstand indicated loads.
 - 1. Rails and Posts: 1-5/8-inch- diameter top and bottom rails and 1-1/2-inch- square posts.
 - 2. Picket Infill: 1/2-inch- round pickets spaced to prohibit the passage of a 4-inch diameter sphere.
- B. Welded Connections: Fabricate railings and guards with welded connections.
 - 1. Cope components at connections to provide close fit, or use fittings designed for this purpose.
 - 2. Weld all around at connections, including at fittings.
 - 3. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 4. Obtain fusion without undercut or overlap.
 - 5. Remove flux immediately.
 - 6. Finish welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Finish #1 No evidence of a welded joint as shown in NAAMM AMP 521.
- C. Form changes in direction of railings and guards as follows: 1. As detailed.
- D. Close exposed ends of railing and guard members with prefabricated end fittings.
- E. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated.
 - 1. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.
- F. Connect posts to stair framing by direct welding unless otherwise indicated.
- G. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnecting components and for attaching to other work.
 - 1. Furnish inserts and other anchorage devices for connecting to concrete or masonry work.
 - 2. Escutcheon Plate: Top mount, round steel plate. Conceal fasteners.
 - a. Finish: Shop Prime
 - 3. For nongalvanized railings and guards, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves, except galvanize anchors embedded in exterior masonry and concrete construction.
- H. Fillers: Provide fillers made from steel plate, or other suitably crush-resistant material, where needed to transfer wall bracket loads through wall finishes to structural supports.
 - 1. Size fillers to suit wall finish thicknesses and to produce adequate bearing area to prevent bracket rotation and overstressing of substrate.

2.9 FINISHES

- A. Finish metal stairs after assembly.
- B. Preparation for Shop Priming: Prepare uncoated, ferrous-metal surfaces to comply with SSPC-SP 3, "Power Tool Cleaning."
- C. Apply shop primer to uncoated surfaces of metal stair components, except those with galvanized finishes and those to be embedded in concrete or masonry unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify elevations of floors, bearing surfaces and locations of bearing plates, and other embedments for compliance with requirements.
 - 1. For wall-mounted railings, verify locations of concealed reinforcement within gypsum board assemblies.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF METAL PAN STAIRS

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction.
 - 1. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.
- C. Install metal stairs by welding stair framing to steel structure or to weld plates cast into concrete unless otherwise indicated.
- D. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- E. Fit exposed connections accurately together to form hairline joints.
 - 1. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations.
 - 2. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
 - 3. Comply with requirements for welding in "Fabrication, General" Article.
- F. Place and finish concrete fill for treads and platforms to comply with Section 033000 "Cast-in-Place Concrete."
 - 1. Center nosings on tread width.
- G. Install precast concrete treads with adhesive supplied by manufacturer.

3.3 INSTALLATION OF RAILINGS AND GUARDS

- A. Adjust railing and guard systems before anchoring to ensure matching alignment at abutting joints with tight, hairline joints.
 - 1. Space posts at spacing indicated or, if not indicated, as required by design loads.
 - 2. Plumb posts in each direction, within a tolerance of 1/16 inch in 3 feet.
 - 3. Align rails and guards so variations from level for horizontal members and variations from parallel with rake of stairs for sloping members do not exceed 1/4 inch in 12 feet.
 - 4. Secure posts, rail ends, and guard ends to building construction as follows:
 - a. Anchor posts to steel by welding to steel supporting members.
 - b. Anchor handrail and guard ends to concrete and masonry with steel round flanges welded to rail and guard ends and anchored with post-installed anchors and bolts.
- B. Attach handrails to wall with wall brackets.
 - 1. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
 - 2. Secure wall brackets to building construction as required to comply with performance requirements.

3.4 REPAIR

- A. Touchup Painting:
 - 1. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - a. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.
 - 2. Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 099123 "Interior Painting,"

SECTION 060413 - COMMON SUBMITTAL REQUIREMENTS FOR WOODS, PLASTICS, AND COMPOSITES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes supplementary administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals specific to the work of this Division.
- B. Related Requirements:
 - 1. Division 01 submittal requirements.

1.2 DEFINITIONS

- A. Contractor: Refers to an entity in direct Contract with the Owner to furnish and/or perform any portion of the Work of the Contract, including but not limited to a Construction Manager.
 - 1. Contractor shall review and approve Product Submittals prior to fowarding them to the Architect.
- B. Product Submittals: In general, Product Submittals show characteristics of the proposed construction in one of the following forms:
 - 1. Shop Drawings.
 - 2. Product Data.
 - 3. Samples.
- C. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- D. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."
- E. Submittal Review Sheet: Specific form required to accompany each submittal. Obtain Submittal Review Sheet from the SmithGroup Project Manager.

1.3 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Requirements specified for submittals are intended to provide efficient handling, while permitting review responsibilities to be carried out.
- B. Avoidable Resubmittals: The first two reviews of each specified submittal will be processed without cost to the Contractor. After the second review, the Owner may charge the Contractor for the cost of such additional processing, unless the processing results from approved Change Orders causing revisions to previously approved submittals.
- C. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 - 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 - 4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect reserve the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- D. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
 - 1. Initial Review: Allow 10 business days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required.

- 2. When a large volume of submittal materials is scheduled, additional review time may be required. Similarly, a particular submittal may require review completion in less than the agreed normal time. Due to variations in submittal volume and processing needs, agreed review time is not intended to apply to extreme conditions.
- 3. Resubmittal Review: Allow 10 business days for review of each resubmittal.
- 4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 15 business days for initial review of each submittal.
- E. Maintain at the Project Site ready access to the latest reviewed Shop Drawings and Product Data, and one set of samples.

1.4 DELEGATED-DESIGN SERVICES

A. Definitions:

- 1. Delegated Design: A portion or component of the Work identified by the Contract Documents to be designed by the Contractor, or an entity assigned by the Contractor, to satisfy performance and design criteria specified in the Contract Documents for that portion or component.
- 2. Registered Design Professional: Design professional, assigned by the Contractor, who is responsible for providing the delegated design work, and for certifying that the work is in compliance with the specified performance requirements and design criteria. Design professional shall be legally qualified to practice in jurisdiction where Project is located and shall be experienced in providing delegated design services of the kind indicated. Delegated design services are defined as those performed for installation of the system, assembly or product that are similar in material, design, and extent to those indicated for this Project.
- B. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- C. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Combine with Submittal Review Sheet before submitting to Architect .
- B. Project Closeout and Maintenance Material Submittals: See requirements in Division 01.
- C. Be responsible for quantities, weights, and dimensions to be confirmed and correlated at the site; for information that pertains solely to the fabrication processes and to the means, methods, techniques, sequences, and procedures of construction; and for coordination of the work of every trade, supplier, and subcontractor.
- D. Be responsible for each submittal to be in conformance with information given and the design intent expressed in the Contract Documents.
- E. Provide with each submittal specific written notice of any variation from the requirements of the Contract Documents by causing a specific notation to be made on the Submittal Review Sheet and Submittal Transmittal.

3.2 ARCHITECT'S AND GENERAL CONTRACTOR'S ACTION

- A. General: Architect will not review submittals that do not include the Submittal Review Sheet.
- B. Action Submittals: Architect's staff and consultants will review the submittal, and mark the Submittal Review Sheet with an action code. The code meanings are described below.

- C. Additional codes may be provided within comments or as an electronic submittal review stamp and shall be used in help indicating return of partial submittals.
- D. The Final Review Code on the Submittal Review Sheet prevails and governs the action of the overall submittal.
- E. Review Code meanings are as follows:
 - 1. Action Codes Permitting Use:
 - a. When an action code permitting use is assigned to a submittal, it does not authorize work that does not comply with the requirements of the Contract Documents. Acceptance of the Work will depend on compliance.
 - b. Code AP Approved: The Work covered by the submittal item may proceed, provided it complies with Contract Document requirements.
 - c. Code AN Approved as Noted: The Work covered by the submittal item may proceed, provided it complies with the Architect's notations and Contract Document requirements.
 - d. Code AN-R Approved as Noted Resubmit: Do not deliver or install the related work until the resubmittal has received Code AP or AN. However, fabrication and other off-site work covered by the submittal item may proceed, at the Contractor's risk, provided it complies with the Architect's notations and Contract Document requirements.
 - 2. Action Code Prohibiting Use:
 - a. Action Code REJ Not Approved: The Work covered by the submittal item, including purchasing, fabrication, delivery, and other activity, shall not proceed. Revise the submittal item or prepare a new item in accordance with the Architect's notations. Resubmit the corrected or new item without delay; do not permit submittal items marked "Not Approved" to be used. Work incorporating such items will be rejected.
 - 3. Action Code for Items Not Required:
 - a. Action Code X Not Requested by Contract Documents: The submittal item is not called for by the Contract Documents and is being returned unreviewed by the Architect except to the extent necessary to determine its status.
- F. Informational Submittals: For Architect's information only. Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
 - 1. Action Code for Information Only:
 - a. Action Code INF Information Only Received: The submittal item is not called for a return with a reviewed action code by the Contract Documents and is being returned un-reviewed by the Architect except to the extent necessary to determine its status.
- G. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- H. Incomplete submittals are not acceptable, will be considered non-responsive, and will be returned without review.
- I. Architect will return without review submittals received from sources other than the Contractor.
- J. Submittals not required by the Contract Documents may be returned by the Architect without action.
 1. Do not submit Material Safety Data Sheets. They will be returned without review.

3.3 SUBMITTAL TRANSMITTAL REQUIREMENTS

- A. Submittal Transmittal shall be a PDF file in electronic format. It is recommended, to expedite the submittal review, the electronic form be emailed for review to the Architect as early as possible.
 - 1. Submittal Numbering: See below.
 - 2. Contact Information: Full Name, Phone Number and Email Address.
- B. Submittal Definition
 - 1. Each submittal consists of items from only ONE Specifications section.
 - 2. Complete Submittal: If ALL the items required by the Specifications section are listed on one Submittal Form (including continuation sheet), it is a complete submittal.
 - 3. Partial Submittals: If it is necessary to divide the required items of a given Specifications section into two or more submittals to meet schedule or handling requirements, the separate submittals are partial submittals. All partial submittals have the same submittal number, and are differentiated by sequential P-numbers (see below).
 - 4. All items in each submittal, whether complete or partial, will be processed together: Individual items will not be 'broken out' for special handling. Arrange submittals accordingly.

C. Submittal Numbering

- 1. Number submittals as described below to assist tracking.
- 2. Number each submittal in the format nnnnn-nn.
 - a. The 6-digit number is the number of the section that requires the submittal. For example, 044200.
 - b. The 2-digit number is based on the numerical sequence of submittals from that section. In other words, for each section, the first submittal is 01, the second is 02, and so on. The 2-digit number does not change for partial or re-submittals, so that the submittal can be tracked.
 - c. P-Number for Partial Submittals: Number each partial submittal in the pee space, beginning with P1, and increasing by one for each partial submittal of that submittal. If the submittal is a complete submittal, leave the P space blank.
 - d. R-Number for Re-submittals: Number each re-submittal in the arr space, beginning with R1, and increasing by one for each re-submittal of that submittal. Do not include an R-Number for the initial submittal.
 - e. Examples:
 - 1) Initial Complete Submittal: 044200-01. First Re-Submittal: 044200-01-R1.
 - 2) Initial Partial Submittal: 044200-01-P1. Second Partial Submittal: 0044200-01-P2. First Re-submittal of Second Partial Submittal: 044200-R1-P2.

3.4 SUBMITTAL REVIEW SHEET REQUIREMENTS

- A. Provide Submittal Review Sheet in PDF format. Submit as the page after the Submittal Transmittal.
- B. When attached, the Submittal Review Sheet shall not obscure information contained in the submittal.
- C. Do not edit any of the information contained within the Submittal Review Sheet except as follows:
 1. Submittal Number: See Submittal Numbering in Submittal Transmittal Requirements paragraph.
- D. The Contractor shall submit the PDF file in a manner that will allow editing of the Submittal Review Sheet fields by SmithGroup and its consultants.

SECTION 061053 - MISCELLANEOUS ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Wood blocking and nailers.
 - 2. Plywood backing panels.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 - 1. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
 - 2. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D5664.
 - 3. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

1.4 QUALITY ASSURANCE

- A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.
- B. Vendor Qualifications: A vendor that is certified for chain of custody by an FSC-accredited certification body.
- C. Provide the following upon request:
 - Evaluation Reports: For the following, from ICC-ES:
 - a. Fire-retardant-treated wood.
 - b. Post-installed anchors.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

1.

2.1 WOOD PRODUCTS, GENERAL

- A. Certified Wood: Lumber and plywood shall be certified as "FSC Pure" or "FSC Mixed Credit" according to FSC STD-01-00 and FSC STD-40-004.
- B. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
 - 2. Dress lumber, S4S, unless otherwise indicated.
- C. Maximum Moisture Content of Lumber: 19 percent unless otherwise indicated.

2.2 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, materials shall comply with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
 - 1. Treatment shall not promote corrosion of metal fasteners.
 - 2. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D3201 at 92 percent relative humidity. Use where exterior type is not indicated.
 - 3. Design Value Adjustment Factors: Treated lumber shall be tested according to ASTM D5664, and design value adjustment factors shall be calculated according to ASTM D6841.
- C. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Kiln-dry plywood after treatment to a maximum moisture content of 15 percent.
- D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.
- E. Application: Treat items indicated on Drawings, and the following:
 - 1. Concealed blocking.
 - 2. Nailers.

2.3 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
 - 1. Blocking.
 - 2. Nailers.
- B. Concealed Boards: 19 percent maximum moisture content of any of the following species and grades:
 - 1. Mixed southern pine or southern pine, No. 2 grade; SPIB.
 - 2. Spruce-pine-fir (south) or spruce-pine-fir, Construction or No. 2 Common grade; NeLMA, NLGA, WCLIB, or WWPA.
- C. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

2.4 PLYWOOD BACKING PANELS

A. Equipment Backing Panels: Plywood, DOC PS 1, , fire-retardant treated, in thickness indicated or, if not indicated, not less than 3/4-inch nominal thickness.

2.5 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. Where carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M of Type 304 stainless steel.
- B. Nails, Brads, and Staples: ASTM F1667.
- C. Screws for Fastening to Metal Framing: ASTM C1002, length as recommended by screw manufacturer for material being fastened.
- D. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- E. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01, ICC-ES AC58, ICC-ES AC193 or ICC-ES AC308 as appropriate for the substrate.
 - 1. Material: Carbon-steel components, zinc plated to comply with ASTM B633, Class Fe/Zn 5.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- B. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry accurately to other construction. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- C. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant-treated plywood backing panels with classification marking of testing agency exposed to view.
- D. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
 - 1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.
- E. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
 - Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
 - 1. Use inorganic boron for items that are continuously protected from liquid water.
 - 2. Use copper naphthenate for items not continuously protected from liquid water.
- G. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- H. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
 - 2. ICC-ES evaluation report for fastener.

3.2 INSTALLATION OF WOOD BLOCKING AND NAILER

- A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

3.3 PROTECTION

F.

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- B. Protect miscellaneous rough carpentry from weather. If, despite protection, miscellaneous rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

SECTION 064023 - ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Architectural woodwork fabications, including wall paneling and wall screens
 - 2. Wood furring, blocking, shims, and hanging strips for installing interior architectural woodwork items that are not concealed within other construction.
- B. Related Requirements:
 - Section 061053 " Miscellaneous Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing interior architectural woodwork that are concealed within other construction before interior architectural woodwork installation.
 - 2. Section 055000 Metal Fabrications

1.3 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections, to ensure that interior architectural woodwork can be supported and installed as indicated.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Prior to commencement of fabrication of complex woodwork fabrications and assemblies. Conduct conference at Project site.

1.5 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Lumber.
 - 2. Anchors.
- B. Shop Drawings:
 - 1. Include the following:
 - a. Dimensioned plans, elevations, and sections.
 - b. Attachment details.
 - 2. Show large-scale details.
 - 3. Show locations and sizes of furring, blocking, and hanging strips, including blocking and reinforcement concealed by construction and specified in other Sections.
 - 4. Indicate location of plumbing and electrical service field conditions.
- C. Samples: For each exposed product and for each shop-applied color and finish specified.
- D. Samples for Verification: For the following:
 - 1. Assembled Panel with Shop-Applied Opaque Finish: 5 inches wide by 12 inches long for lumber and 12 by 12 inches for panels, for each finish system and color.
 - a. Finish entire exposed surface.

1.6 QUALITY ASSURANCE

B.

- A. Manufacturer's Qualifications: Employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
 Installer Qualifications: Manufacturer of products.
 - _____
 - Provide the following upon request: 1. Qualification Data: For architectural woodwork manufacturer.
 - Qualification Data: For architectural woodwork in
 Product Certificates: For the following:
 - a. Composite wood and agrifiber products.
 - b. Adhesives.
 - 3. Evaluation Reports: For preservative-treated wood materials, from ICC-ES.

- C. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
 - 1. Build mockups of typical interior architectural woodwork as shown on Drawings.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Owner specifically approves such deviations by Change Order.
 - Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Comply with the Architectural Woodwork Standards, Section 2.
- B. Do not deliver interior architectural woodwork until painting and similar finish operations that might damage woodwork have been completed in installation areas.
- C. Store woodwork in installation areas or in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.
 - 1. Handle and store fire-retardant-treated wood to comply with chemical treatment manufacturer's written instructions.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install interior architectural woodwork until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during the remainder of the construction period.
- B. Field Measurements: Where interior architectural woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings.
 - 1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being concealed by construction, and indicate measurements on Shop Drawings.
- C. Established Dimensions: Where interior architectural woodwork is indicated to fit to other construction, establish dimensions for areas where woodwork is to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.9 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that architectural woodwork can be supported and installed as indicated.

PART 2 - PRODUCTS

2.1 ARCHITECTURAL WOODWORK, GENERAL

- A. Quality Standard: Unless otherwise indicated, comply with the Architectural Woodwork Standards for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.
 - 1. The Contract Documents may contain requirements that are more stringent than the Architectural Woodwork Standards. Comply with Contract Documents and Architectural Woodwork Standards.

2.2 INTERIOR STANDING AND RUNNING TRIM FOR TRANSPARENT FINISH

- A. Architectural Woodwork Standards Grade: Custom.
- B. Hardwood Lumber:
 - 1. Wood Species and Cut: Match species and cut indicated for other types of transparent-finished architectural woodwork located in same area of building unless otherwise indicated.
 - 2. Species: Red oak.
 - 3. Cut: Rift-cut with fine tooth grain.
 - 4. Wood Moisture Content: 5 to 10 percent.
 - 5. Provide split species on trim that faces areas with different wood species, matching each face of woodwork to species and cut of finish wood surfaces in areas finished.

2.3 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims: Softwood or hardwood lumber, kiln-dried to less than 15 percent moisture content.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage.
 - Nails, screws, and other anchoring devices of type, size, material, and finish required for application indicated to provide secure attachment, concealed where possible.
 a. Finish: Black.
 - 2. Speaker Cloth: 100 percent cotton, flame-resistant.
 - a. Finish: Black.
 - 3. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.
- C. Installation Adhesive: Product recommended by fabricator for each substrate for secure anchorage.

2.4 FABRICATION

- A. Fabricate interior architectural woodwork to dimensions, profiles, and details indicated.
 - 1. Ease edges to radius indicated for the following:
 - a. Edges of Solid-Wood (Lumber) Members: 1/16 inch unless otherwise indicated.
 - b. Retain "Edges of Rails and Similar Members More Than 3/4 Inch (19 mm) Thick" Subparagraph below if required.
 - c. Edges of Rails and Similar Members More Than 3/4 Inch Thick: 1/8 inch.
- B. Shop Fabrication: Shop fabicate to create a panelized assembly consisting of verical wood dowels, horizontal wood suports, and cloth adhered to backside of supports.
- C. Complete fabrication, including assembly, to maximum extent possible before shipment to Project site.
 - 1. Disassemble components only as necessary for shipment and installation.
 - 2. Where necessary for fitting at site, provide allowance for scribing, trimming, and fitting.
 - 3. Notify Architect seven days in advance of the dates and times architectural woodwork fabrication will be complete.
 - 4. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled.
 - a. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting.
 - b. Verify that parts fit as intended, and check measurements of assemblies against field measurements indicated on approved Shop Drawings before disassembling for shipment.

2.5 SHOP FINISHING

- A. Finish interior architectural woodwork with stain finish at fabrication shop. Defer only final touchup, cleaning, and polishing until after installation.
- B. Preparation for Finishing: Comply with Architectural Woodwork Standards, Section 5 for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural woodwork, as applicable to each unit of work.
 - 1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of architectural woodwork. Apply two coats to end-grain surfaces.
- C. Transparent Finish:
 - 1. Architectural Woodwork Standards Grade: Custom.
 - 2. Finish: System 5, Varnish, Conversion.
 - 3. Filled Finish for Open-Grain Woods: After staining, apply wash-coat sealer and allow to dry. Apply paste wood filler and wipe off excess. Tint filler to match stained wood.
 - 4. Stain to match Architect's sample.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition architectural woodwork to humidity conditions in installation areas for not less than 72 hours prior to beginning of installation.
- B. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming of concealed surfaces.

3.2 INSTALLATION

- A. Grade: Install architectural woodwork to comply with same grade as item to be installed.
- B. Assemble architectural woodwork and complete fabrication at Project site to the extent that it was not completed during shop fabrication.
- C. Install architectural woodwork level, plumb, true in line, and without distortion.
 - 1. Shim as required with concealed shims.
 - 2. Install level and plumb to a tolerance of 1/8 inch in 96 inches.
- D. Scribe and cut architectural woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. Anchor architectural woodwork to anchors or blocking built in or directly attached to substrates.
 - 1. Secure with countersunk, concealed fasteners and blind nailing.
 - 2. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with architectural woodwork.
 - 3. For shop-finished items, use filler matching finish of items being installed.

3.3 FIELD QUALITY CONTROL

A. Inspections: Provide inspection of installed Work through certifying that woodwork, including installation, complies with requirements of the Architectural Woodwork Standards for the specified grade.

3.4 REPAIR

- A. Repair damaged and defective interior architectural woodwork, where possible, to eliminate functional and visual defects and to result in interior architectural woodwork being in compliance with requirements of Architectural Woodwork Standards for the specified grade.
- B. Where not possible to repair, replace defective woodwork.
- C. Shop Finish: Touch up finishing work specified in this Section after installation of interior architectural woodwork.
 - 1. Apply specified finish coats, including stains and paste fillers if any, to exposed surfaces where only sealer/prime coats are shop applied.

3.5 CLEANING

A. Clean interior architectural woodwork on exposed and semiexposed surfaces.

SECTION 064116 - PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Plastic-laminate-clad architectural cabinets.
 - 2. Wood furring, blocking, shims, and hanging strips for installing plastic-laminate-clad architectural cabinets that are not concealed within other construction.
- B. Related Requirements:
 - 1. Section 061053 "Miscellaneous Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing cabinets that are concealed within other construction before cabinet installation.

1.3 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to support loads imposed by installed and fully loaded cabinets.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.
- B. Shop Drawings:
 - 1. Include plans, elevations, sections, and attachment details.
 - 2. Show large-scale details.
 - 3. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
 - 4. Show locations and sizes of cutouts and holes for items installed in plastic-laminate architectural cabinets.
- C. Samples: For each exposed product and for each color and texture specified, in manufacturer's or manufacturer's standard size.

1.5 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
- B. Installer Qualifications: Manufacturer of products.
- C. Provide the following upon request:
 - 1. Qualification Data: For Installer.
 - 2. Product Certificates: For each type of product.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver cabinets until painting and similar finish operations that might damage architectural cabinets have been completed in installation areas. Store cabinets in installation areas or in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during the remainder of the construction period.
- B. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

- 1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed/concealed by construction, and indicate measurements on Shop Drawings.
- C. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS

- A. Quality Standard: Unless otherwise indicated, comply with the Architectural Woodwork Standards for grades of cabinets indicated for construction, finishes, installation, and other requirements.
 - 1. The Contract Documents contain requirements that are more stringent than the referenced quality standard. Comply with requirements of Contract Documents in addition to those of the referenced quality standard.
- B. Architectural Woodwork Standards Grade: Custom.
- C. Certified Wood: Wood products shall be certified as "FSC Pure" or "FSC Mixed Credit" according to FSC STD-01-001 and FSC STD-40-004.
- D. Type of Construction: Frameless.
- E. High-Pressure Decorative Laminate (PLAM-1): NEMA LD 3, grades as indicated or if not indicated, as required by quality standard.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Abet Laminati Inc.
 - b. Formica Corporation.
 - c. Lamin-Art, Inc.
 - d. Pionite; a Panolam Industries International, Inc. brand.
 - e. Wilsonart LLC.
- F. Laminate Cladding for Exposed Surfaces:
 - 1. Horizontal Surfaces: Grade HGS.
 - 2. Vertical Surfaces: Grade HGS.
 - 3. Edges: Grade HGS.
- G. Materials for Semiexposed Surfaces:
 - Surfaces Other Than Drawer Bodies: Thermoset decorative panels.
 - a. Edges of Thermoset Decorative Panel Shelves: PVC or polyester edge banding.
 - b. For semiexposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, NEMA LD 3, Grade VGS.
 - 2. Drawer Sides and Backs: Thermoset decorative panels with PVC or polyester edge banding.
 - 3. Drawer Bottoms: Thermoset decorative panels.
- H. Concealed Backs of Panels with Exposed Plastic-Laminate Surfaces: High-pressure decorative laminate, NEMA LD 3, Grade BKL.
- I. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.
 - 1. Join subfronts, backs, and sides with glued rabbeted joints supplemented by mechanical fasteners.
- J. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
 - 1. As indicated by laminate manufacturer's designations.

2.2 WOOD MATERIALS

1

- A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.
 1. Wood Moisture Content: 5 to 10 percent.
- B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.

- C. Composite Wood Products: Products shall be made using ultra-low-emitting formaldehyde resins as defined in the California Air Resources Board's "Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products" or shall be made with no added formaldehyde.
 - 1. Medium-Density Fiberboard (MDF): ANSI A208.2, Grade 130.
 - 2. Particleboard (Medium Density): ANSI A208.1, Grade M-2, Grade M-2-Exterior Glue.
 - 3. Softwood Plywood: DOC PS 1, medium-density overlay.
- D. Thermoset Decorative Panels: Particleboard or MDF finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for Test Methods 3.3, 3.4, 3.6, 3.8, and 3.10.

2.3 CABINET HARDWARE AND ACCESSORIES

- A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Accuride International.
 - b. Blum, Julius & Co., Inc.
 - c. CompX International, Inc.
 - d. Grass America Inc.
 - e. Hettich America L.P.
 - f. Knape & Vogt Manufacturing Company.
- B. Frameless Concealed Hinges (European Type): ANSI/BHMA A156.9, B01602, 100 degrees of opening, self-closing.
- C. Wire Pulls: Back mounted, solid metal, 4 inches long, 5/16 inch in diameter.
- D. Catches: Magnetic catches, ANSI/BHMA A156.9, B03141.
- E. Adjustable Shelf Standards and Supports: ANSI/BHMA A156.9, B04071; with shelf rests, B04081.
- F. Shelf Rests: ANSI/BHMA A156.9, B04013; metal.
- G. Drawer Slides: ANSI/BHMA A156.9.
 - 1. Grade 1 and Grade 2: Side mounted.
 - a. Type: Full extension.
 - b. Material: Zinc-plated steel with polymer rollers.
 - 2. Grade 1HD-100 and Grade 1HD-200: Side mounted; full -extension type; zinc-plated-steel ball-bearing slides.
 - 3. For drawers not more than 3 inches high and not more than 24 inches wide, provide Grade 1.
 - 4. For drawers more than 3 inches high, but not more than 6 inches high and not more than 24 inches wide, provide Grade 1HD-100.
 - 5. For drawers more than 6 inches high or more than 24 inches wide, provide Grade 1HD-100.
 - 6. For trash bins not more than 20 inches high and 16 inches wide, provide Grade 1HD-100.
- H. Door and Drawer Silencers: ANSI/BHMA A156.16, L03011.
- I. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with ANSI/BHMA A156.18 for ANSI/BHMA finish number indicated.
- J. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in ANSI/BHMA A156.9.

2.4 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln-dried to less than 15 percent moisture content.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.
- C. Adhesives: Use adhesives that meet the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.5 FABRICATION

A. Fabricate architectural cabinets to dimensions, profiles, and details indicated.

- B. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
 - 1. Trial fit assemblies at manufacturer's shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements before disassembling for shipment.
- C. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installation, condition cabinets to humidity conditions in installation areas for not less than 72 hours.

3.2 INSTALLATION

- A. Architectural Woodwork Standards Grade: Install cabinets to comply with quality standard grade of item to be installed.
- B. Assemble cabinets and complete fabrication at Project site to extent that it was not completed in the shop.
- C. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with wafer-head cabinet installation screws.
- D. Install cabinets level, plumb, and true in line to a tolerance of 1/8 inch in 96 inches using concealed shims.
 - 1. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
 - 2. Install cabinets without distortion so doors and drawers fit openings and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
 - 3. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c. with No. 10 wafer-head screws sized for not less than 1-1/2-inch penetration into wood framing, blocking, or hanging strips.

3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects. Where not possible to repair, replace architectural cabinets. Adjust joinery for uniform appearance.
- B. Clean, lubricate, and adjust hardware.
- C. Clean cabinets on exposed and semiexposed surfaces.

SECTION 070413 - COMMON SUBMITTAL REQUIREMENTS FOR THERMAL AND MOISTURE PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes supplementary administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals specific to the work of this Division.
- B. Related Requirements:
 - 1. Division 01 submittal requirements.

1.2 DEFINITIONS

- A. Contractor: Refers to an entity in direct Contract with the Owner to furnish and/or perform any portion of the Work of the Contract, including but not limited to a Construction Manager.
 - 1. Contractor shall review and approve Product Submittals prior to fowarding them to the Architect.
- B. Product Submittals: In general, Product Submittals show characteristics of the proposed construction in one of the following forms:
 - 1. Shop Drawings.
 - 2. Product Data.
 - 3. Samples.
- C. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- D. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."
- E. Submittal Review Sheet: Specific form required to accompany each submittal. Obtain Submittal Review Sheet from the SmithGroup Project Manager.

1.3 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Requirements specified for submittals are intended to provide efficient handling, while permitting review responsibilities to be carried out.
- B. Avoidable Resubmittals: The first two reviews of each specified submittal will be processed without cost to the Contractor. After the second review, the Owner may charge the Contractor for the cost of such additional processing, unless the processing results from approved Change Orders causing revisions to previously approved submittals.
- C. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 - 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 - 4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect reserve the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- D. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
 - 1. Initial Review: Allow 10 business days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required.

- 2. When a large volume of submittal materials is scheduled, additional review time may be required. Similarly, a particular submittal may require review completion in less than the agreed normal time. Due to variations in submittal volume and processing needs, agreed review time is not intended to apply to extreme conditions.
- 3. Resubmittal Review: Allow 10 business days for review of each resubmittal.
- 4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 15 business days for initial review of each submittal.
- E. Maintain at the Project Site ready access to the latest reviewed Shop Drawings and Product Data, and one set of samples.

1.4 DELEGATED-DESIGN SERVICES

A. Definitions:

- 1. Delegated Design: A portion or component of the Work identified by the Contract Documents to be designed by the Contractor, or an entity assigned by the Contractor, to satisfy performance and design criteria specified in the Contract Documents for that portion or component.
- 2. Registered Design Professional: Design professional, assigned by the Contractor, who is responsible for providing the delegated design work, and for certifying that the work is in compliance with the specified performance requirements and design criteria. Design professional shall be legally qualified to practice in jurisdiction where Project is located and shall be experienced in providing delegated design services of the kind indicated. Delegated design services are defined as those performed for installation of the system, assembly or product that are similar in material, design, and extent to those indicated for this Project.
- B. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- C. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Combine with Submittal Review Sheet before submitting to Architect .
- B. Project Closeout and Maintenance Material Submittals: See requirements in Division 01.
- C. Be responsible for quantities, weights, and dimensions to be confirmed and correlated at the site; for information that pertains solely to the fabrication processes and to the means, methods, techniques, sequences, and procedures of construction; and for coordination of the work of every trade, supplier, and subcontractor.
- D. Be responsible for each submittal to be in conformance with information given and the design intent expressed in the Contract Documents.
- E. Provide with each submittal specific written notice of any variation from the requirements of the Contract Documents by causing a specific notation to be made on the Submittal Review Sheet and Submittal Transmittal.

3.2 ARCHITECT'S AND GENERAL CONTRACTOR'S ACTION

- A. General: Architect will not review submittals that do not include the Submittal Review Sheet.
- B. Action Submittals: Architect's staff and consultants will review the submittal, and mark the Submittal Review Sheet with an action code. The code meanings are described below.

- C. Additional codes may be provided within comments or as an electronic submittal review stamp and shall be used in help indicating return of partial submittals.
- D. The Final Review Code on the Submittal Review Sheet prevails and governs the action of the overall submittal.
- E. Review Code meanings are as follows:
 - 1. Action Codes Permitting Use:
 - a. When an action code permitting use is assigned to a submittal, it does not authorize work that does not comply with the requirements of the Contract Documents. Acceptance of the Work will depend on compliance.
 - b. Code AP Approved: The Work covered by the submittal item may proceed, provided it complies with Contract Document requirements.
 - c. Code AN Approved as Noted: The Work covered by the submittal item may proceed, provided it complies with the Architect's notations and Contract Document requirements.
 - d. Code AN-R Approved as Noted Resubmit: Do not deliver or install the related work until the resubmittal has received Code AP or AN. However, fabrication and other off-site work covered by the submittal item may proceed, at the Contractor's risk, provided it complies with the Architect's notations and Contract Document requirements.
 - 2. Action Code Prohibiting Use:
 - a. Action Code REJ Not Approved: The Work covered by the submittal item, including purchasing, fabrication, delivery, and other activity, shall not proceed. Revise the submittal item or prepare a new item in accordance with the Architect's notations. Resubmit the corrected or new item without delay; do not permit submittal items marked "Not Approved" to be used. Work incorporating such items will be rejected.
 - 3. Action Code for Items Not Required:
 - a. Action Code X Not Requested by Contract Documents: The submittal item is not called for by the Contract Documents and is being returned unreviewed by the Architect except to the extent necessary to determine its status.
- F. Informational Submittals: For Architect's information only. Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
 - 1. Action Code for Information Only:
 - a. Action Code INF Information Only Received: The submittal item is not called for a return with a reviewed action code by the Contract Documents and is being returned un-reviewed by the Architect except to the extent necessary to determine its status.
- G. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- H. Incomplete submittals are not acceptable, will be considered non-responsive, and will be returned without review.
- I. Architect will return without review submittals received from sources other than the Contractor.
- J. Submittals not required by the Contract Documents may be returned by the Architect without action.
 - 1. Do not submit Material Safety Data Sheets. They will be returned without review.

3.3 SUBMITTAL TRANSMITTAL REQUIREMENTS

- A. Submittal Transmittal shall be a PDF file in electronic format. It is recommended, to expedite the submittal review, the electronic form be emailed for review to the Architect as early as possible.
 - 1. Submittal Numbering: See below.
 - 2. Contact Information: Full Name, Phone Number and Email Address.
- B. Submittal Definition
 - 1. Each submittal consists of items from only ONE Specifications section.
 - 2. Complete Submittal: If ALL the items required by the Specifications section are listed on one Submittal Form (including continuation sheet), it is a complete submittal.
 - 3. Partial Submittals: If it is necessary to divide the required items of a given Specifications section into two or more submittals to meet schedule or handling requirements, the separate submittals are partial submittals. All partial submittals have the same submittal number, and are differentiated by sequential P-numbers (see below).
 - 4. All items in each submittal, whether complete or partial, will be processed together: Individual items will not be 'broken out' for special handling. Arrange submittals accordingly.

C. Submittal Numbering

- 1. Number submittals as described below to assist tracking.
- 2. Number each submittal in the format nnnnn-nn.
 - a. The 6-digit number is the number of the section that requires the submittal. For example, 044200.
 - b. The 2-digit number is based on the numerical sequence of submittals from that section. In other words, for each section, the first submittal is 01, the second is 02, and so on. The 2-digit number does not change for partial or re-submittals, so that the submittal can be tracked.
 - c. P-Number for Partial Submittals: Number each partial submittal in the pee space, beginning with P1, and increasing by one for each partial submittal of that submittal. If the submittal is a complete submittal, leave the P space blank.
 - d. R-Number for Re-submittals: Number each re-submittal in the arr space, beginning with R1, and increasing by one for each re-submittal of that submittal. Do not include an R-Number for the initial submittal.
 - e. Examples:
 - 1) Initial Complete Submittal: 044200-01. First Re-Submittal: 044200-01-R1.
 - 2) Initial Partial Submittal: 044200-01-P1. Second Partial Submittal: 0044200-01-P2. First Re-submittal of Second Partial Submittal: 044200-R1-P2.

3.4 SUBMITTAL REVIEW SHEET REQUIREMENTS

- A. Provide Submittal Review Sheet in PDF format. Submit as the page after the Submittal Transmittal.
- B. When attached, the Submittal Review Sheet shall not obscure information contained in the submittal.
- C. Do not edit any of the information contained within the Submittal Review Sheet except as follows:
 1. Submittal Number: See Submittal Numbering in Submittal Transmittal Requirements paragraph.
- D. The Contractor shall submit the PDF file in a manner that will allow editing of the Submittal Review Sheet fields by SmithGroup and its consultants.

SECTION 078413 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Penetrations in fire-resistance-rated walls.
 - 2. Penetrations in horizontal assemblies.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 CLOSEOUT SUBMITTALS

A. Installer Certificates: From Installer indicating that penetration firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that has been approved by FM Approvals according to FM Approvals 4991, "Approval Standard for Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."
- B. Provide the following upon request:
 - 1. Qualification Data: For Installer.
 - 2. Listed System Designs: For each penetration firestopping system, for tests performed by a qualified testing agency.

1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install penetration firestopping system when ambient or substrate temperatures are outside limits permitted by penetration firestopping system manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.
- B. Install and cure penetration firestopping materials per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.6 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping systems can be installed according to specified firestopping system design.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping systems.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain joint firestop systems for each type of joint opening indicated from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics:
 - 1. Perform penetration firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
 - 2. Test per testing standards referenced in "Penetration Firestopping Systems" Article. Provide rated systems complying with the following requirements:
 - a. Penetration firestop systems installed with products bearing the classification marking of a qualified product certification agency in accordance with listed system designs published by a qualified testing agency.
 - 1) UL in its online directory "Product iQ."
 - 2) Intertek Group in its "Directory of Building Products."
 - 3) FM Approvals in its "Approval Guide."

2.3 PENETRATION FIRESTOPPING SYSTEMS

- A. Penetration Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems are to be compatible with one another, with the substrates forming openings, and with penetrating items if any.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. 3M Fire Protection Products.
 - b. A/D Fire Protection Systems Inc.
 - c. Construction Solutions.
 - d. Grabber Construction Products.
 - e. Hilti, Inc.
 - f. HoldRite; Reliance Worldwide Company.
 - g. NUCO Inc.
 - h. Passive Fire Protection Partners.
 - i. RectorSeal Firestop; a CSW Industrials Company.
 - j. Specified Technologies, Inc.
 - k. STC Sound Control.
 - I. Tremco, Inc.
- B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined per ASTM E814 or UL 1479.
 - 1. F-Rating: Not less than the fire-resistance rating of the wall penetrated.
 - 2. Membrane Penetrations: Install recessed fixtures such that the required fire resistance will not be reduced.
- C. Penetrations in Horizontal Assemblies: Penetration firestopping systems with ratings determined per ASTM E814 or UL 1479.
 - 1. F-Rating: At least one hour, but not less than the fire-resistance rating of the floor penetrated.
 - 2. T-Rating: At least one hour, but not less than the fire-resistance rating of the floor. The following floor penetrations do not require a T-rating:
 - 3. W-Rating: Provide penetration firestopping systems with a Class 1 W-rating in accordance with UL 1479.
- D. Exposed Penetration Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, per ASTM E84.
 - 1. Sealant shall have a VOC content of 250 g/L or less.
- E. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping system manufacturer and approved by qualified testing and inspecting agency for conditions indicated.
 - 1. Permanent forming/damming/backing materials.
 - 2. Substrate primers.
 - 3. Collars.
 - 4. Steel sleeves.

2.4 FILL MATERIALS

- A. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer sleeve lined with an intumescent strip, a flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.
- B. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.
- C. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- D. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.
- E. Pillows/Bags: Compressible, removable, and reusable intumescent pillows encased in fire-retardant polyester or glass-fiber cloth. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.

- F. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
- G. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants.
- H. Fire-Rated Cable Sleeve Kits: Complete kits designed for new or existing cable penetrations through walls to accept standard accessories.
- I. Fire-Rated HVAC Retaining Angles: Steel angle system with integral intumescent firestop gasket for use around rectangular steel HVAC ducts without fire dampers.
- J. Firestop Plugs: Flexible, re-enterable, intumescent, foam-rubber plug for use in blank round openings and cable sleeves.

2.5 MIXING

A. Penetration Firestopping Materials: For those products requiring mixing before application, comply with penetration firestopping system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning: Before installing penetration firestopping systems, clean out openings immediately to comply with manufacturer's written instructions and with the following requirements:
 - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping materials.
 - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping materials. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form-release agents from concrete.
- B. Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

3.3 INSTALLATION OF PENETRATION FIRESTOPPING SYSTEMS

- A. General: Install penetration firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications.
- B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings.
 - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not forming permanent components of firestopping.
- C. Install fill materials by proven techniques to produce the following results:
 - 1. Fill voids and cavities formed by openings, forming materials, accessories and penetrating items to achieve required fire-resistance ratings.
 - 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
 - 3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

A. Wall Identification: Permanently label walls containing penetration firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches high and with minimum 0.375-inch strokes.

- 1. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 feet from end of wall and at intervals not exceeding 30 feet.
- B. Penetration Identification: Identify each penetration firestopping system with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of penetration firestopping system edge so labels are visible to anyone seeking to remove penetrating items or firestopping systems. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
 - 1. The words "Warning Penetration Firestopping Do Not Disturb. Notify Building Management of Any Damage."
 - 2. Contractor's name, address, and phone number.
 - 3. Designation of applicable testing and inspecting agency.
 - 4. Date of installation.
 - 5. Manufacturer's name.
 - 6. Installer's name.

3.5 FIELD QUALITY CONTROL

- A. Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E2174.
- B. Where deficiencies are found or penetration firestopping system is damaged or removed because of testing, repair or replace penetration firestopping system to comply with requirements.
- C. Proceed with enclosing penetration firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

3.6 CLEANING AND PROTECTION

- A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping system manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping material and install new materials to produce systems complying with specified requirements.

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Urethane joint sealants.
 - 2. Latex joint sealants.
 - 3. Mildew-resistant joint sealants.
- B. Related Requirements:
 - 1. Section 079219 "Acoustical Joint Sealants" for acoustical sealants used in sound rated partitions.
 - 2. Section 092900 "Gypsum Board" for sealing perimeter joints.
 - 3. Section 093013 "Ceramic Tiling" for sealing tile joints.
 - 4. Section 095113 "Acoustical Panel Ceilings" for sealing edge moldings at perimeters with acoustical sealant.

1.2 PRECONSTRUCTION TESTING

- A. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.
 - 1. Use manufacturer's standard test method to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
 - 2. Submit not fewer than eight pieces of each kind of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
 - 3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
 - 4. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.
 - 5. Testing will not be required if joint-sealant manufacturers submit joint preparation data that are based on previous testing, not older than 24 months, of sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.
- B. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates as follows:
 - 1. Locate test joints where indicated on Project or, if not indicated, as directed by Architect.
 - 2. Conduct field tests for each application indicated below:
 - a. Each kind of sealant and joint substrate indicated.
 - 3. Notify Architect seven days in advance of dates and times when test joints will be erected.
 - 4. Arrange for tests to take place with joint-sealant manufacturer's technical representative present.
 - Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand
 - Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
 1) For joints with dissimilar substrates, verify adhesion to each substrate separately;
 - extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
 - 5. Report whether sealant failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
 - 6. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

1.3 ACTION SUBMITTALS

a.

- A. Product Data: For each joint-sealant product indicated.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- C. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- D. Joint-Sealant Schedule: Include the following information:
 - 1. Joint-sealant application, joint location, and designation.

- 2. Joint-sealant manufacturer and product name.
- 3. Joint-sealant formulation.
- 4. Joint-sealant color.

1.4 INFORMATIONAL SUBMITTALS

- A. Preconstruction Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
 - 1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
 - 2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
- B. Preconstruction Field-Adhesion Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on testing specified in "Preconstruction Testing" Article.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.
- C. Product Testing: Test joint sealants using a qualified testing agency.
 - 1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.
 - 2. Test according to SWRI's Sealant Validation Program for compliance with requirements specified by reference to ASTM C 920 for adhesion and cohesion under cyclic movement, adhesion-in-peel, and indentation hardness.
- D. Provide the following upon request:
 - 1. Qualification Data: For qualified Installer.
 - 2. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.
 - 3. Sealant, Waterproofing, and Restoration Institute (SWRI) Validation Certificate: For each sealant specified to be validated by SWRI's Sealant Validation Program.
 - 4. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.
- E. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.
- F. Preinstallation Conference: Conduct conference at Project site.

1.6 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
 - 2. When joint substrates are wet.
 - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 - 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.7 WARRANTY

- A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.
- B. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
 - 1. Movement of the structure caused by structural settlement or errors attributable to design or construction resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
 - 2. Disintegration of joint substrates from natural causes exceeding design specifications.

- 3. Mechanical damage caused by individuals, tools, or other outside agents.
- 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. VOC Content: Verify sealants and sealant primers comply with the following:
 - 1. Architectural sealant shall have a VOC content of 250 g/L or less.
 - 2. Sealants and sealant primers for nonporous substrates have a VOC content of 250 g/L or less.
 - 3. Sealants and sealant primers for porous substrates have a VOC content of 775 g/L or less.
- C. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
- D. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
- E. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 URETHANE JOINT SEALANTS

- A. Sealant JS-U1 Multicomponent, Pourable, Traffic-Grade, Urethane Joint Sealant: ASTM C 920. Type M, Grade P, Class 25, for Use T and I.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. LymTal International, Inc.; Iso-Flex 880 GB.
 - b. Sika Corporation; Sikaflex-2c SL.
 - c. Tremco Incorporated; Vulkem 445SSL.
- B. Sealant JS-U2 Multicomponent, Nonsag, Traffic-Grade, Urethane Joint Sealant: ASTM C 920, Type M, Grade NS, Class 25, for Use T.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Master Builders Solutions; MasterSeal NP 2.
 - b. LymTal International, Inc.; Iso-Flex 881 or Iso-Flex 885 SG.
 - c. Pacific Polymers International, Inc.; Elasto-Thane 227 High Shore Type II or Elasto-Thane 227 Type II.
 - d. Pecora Corporation; DynaTred.
 - e. Sika Corporation, Construction Products Division; Sikaflex-2c NS or Sikaflex-2c EZ Mix.
 - f. Tremco Incorporated; Vulkem 116 + catalyst.

2.3 LATEX JOINT SEALANTS

- A. Sealant JS-L1 Latex Joint Sealant: Acrylic latex or siliconized acrylic latex, ASTM C 834.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Bostik, Inc.; Chem-Calk 600.
 - b. DAP Products Inc.; Dynaflex 230.
 - c. May National Associates, Inc.; Bondaflex 600 or Bonaflex Sil-A 700.
 - d. Pecora Corporation; AC-20 + Silicone.
 - e. Schnee-Morehead, Inc.; Acryl-R SM8200.
 - f. Tremco Incorporated; Tremflex 834.

2.4 MILDEW-RESISTANT JOINT SEALANTS

- A. Sealant JS-M1 Mildew-Resistant, Single-Component, Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.
 - Products: Subject to compliance with requirements, provide one of the following:
 - a. Dow Inc.; Dowsil 786 Silicone Sealant.
 - b. GE Silicones; SCS1700 Sanitary.

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- c. Pecora Corporation; 898NST.
- d. Tremco Incorporated; Tremsil 200.
- e. May National Associates, Inc.; Bondaflex 600 or Bonaflex Sil-A 700.

2.5 JOINT SEALANT BACKING

- A. General: Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), Type O (open-cell material), Type B (bicellular material with a surface skin), or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.6 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

3.

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Concrete.
 - b. Unglazed surfaces of ceramic tile.
 - Remove laitance and form-release agents from concrete.
 - 4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
 - a. Metal.
 - b. Porcelain enamel.
 - c. Glazed surfaces of ceramic tile.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Do not extend exterior sealants and primers into building interior (that is, inside the weatherproofing system) unless first verifying compliance with VOC requirements.
- D. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- E. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- F. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- G. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces. Water-based tooling agents are unacceptable.
 - 3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.
 - 4. Provide flush joint profile where indicated per Figure 8B in ASTM C 1193.
 - 5. Provide recessed joint configuration of recess depth and at locations indicated per Figure 8C in ASTM C 1193.
 - a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

3.4 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.6 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces; Type JS-U1 and JS-U2.
 1. Joint Locations:
 - a. Isolation and contraction joints in cast-in-place concrete slabs.
- B. Joint-Sealant Application: Interior joints in horizontal traffic surfaces; Type JS-U1 or JS-U2.
 - 1. Joint Locations:
 - a. Isolation joints in cast-in-place concrete slabs.

- b. Control and expansion joints in tile flooring.
- C. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces; Type JS-L1.
 1. Joint Locations:
 - a. Control and expansion joints on exposed interior surfaces of exterior walls.
 - b. Tile control and expansion joints.
 - c. Vertical joints on exposed surfaces of interior unit masonry and partitions.
 - d. Perimeter joints between interior wall surfaces and frames of interior doors .
 - e. Other joints as indicated.
- D. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces; Type JS-M1.
 - 1. Joint Sealant Location:
 - a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
 - b. Tile control and expansion joints where indicated.
 - c. Other joints as indicated.

SECTION 079219 - ACOUSTICAL JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Acoustical joint sealants.

1.2 ACTION SUBMITTALS

- A. Product Data:
 - 1. Acoustical joint sealants.
- B. Samples for Verification: For each type and color of acoustical joint sealant required.
 - 1. Size: 1/2-inch- wide sealant joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

1.3 INFORMATIONAL SUBMITTALS

- A. Test and Evaluation Reports:
 - 1. Product Test Reports: For each type of acoustical joint sealant, for tests performed by manufacturer and witnessed by a qualified testing agency.

1.4 CLOSEOUT SUBMITTALS

- A. Warranty Documentation:
 - 1. Manufacturers' special warranties.

PART 2 - PRODUCTS

2.1 ACOUSTICAL JOINT SEALANTS

- A. Acoustical joint-sealant products that effectively reduce airborne sound transmission through perimeter joints and openings in building construction, as demonstrated by testing representative assemblies in accordance with ASTM E90.
- B. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex acoustical sealant complying with ASTM C834.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Accumetric LLC.
 - b. GE Construction Sealants; Momentive Performance Materials Inc.
 - c. Hilti, Inc.
 - d. Pecora Corporation.
 - e. Specified Technologies, Inc.
 - f. Tremco Incorporated.
 - g. USG Corporation.
 - 2. Colors of Exposed Acoustical Joint Sealants: As selected by Architect from manufacturer's full range of colors.
- C. Acoustical Sealant for Concealed Joints: Manufacturer's standard nonsag, nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber acoustical sealant.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Pecora Corporation.
 - b. Serious Energy Inc.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive acoustical joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing acoustical joint sealants to comply with joint-sealant manufacturer's written instructions.
- B. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF ACOUSTICAL JOINT SEALANTS

- A. Comply with acoustical joint-sealant manufacturer's written installation instructions unless more stringent requirements apply.
- B. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical joint sealant. Install acoustical joint sealants at both faces of partitions, at perimeters, and through penetrations. Comply with ASTM C919, ASTM C1193, and manufacturer's written instructions for closing off sound-flanking paths around or through assemblies, including sealing partitions to underside of floor slabs above acoustical ceilings.
- C. Acoustical Ceiling Areas: Apply acoustical joint sealant at perimeter edge moldings of acoustical ceiling areas in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.

3.4 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of acoustical joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect acoustical joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated acoustical joint sealants immediately so installations with repaired areas are indistinguishable from original work.

SECTION 079513.13 - INTERIOR EXPANSION JOINT COVER ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes interior expansion joint cover assemblies.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for expansion joint cover assemblies.
- B. Shop Drawings: For each expansion joint cover assembly.
 - Include project specifc plans, elevations, sections, details, splices, block-out requirement, attachments to other work, and line diagrams showing entire route of each expansion joint.
 - 2. Where expansion joint cover assemblies change planes, provide isometric or clearly detailed drawing depicting how components interconnect.
- C. Samples for Initial Selection: For each type of exposed finish.
 - 1. Include manufacturer's color charts showing the full range of colors and finishes available for each exposed metal and elastomeric-seal material.
- D. Samples for Verification: For each type of expansion joint cover assembly, full width by 6 inches long in size.
- E. Expansion Joint Cover Assembly Schedule: Prepared by or under the supervision of the supplier. Include the following information in tabular form:
 - 1. Manufacturer and model number for each expansion joint cover assembly.
 - 2. Expansion joint cover assembly location cross-referenced to Drawings.
 - 3. Nominal, minimum, and maximum joint width.
 - 4. Movement direction.
 - 5. Materials, colors, and finishes.
 - 6. Product options.

1.3 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each fire-resistance-rated expansion joint cover assembly, for tests performed by manufacturer and witnessed by a qualified testing agency.

PART 2 - PRODUCTS

2.1 ASSEMBLY DESCRIPTION

- A. Furnish units in longest practicable lengths to minimize field splicing.
- B. Include factory-fabricated closure materials and transition pieces, T-joints, corners, curbs, cross-connections, and other accessories as required to provide continuous expansion joint cover assemblies.

2.2 FLOOR EXPANSION JOINT COVERS

- A. Single Sightline Floor Joint Cover Insert drawing designation: Saddle plate assembly designed to accept field-applied finish materials on visible surfaces for minimum frame exposure.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Balco; a CSW Industrials Company; BCP-2-250 (Basis-Of-Design).
 - b. BASF Corp. Watson Bowman Acme Corp.
 - c. Construction Specialties, Inc.
 - d. Inpro Corporation.
 - e. MM Systems Corporation.
 - f. Nystrom.
 - 2. Application: Floor to wall.
 - 3. Design Criteria
 - a. Type of Movement
 - 1) Nominal Joint Width: 2 inches
 - 2) Expansion / Contraction: 50 percent

- 4. Installation: Surface mounted.
- 5. Cover-Plate Design: Serrated.
- 6. Exposed Metal:
 - a. Aluminum: Mill.

2.3 WALL EXPANSION JOINT COVERS

- A. Elastomeric-Seal Wall Joint Cover : Assembly consisting of elastomeric seal anchored to frames fixed to sides of joint gap.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Balco; a CSW Industrials Company.
 - b. BASF Corp. Watson Bowman Acme Corp; 75FWG-2 (Basis-Of-Design).
 - c. Construction Specialties, Inc.
 - d. Inpro Corporation.
 - e. MM Systems Corporation.
 - f. Nystrom.
 - 2. Application: Wall to wall.
 - 3. Design Criteria
 - a. Type of Movement
 - 1) Nominal Joint Width: 2 inches
 - Expansion / Contraction: 25 percent
 - 4. Exposed Metal:

5.

- a. Aluminum: Mill.
- Seal: Preformed elastomeric membranes or extrusions.
 - a. Color: As selected by Architect from manufacturer's full range.

2.4 CEILING EXPANSION JOINT COVERS

- A. Elastomeric-Seal Ceiling Joint Cover : Assembly consisting of elastomeric seal anchored to frames fixed to sides of joint gap.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Balco; a CSW Industrials Company; 75FCA-2 (Basis-of-Design).
 - b. BASF Corp. Watson Bowman Acme Corp.
 - c. Construction Specialties, Inc.
 - d. Inpro Corporation.
 - e. MM Systems Corporation.
 - f. Nystrom.
 - 2. Application: Ceiling to ceiling.
 - 3. Design Criteria
 - a. Type of Movement
 - 1) Nominal Joint Width: 2 inches
 - 2) Expansion / Contraction: 25 percent
 - 4. Exposed Metal:
 - a. Aluminum: Mill.
 - Seal: Preformed elastomeric membranes or extrusions.
 - a. Color: As selected by Architect from manufacturer's full range.

2.5 MATERIALS

5.

- A. Aluminum: ASTM B221, Alloy 6063-T5 for extrusions; ASTM B209, Alloy 6061-T6 for sheet and plate.
 1. Apply manufacturer's standard protective coating on aluminum surfaces to be placed in contact with cementitious materials.
- B. Elastomeric Seals: Manufacturer's standard preformed elastomeric membranes or extrusions to be installed in metal frames.
- C. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.6 ALUMINUM FINISHES

A. Mill finish.

2.7 ACCESSORIES

A. Manufacturer's standard attachment devices. Include anchors, clips, fasteners, set screws, spacers, and other accessories compatible with material in contact, as indicated or required for complete installations.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces where expansion joint cover assemblies will be installed for installation tolerances and other conditions affecting performance of the Work.
- B. Notify Architect where discrepancies occur that will affect proper expansion joint cover assembly installation and performance.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to expansion joint cover assembly manufacturer's written instructions.
- B. Coordinate and furnish anchorages, setting drawings, and instructions for installing expansion joint cover assemblies. Provide fasteners of metal, type, and size to suit type of construction indicated and to provide for secure attachment of expansion joint cover assemblies.

3.3 INSTALLATION

- A. Comply with manufacturer's written instructions for storing, handling, and installing expansion joint cover assemblies and materials unless more stringent requirements are indicated.
- B. Metal Frames: Perform cutting, drilling, and fitting required to install expansion joint cover assemblies.
 1. Repair or grout block out as required for continuous frame support using nonmetallic,
 - shrinkage-resistant grout.
 - 2. Install frames in continuous contact with adjacent surfaces.
 - a. Shimming is not permitted.
 - 3. Install in true alignment and proper relationship to joints and adjoining finished surfaces measured from established lines and levels.
 - 4. Adjust for differences between actual structural gap and nominal design gap due to ambient temperature at time of installation.
 - 5. Cut and fit ends to accommodate thermal expansion and contraction of metal without buckling of frames.
 - 6. Locate anchors at interval recommended by manufacturer, but not less than 3 inches from each end and not more than 24 inches o.c.
- C. Seals: Install elastomeric seals and membranes in frames to comply with manufacturer's written instructions. Install with minimum number of end joints.
 - 1. Provide in continuous lengths for straight sections.
 - 2. Seal transitions. Vulcanize or heat-weld field-spliced joints as recommended by manufacturer.
 - 3. Installation: Mechanically lock seals into frames or adhere to frames with adhesive or pressure-sensitive tape as recommended by manufacturer.
- D. Install with hairline mitered corners where expansion joint cover assemblies change direction or abut other materials.
- E. Terminate exposed ends of expansion joint cover assemblies with field- or factory-fabricated termination devices.

3.4 PROTECTION

- A. Do not remove protective covering until finish work in adjacent areas is complete. When protective covering is removed, clean exposed metal surfaces to comply with manufacturer's written instructions.
- B. Protect the installation from damage by work of other Sections. Where necessary due to heavy construction traffic, remove and properly store cover plates or seals and install temporary protection over expansion joint cover assemblies. Reinstall cover plates or seals prior to Substantial Completion.

SECTION 080413 - COMMON SUBMITTAL REQUIREMENTS FOR OPENINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes supplementary administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals specific to the work of this Division.
- B. Related Requirements:
 - 1. Division 01 submittal requirements.

1.2 DEFINITIONS

- A. Contractor: Refers to an entity in direct Contract with the Owner to furnish and/or perform any portion of the Work of the Contract, including but not limited to a Construction Manager.
 - 1. Contractor shall review and approve Product Submittals prior to fowarding them to the Architect.
- B. Product Submittals: In general, Product Submittals show characteristics of the proposed construction in one of the following forms:
 - 1. Shop Drawings.
 - 2. Product Data.
 - 3. Samples.
- C. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- D. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."
- E. Submittal Review Sheet: Specific form required to accompany each submittal. Obtain Submittal Review Sheet from the SmithGroup Project Manager.

1.3 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Requirements specified for submittals are intended to provide efficient handling, while permitting review responsibilities to be carried out.
- B. Avoidable Resubmittals: The first two reviews of each specified submittal will be processed without cost to the Contractor. After the second review, the Owner may charge the Contractor for the cost of such additional processing, unless the processing results from approved Change Orders causing revisions to previously approved submittals.
- C. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 - 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 - 4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect reserve the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- D. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
 - 1. Initial Review: Allow 10 business days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required.

- 2. When a large volume of submittal materials is scheduled, additional review time may be required. Similarly, a particular submittal may require review completion in less than the agreed normal time. Due to variations in submittal volume and processing needs, agreed review time is not intended to apply to extreme conditions.
- 3. Resubmittal Review: Allow 10 business days for review of each resubmittal.
- 4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 15 business days for initial review of each submittal.
- E. Maintain at the Project Site ready access to the latest reviewed Shop Drawings and Product Data, and one set of samples.

1.4 DELEGATED-DESIGN SERVICES

A. Definitions:

- 1. Delegated Design: A portion or component of the Work identified by the Contract Documents to be designed by the Contractor, or an entity assigned by the Contractor, to satisfy performance and design criteria specified in the Contract Documents for that portion or component.
- 2. Registered Design Professional: Design professional, assigned by the Contractor, who is responsible for providing the delegated design work, and for certifying that the work is in compliance with the specified performance requirements and design criteria. Design professional shall be legally qualified to practice in jurisdiction where Project is located and shall be experienced in providing delegated design services of the kind indicated. Delegated design services are defined as those performed for installation of the system, assembly or product that are similar in material, design, and extent to those indicated for this Project.
- B. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- C. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Combine with Submittal Review Sheet before submitting to Architect .
- B. Project Closeout and Maintenance Material Submittals: See requirements in Division 01.
- C. Be responsible for quantities, weights, and dimensions to be confirmed and correlated at the site; for information that pertains solely to the fabrication processes and to the means, methods, techniques, sequences, and procedures of construction; and for coordination of the work of every trade, supplier, and subcontractor.
- D. Be responsible for each submittal to be in conformance with information given and the design intent expressed in the Contract Documents.
- E. Provide with each submittal specific written notice of any variation from the requirements of the Contract Documents by causing a specific notation to be made on the Submittal Review Sheet and Submittal Transmittal.

3.2 ARCHITECT'S AND GENERAL CONTRACTOR'S ACTION

- A. General: Architect will not review submittals that do not include the Submittal Review Sheet.
- B. Action Submittals: Architect's staff and consultants will review the submittal, and mark the Submittal Review Sheet with an action code. The code meanings are described below.

- C. Additional codes may be provided within comments or as an electronic submittal review stamp and shall be used in help indicating return of partial submittals.
- D. The Final Review Code on the Submittal Review Sheet prevails and governs the action of the overall submittal.
- E. Review Code meanings are as follows:
 - 1. Action Codes Permitting Use:
 - a. When an action code permitting use is assigned to a submittal, it does not authorize work that does not comply with the requirements of the Contract Documents. Acceptance of the Work will depend on compliance.
 - b. Code AP Approved: The Work covered by the submittal item may proceed, provided it complies with Contract Document requirements.
 - c. Code AN Approved as Noted: The Work covered by the submittal item may proceed, provided it complies with the Architect's notations and Contract Document requirements.
 - d. Code AN-R Approved as Noted Resubmit: Do not deliver or install the related work until the resubmittal has received Code AP or AN. However, fabrication and other off-site work covered by the submittal item may proceed, at the Contractor's risk, provided it complies with the Architect's notations and Contract Document requirements.
 - 2. Action Code Prohibiting Use:
 - a. Action Code REJ Not Approved: The Work covered by the submittal item, including purchasing, fabrication, delivery, and other activity, shall not proceed. Revise the submittal item or prepare a new item in accordance with the Architect's notations. Resubmit the corrected or new item without delay; do not permit submittal items marked "Not Approved" to be used. Work incorporating such items will be rejected.
 - 3. Action Code for Items Not Required:
 - a. Action Code X Not Requested by Contract Documents: The submittal item is not called for by the Contract Documents and is being returned unreviewed by the Architect except to the extent necessary to determine its status.
- F. Informational Submittals: For Architect's information only. Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
 - 1. Action Code for Information Only:
 - a. Action Code INF Information Only Received: The submittal item is not called for a return with a reviewed action code by the Contract Documents and is being returned un-reviewed by the Architect except to the extent necessary to determine its status.
- G. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- H. Incomplete submittals are not acceptable, will be considered non-responsive, and will be returned without review.
- I. Architect will return without review submittals received from sources other than the Contractor.
- J. Submittals not required by the Contract Documents may be returned by the Architect without action.
 - 1. Do not submit Material Safety Data Sheets. They will be returned without review.

3.3 SUBMITTAL TRANSMITTAL REQUIREMENTS

- A. Submittal Transmittal shall be a PDF file in electronic format. It is recommended, to expedite the submittal review, the electronic form be emailed for review to the Architect as early as possible.
 - 1. Submittal Numbering: See below.
 - 2. Contact Information: Full Name, Phone Number and Email Address.
- B. Submittal Definition
 - 1. Each submittal consists of items from only ONE Specifications section.
 - 2. Complete Submittal: If ALL the items required by the Specifications section are listed on one Submittal Form (including continuation sheet), it is a complete submittal.
 - 3. Partial Submittals: If it is necessary to divide the required items of a given Specifications section into two or more submittals to meet schedule or handling requirements, the separate submittals are partial submittals. All partial submittals have the same submittal number, and are differentiated by sequential P-numbers (see below).
 - 4. All items in each submittal, whether complete or partial, will be processed together: Individual items will not be 'broken out' for special handling. Arrange submittals accordingly.

C. Submittal Numbering

- 1. Number submittals as described below to assist tracking.
- 2. Number each submittal in the format nnnnn-nn.
 - a. The 6-digit number is the number of the section that requires the submittal. For example, 044200.
 - b. The 2-digit number is based on the numerical sequence of submittals from that section. In other words, for each section, the first submittal is 01, the second is 02, and so on. The 2-digit number does not change for partial or re-submittals, so that the submittal can be tracked.
 - c. P-Number for Partial Submittals: Number each partial submittal in the pee space, beginning with P1, and increasing by one for each partial submittal of that submittal. If the submittal is a complete submittal, leave the P space blank.
 - d. R-Number for Re-submittals: Number each re-submittal in the arr space, beginning with R1, and increasing by one for each re-submittal of that submittal. Do not include an R-Number for the initial submittal.
 - e. Examples:
 - 1) Initial Complete Submittal: 044200-01. First Re-Submittal: 044200-01-R1.
 - 2) Initial Partial Submittal: 044200-01-P1. Second Partial Submittal: 0044200-01-P2. First Re-submittal of Second Partial Submittal: 044200-R1-P2.

3.4 SUBMITTAL REVIEW SHEET REQUIREMENTS

- A. Provide Submittal Review Sheet in PDF format. Submit as the page after the Submittal Transmittal.
- B. When attached, the Submittal Review Sheet shall not obscure information contained in the submittal.
- C. Do not edit any of the information contained within the Submittal Review Sheet except as follows:
 1. Submittal Number: See Submittal Numbering in Submittal Transmittal Requirements paragraph.
- D. The Contractor shall submit the PDF file in a manner that will allow editing of the Submittal Review Sheet fields by SmithGroup and its consultants.

SECTION 083113 - ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Access doors and frames.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details material descriptions, dimensions of individual components and profiles, and finishes.
- B. Product Schedule: For access doors and frames.

PART 2 - PRODUCTS

1.

2.1 ACCESS DOORS AND FRAMES

- A. Recessed Access Doors with Concealed Flanges:
 - Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. ACUDOR Products, Inc.; DW-5058 (Basis-of-Design)
 - b. Babcock-Davis.
 - c. Bauco Access Panel Solutions.
 - d. Nystrom.
 - 2. Description: Door face recessed 5/8 inch for gypsum board infill; with concealed flange for gypsum board installation and concealed hinge and with 5/8 inch gypsum board inserted into door panel.
 - 3. Locations: Wall and ceiling.
 - 4. Door Size: .

b.

- a. Wall:
 - 1) 12 inches wide by 12 inches high
 - Ceiling:
 - 1) 24 inches wide by 24 inches high
- 5. Aluminum Sheet for Door: 0.06 inch, with manufacturer's standard baked-enamel or power-coat finish.
- 6. Frame Material: Same material, thickness, and finish as door.
- 7. Latch and Lock: Cam latch, screwdriver operated.

2.2 MATERIALS

- A. Aluminum Extrusions: ASTM B221, Alloy 6063.
- B. Aluminum Sheet: ASTM B209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- C. Frame Anchors: Same material as door face.
- D. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A153/A153M or ASTM F2329.

2.3 FABRICATION

- A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.
- B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish mounting holes, attachment devices and fasteners of type required to secure access doors to types of supports indicated.
 - 1. For concealed flanges with drywall bead, provide edge trim for gypsum panels securely attached to perimeter of frames.
 - 2. For concealed flanges with plaster bead for full-bed plaster applications, provide zinc-coated expanded-metal lath and exposed casing bead welded to perimeter of frames.
- D. Recessed Access Doors: Form face of panel to provide recess for application of applied finish. Reinforce panel as required to prevent buckling. Provide access sleeves for each latch operator and install in holes cut through finish.

- 1. For recessed doors with plaster infill, provide self-furring expanded-metal lath attached to door panel.
- E. Latch and Lock Hardware:
 - 1. Quantity: Furnish number of latches and locks required to hold doors tightly closed.
- F. Aluminum: After fabrication, apply manufacturer's standard protective coating on aluminum that will come in contact with concrete.

2.4 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. Painted Finishes: Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
 - 1. Factory Finished: Apply manufacturer's standard baked-enamel or powder-coat finish immediately after cleaning and pretreating, with minimum dry-film thickness of 1 mil for topcoat.
 - a. Color: As selected by Architect from full range of industry colors.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's written instructions for installing access doors and frames.

3.3 FIELD QUALITY CONTROL

- A. Inspection Agency: Owner will engage a qualified inspector to perform inspections and to furnish reports to Architect.
- B. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.
- C. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.
- D. Prepare and submit separate inspection report for each fire-rated access door indicating compliance with each item listed in NFPA 80 and NFPA 101.

3.4 ADJUSTING

A. Adjust doors and hardware, after installation, for proper operation.

SECTION 083473.13 - METAL SOUND CONTROL DOOR ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes metal sound control door assemblies.

1.2 COORDINATION

A. Coordinate installation of anchorages for sound control door assemblies. Furnish setting drawings, templates, and directions for installing anchorages. Deliver sleeves, inserts, anchor bolts, and items with integral anchors to Project site in time for installation.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review procedures for coordinating frame and anchor installation with wall construction.
 - 2. Review required field quality-control procedures.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include sound ratings, project specific construction details, material descriptions, core descriptions, fire-resistance rating, and finishes.
- B. Shop Drawings: For sound control door assemblies.
 - 1. Include elevations of each door design.
 - 2. Include details of sound control seals, door bottoms, and thresholds.
 - 3. Include details of doors, including vertical- and horizontal-edge details and metal thicknesses.
 - 4. Include frame details for each frame type, including dimensioned profiles and metal thicknesses.
 - 5. Include locations of reinforcements and preparations for hardware.
 - 6. Include details of each different wall opening condition.
 - 7. Include details of anchorages, joints, field splices, and connections.
- C. Samples for Verification: For each type of exposed finish not less than 3 by 5 inches
 - 1. Doors and Frames: Samples approximately 12 by 12 inches.
 - a. Doors: Include section of vertical-edge, top, and bottom construction; automatic door bottom or gasket; core construction; and hinge and other applied hardware reinforcement.
 - b. Frames: Include profile, corner joint, floor and wall anchors, and seals.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For sound control door assemblies to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. Acoustical Testing Agency Qualifications: An independent agency accredited as an acoustical laboratory according to the National Voluntary Laboratory Accreditation Program of NIST.
- C. Provide the following upon request:
 - 1. Qualification Data: For Installer.
 - 2. Product Certificates: For each type of sound control door assembly.
 - 3. Product Test Reports: For each sound control door assembly, for tests performed by manufacturer and witnessed by a qualified testing agency.
 - 4. Field quality-control reports.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver doors and frames palletized, wrapped, or crated to provide protection during transit and Project-site storage. Avoid the use of nonvented plastic.
 - 1. Provide additional protection to prevent damage to factory-finished units.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store doors and frames vertically under cover at Project site with head up. Place on minimum 4-inch- high wood blocking. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

1.8 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of sound control door assemblies that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Failure to meet sound rating requirements.
 - b. Faulty operation of sound seals.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal use or weathering.
 - 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Sound Rating: Provide sound control door assemblies identical to those of assemblies tested as sound-retardant units by an acoustical testing agency, and have the following minimum rating:
 - 1. STC Rating: Minimum 52 STC as calculated by ASTM E 413 when tested in an operable condition according to ASTM E 90.
- B. Fire-Rated Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.

2.2 STEEL SOUND CONTROL DOORS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Noise Barriers; Quiet Swing Model QS-52 Door or comparable product by one of the following:
 - 1. Industrial Acoustics Company.
 - 2. Krieger Specialty Products Company.
 - 3. Noise Barriers, LLC , QuietSwing QS-52; (Basis-of-Design).
 - 4. Overly Door Company.
- B. Source Limitations: Obtain steel sound control door assemblies, including doors, frames, sound control seals, hinges, thresholds, and other items essential for sound control, from single source from single manufacturer.
- C. Doors: Flush-design sound control doors, 2-1/2 inches thickness or as required to provide STC rating 52, of seamless construction; with manufacturer's standard sound-retardant core as required to provide STC and fire rating indicated. Construct doors with smooth, flush surfaces without visible joints or seams on exposed faces or stile edges. Fabricate according to NAAMM-HMMA 865.
 - 1. Interior Doors: Fabricate from cold-rolled steel sheet unless otherwise indicated, 0.048-inch nominal thickness or thicker as required to achieve STC rating indicated.
 - 2. Core: Manufacturer's standard sound control core.
 - 3. Top and Bottom Channels: Closed with continuous channels of same material as face sheets, spot welded to face sheets not more than 6 inches o.c.
 - 4. Hardware Reinforcement: Same material as face sheets.
- D. Materials:
 - 1. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B, suitable for exposed applications.
- E. Finishes:
 - 1. Adhered-Applied Finish: Acoustic felt, refer to finish schedule.
 - 2. Factory-Applied Paint Finish: Manufacturer's standard primer and finish coats, complying with SDI A250.3 for performance and acceptance criteria.
 - a. Color and Gloss: As selected by Architect from manufacturer's full range.

2.3 SOUND CONTROL FRAMES

- A. Frames: Fabricate sound control door frames with corners mitered, reinforced, and continuously welded the full depth and width of frame. Fabricate according to NAAMM-HMMA 865.
 - 1. Weld frames according to NAAMM-HMMA 820.
 - 2. Interior Frames: Fabricate from cold-rolled steel sheet unless otherwise indicated, 0.075-inch nominal thickness or thicker as required to provide STC rating indicated.

- 3. Hardware Reinforcement: Fabricate according to NAAMM-HMMA 865 of same material as face sheets.
- 4. Head Reinforcement: Metallic-coated steel channel or angle stiffener, 0.108-inch nominal thickness.
- 5. Jamb Anchors:
 - a. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.064-inch nominal-thickness metallic-coated steel with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.156 inch thick.
 - b. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.048-inch nominal-thickness uncoated steel unless otherwise indicated.
- 6. Floor Anchors: Not less than 0.079-inch nominal-thickness metallic-coated steel, and as follows: a. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
- 7. Ceiling Struts: Minimum 3/8-inch-thick by 2-inch- wide uncoated steel unless otherwise indicated.
- B. Materials:
 - 1. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B, suitable for exposed applications.
 - 2. Supports and Anchors: After fabricating, galvanize units to be built into exterior walls according to ASTM A 153/A 153M, Class B.
 - 3. Inserts, Bolts, and Fasteners: Provide items to be built into exterior walls, hot-dip galvanized according to ASTM A 153/A 153M or ASTM F 2329.
- C. Finishes:
 - 1. Factory-Applied Paint Finish: Manufacturer's standard primer and finish coats, complying with SDI A250.3 for performance and acceptance criteria.
 - a. Color and Gloss: As selected by Architect from manufacturer's full range.

2.4 HARDWARE

- A. Sound Control Door Hardware: Manufacturer's standard sound control system, including head and jamb seals, door bottoms, cam-lift hinges, and thresholds, as required by testing to achieve STC rating indicated.
 - 1. Head and Jamb Seals:
 - a. Magnetic Seals: Two-piece units consisting of closed-cell sponge neoprene seal and resiliently mounted magnet held in place by metal retainer, with retainer cover of same material as door frame; attached to door frame with concealed screws.
 - 2. Door Bottoms: Teflon coated neoprene held in place by metal housing; seal mortised into bottom edge of door.
 - 3. Cam-Lift Hinges: Full-mortise template type that raises door 1/2 inch when door is fully open; with hardened pin; fabricated from stainless steel.
 - 4. Thresholds: Flat, smooth, unfluted type as recommended by manufacturer; fabricated from stainless steel.
 - a. Color: As selected by Architect from full range of industry colors and color densities.
- B. Other Hardware: Comply with requirements in Section 087100 "Door Hardware."

2.5 SOUND CONTROL ACCESSORIES

- A. Grout: Comply with ASTM C 476, with a slump of not more than 4 inches as measured according to ASTM C 143/C 143M.
- B. Corrosion-Resistant Coating: Cold-applied asphalt mastic, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.6 FABRICATION

- A. Steel Sound Control Door Fabrication: Sound control doors to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal.
 - 1. Comply with requirements in NFPA 80 for fire-rated and smoke control doors.
 - 2. Seamless Edge Construction: Fabricate doors with faces joined at vertical edges by welding; welds shall be ground, filled, and dressed to make them invisible and to provide a smooth, flush surface.
 - 3. Hardware Preparation: Factory prepare sound control doors to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping.
 - a. Reinforce doors to receive nontemplated mortised and surface-mounted door hardware.

- b. Locate door hardware as indicated, or if not indicated, according to NAAMM-HMMA 831, "Recommended Hardware Locations for Custom Hollow Metal Doors and Frames."
- 4. Tolerances: Fabricate doors to tolerances indicated in NAAMM-HMMA 865.
- B. Sound Control Frame Fabrication: Fabricate sound control frames to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
 - 1. Factory-weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible. Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated from same thickness metal as frames.
 - 2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 - 3. Hardware Preparation: Factory prepare sound control frames to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping.
 - a. Reinforce frames to receive nontemplated mortised and surface-mounted door hardware.
 - b. Locate hardware as indicated, or if not indicated, according to NAAMM-HMMA 831, "Recommended Hardware Locations for Custom Hollow Metal Doors and Frames."
 - 4. Tolerances: Fabricate frames to tolerances indicated in NAAMM-HMMA 865.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

Β.

- A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
 - Prior to installation, adjust and securely brace sound control door frames to the following tolerances:
 - 1. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - 2. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - 3. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - 4. Plumbness: Plus or minus 1/16 inch, measured at jambs on a perpendicular line from head to floor.
- C. Drill and tap doors and frames to receive nontemplated mortised and surface-mounted door hardware.

3.3 INSTALLATION

- A. General: Install sound control door assemblies plumb, rigid, properly aligned, and securely fastened in place; comply with manufacturer's written instructions.
- B. Frames: Install sound control door frames in sizes and profiles indicated.
 - 1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
 - a. At fire-rated openings, install frames according to NFPA 80.
 - b. Where frames are fabricated in sections due to shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, and dress; make splice smooth, flush, and invisible on exposed faces.
 - c. Remove temporary braces only after frames or bucks have been properly set and secured.
 - d. Check squareness, twist, and plumbness of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
 - e. Apply corrosion-resistant coating to backs of frames to be filled with mortar, grout, and plaster containing antifreezing agents.
 - 2. Metal-Stud Partitions: Fully fill frames with mineral-fiber insulation.
 - 3. Grouted Frames: Solidly fill space between frames and substrate with grout. Take precautions, including bracing frames, to ensure that frames are not deformed or damaged by grout forces.
 - 4. Installation Tolerances: Adjust sound control door frames for squareness, alignment, twist, and plumbness to the following tolerances:

- a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
- b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
- c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
- d. Plumbness: Plus or minus 1/16 inch, measured at jambs on a perpendicular line from head to floor.
- C. Doors: Fit sound control doors accurately in frames, within clearances indicated below. Shim as necessary.
 - 1. Non-Fire-Rated Doors: Fit non-fire-rated doors accurately in frames with the following clearances: a. Jambs: 1/8 inch.
 - b. Head with Butt Hinges: 1/8 inch.
 - c. Head with Cam-Lift Hinges: As required by manufacturer, but not more than 3/8 inch.
 - d. Sill: Manufacturer's standard.
 - e. Between Edges of Pairs of Doors: 1/8 inch.
 - 2. Fire-Rated Doors: Install fire-rated doors with clearances according to NFPA 80.
- D. Sound Control Seals: Where seals have been factory prefit and preinstalled and subsequently removed for shipping, reinstall seals and adjust according to manufacturer's written instructions.
- E. Cam-Lift Hinges: Install hinges according to manufacturer's written instructions.
- F. Thresholds: Set thresholds in full bed of sealant complying with requirements in Section 079200 "Joint Sealants."

3.4 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and adjust seals, door bottoms, and other sound control hardware items right before final inspection. Leave work in complete and proper operating condition.
- B. Remove and replace defective work, including defective or damaged sound seals and doors and frames that are warped, bowed, or otherwise unacceptable.
 - 1. Adjust gaskets, gasket retainers, and retainer covers to provide contact required to achieve STC rating.
- C. Grouted Frames: Clean grout off sound control door frames immediately after installation.
- D. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible, rust-inhibitive, air-drying primer.

END OF SECTION

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Mechanical and electrified door hardware
 - 2. Electronic access control system components
- B. Section excludes:
 - 1. Windows
 - 2. Cabinets (casework), including locks in cabinets
 - 3. Signage
 - 4. Toilet accessories
 - 5. Overhead doors
- C. Related Sections:
 - 1. Division 01 Section "Alternates" for alternates affecting this section.
 - Division 06 Section "Rough Carpentry"
 Division 06 Section "Finish Carpentry"

 - 4. Division 07 Section "Joint Sealants" for sealant requirements applicable to threshold installation specified in this section.
 - 5. Division 08 Sections:
 - "Metal Doors and Frames" a.
 - "Flush Wood Doors" b.
 - "Stile and Rail Wood Doors" c.
 - d. "Interior Aluminum Doors and Frames"
 - "Aluminum-Framed Entrances and Storefronts" e.
 - "Stainless Steel Doors and Frames" f.
 - g. "Special Function Doors"
 - ĥ. "Entrances"
 - 6. Division 26 "Electrical" sections for connections to electrical power system and for low-voltage wirina.
 - 7. Division 28 "Electronic Safety and Security" sections for coordination with other components of electronic access control system and fire alarm system.

1.02 REFERENCES

- A. UL LLC
 - 1. UL 10B Fire Test of Door Assemblies
 - 2. UL 10C Positive Pressure Test of Fire Door Assemblies
 - 3. UL 1784 Air Leakage Tests of Door Assemblies
 - 4. UL 305 Panic Hardware
- B. DHI Door and Hardware Institute
 - 1. Sequence and Format for the Hardware Schedule
 - 2. Recommended Locations for Builders Hardware
 - Keying Systems and Nomenclature 3.

- 4. Installation Guide for Doors and Hardware
- C. NFPA National Fire Protection Association
 - 1. NFPA 70 National Electric Code
 - 2. NFPA 80 2016 Edition Standard for Fire Doors and Other Opening Protectives
 - 3. NFPA 101 Life Safety Code
 - 4. NFPA 105 Smoke and Draft Control Door Assemblies
 - 5. NFPA 252 Fire Tests of Door Assemblies
- D. ANSI American National Standards Institute
 - 1. ANSI A117.1 2017 Edition Accessible and Usable Buildings and Facilities
 - 2. ANSI/BHMA A156.1 A156.29, and ANSI/BHMA A156.31 Standards for Hardware and Specialties
 - 3. ANSI/BHMA A156.28 Recommended Practices for Keying Systems
 - 4. ANSI/WDMA I.S. 1A Interior Architectural Wood Flush Doors
 - 5. ANSI/SDI A250.8 Standard Steel Doors and Frames

1.03 SUBMITTALS

- A. General:
 - 1. Submit in accordance with Conditions of Contract and Division 01 Submittal Procedures.
 - 2. Prior to forwarding submittal:
 - a. Review drawings and Sections from related trades to verify compatibility with specified hardware.
 - b. Highlight, encircle, or otherwise specifically identify on submittals: deviations from Contract Documents, issues of incompatibility or other issues which may detrimentally affect the Work.
- B. Action Submittals:
 - 1. Product Data: Submit technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
 - 2. Riser and Wiring Diagrams: After final approval of hardware schedule, submit details of electrified door hardware, indicating:
 - a. Wiring Diagrams: For power, signal, and control wiring and including:
 - 1) Details of interface of electrified door hardware and building safety and security systems.
 - 2) Schematic diagram of systems that interface with electrified door hardware.
 - 3) Point-to-point wiring.
 - 4) Risers.
 - 3. Samples for Verification: If requested by Architect, submit production sample of requested door hardware unit in finish indicated and tagged with full description for coordination with schedule.
 - a. Samples will be returned to supplier. Units that are acceptable to Architect may, after final check of operations, be incorporated into Work, within limitations of key coordination requirements.
 - 4. Door Hardware Schedule:
 - a. Submit concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate fabrication of other work critical in Project construction schedule.

- b. Submit under direct supervision of a Door Hardware Institute (DHI) certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule published by DHI.
- c. Indicate complete designations of each item required for each opening, include:
 - 1) Door Index: door number, heading number, and Architect's hardware set number.
 - 2) Quantity, type, style, function, size, and finish of each hardware item.
 - 3) Name and manufacturer of each item.
 - 4) Fastenings and other pertinent information.
 - 5) Location of each hardware set cross-referenced to indications on Drawings.
 - 6) Explanation of all abbreviations, symbols, and codes contained in schedule.
 - 7) Mounting locations for hardware.
 - 8) Door and frame sizes and materials.
 - 9) Degree of door swing and handing.
 - 10) Operational Description of openings with electrified hardware covering egress, ingress (access), and fire/smoke alarm connections.
- 5. Key Schedule:
 - a. After Keying Conference, provide keying schedule that includes levels of keying, explanations of key system's function, key symbols used, and door numbers controlled.
 - b. Use ANSI/BHMA A156.28 "Recommended Practices for Keying Systems" as guideline for nomenclature, definitions, and approach for selecting optimal keying system.
 - c. Provide 3 copies of keying schedule for review prepared and detailed in accordance with referenced DHI publication. Include schematic keying diagram and index each key to unique door designations.
 - d. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.
 - e. Provide one complete bitting list of key cuts and one key system schematic illustrating system usage and expansion. Forward bitting list, key cuts and key system schematic directly to Owner, by means as directed by Owner.
 - f. Prepare key schedule by or under supervision of supplier, detailing Owner's final keying instructions for locks.
- C. Informational Submittals:
 - 1. Provide Qualification Data for Supplier, Installer and Architectural Hard ware Consultant.
 - 2. Provide Product Data:
 - a. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.
 - b. Include warranties for specified door hardware.
- D. Closeout Submittals:
 - 1. Operations and Maintenance Data: Provide in accordance with Division 01 and include:
 - a. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.
 - b. Catalog pages for each product.
 - c. Final approved hardware schedule edited to reflect conditions as installed.
 - d. Final keying schedule
 - e. Copy of warranties including appropriate reference numbers for manufacturers to identify project.
 - f. As-installed wiring diagrams for each opening connected to power, both low voltage and 110 volts.
- E. Inspection and Testing:
 - 1. Submit written reports to the Owner and Authority Having Jurisdiction (AHJ) of the results of functional testing and inspection for:

- a. Fire door assemblies, in compliance with NFPA 80.
- b. Required egress door assemblies, in compliance with NFPA 101.

1.04 QUALITY ASSURANCE

- A. Qualifications and Responsibilities:
 - Supplier: Recognized architectural hardware supplier with a minimum of 5 years documented experience supplying both mechanical and electromechanical door hardware similar in quantity, type, and quality to that indicated for this Project. Supplier to be recognized as a factory direct distributor by the manufacturer of the primary materials with a warehousing facility in the Project's vicinity. Supplier to have on staff, a certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) available to Owner, Architect, and Contractor, at reasonable times during the Work for consultation.
 - 2. Installer: Qualified tradesperson skilled in the application of commercial grade hardware with experience installing door hardware similar in quantity, type, and quality as indicated for this Project.
 - 3. Architectural Hardware Consultant: Person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and meets these requirements:
 - a. For door hardware: DHI certified AHC or DHC.
 - b. Can provide installation and technical data to Architect and other related subcontractors.
 - c. Can inspect and verify components are in working order upon completion of installation.
 - d. Capable of producing wiring diagram and coordinating installation of electrified hardware with Architect and electrical engineers.
 - 4. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.
- B. Certifications:
 - 1. Fire-Rated Door Openings:
 - a. Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction.
 - b. Provide only items of door hardware that are listed products tested by UL LLC, Intertek Testing Services, or other testing and inspecting organizations acceptable to authorities having jurisdiction for use on types and sizes of doors indicated, based on testing at positive pressure and according to NFPA 252 or UL 10C and in compliance with requirements of fire-rated door and door frame labels.
 - 2. Smoke and Draft Control Door Assemblies:
 - a. Provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105
 - b. Comply with the maximum air leakage of 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at tested pressure differential of 0.3-inch wg (75 Pa) of water.
 - 3. Electrified Door Hardware
 - a. Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction.
 - 4. Accessibility Requirements:

- a. Comply with governing accessibility regulations cited in "REFERENCES" article 087100, 1.02.D3 herein for door hardware on doors in an accessible route. This project must comply with all Federal Americans with Disability Act regulations and all Local Accessibility Regulations.
- C. Pre-Installation Meetings
 - 1. Keying Conference
 - a. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including:
 - 1) Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
 - 2) Preliminary key system schematic diagram.
 - 3) Requirements for key control system.
 - 4) Requirements for access control.
 - 5) Address for delivery of keys.
 - 2. Pre-installation Conference
 - a. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - b. Inspect and discuss preparatory work performed by other trades.
 - c. Inspect and discuss electrical roughing-in for electrified door hardware.
 - d. Review sequence of operation for each type of electrified door hardware.
 - e. Review required testing, inspecting, and certifying procedures.
 - f. Review questions or concerns related to proper installation and adjustment of door hardware.
 - 3. Electrified Hardware Coordination Conference:
 - a. Prior to ordering electrified hardware, schedule and hold meeting to coordinate door hardware with security, electrical, doors and frames, and other related suppliers.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site. Promptly replace products damaged during shipping.
- B. Tag each item or package separately with identification coordinated with final doorhardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package. Deliver each article of hardware in manufacturer's original packaging.
- C. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.
- D. Provide secure lock-up for door hardware delivered to Project. Control handling and installation of hardware items so that completion of Work will not be delayed by hardware losses both before and after installation.
- E. Handle hardware in manner to avoid damage, marring, or scratching. Correct, replace or repair products damaged during Work. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.
- F. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

1.06 COORDINATION

- A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete.
- B. Installation Templates: Distribute for doors, frames, and other work specified to be factory or shop prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

- C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.
- D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

1.07 WARRANTY

- A. Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within published warranty period.
 - 1. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.
 - 2. Warranty Period: Beginning from date of Substantial Completion, for durations indicated in manufacturer's published listings.
 - a. Mechanical Warranty
 - 1) Locks
 - a) Schlage L Series: 3 years
 - b) Schlage ND Series: 10 years
 - c) Schlage ALX Series: 10 years
 - d) Falcon: 10 years
 - 2) Exit Devices
 - a) Von Duprin: 3 years
 - b) Falcon: 10 years
 - 3) Closers
 - a) LCN 4000 Series: 30 years
 - b) LCN 1460 Series: 30 years
 - c) LCN 4050 Series: 25 years
 - d) LCN 1450 Series: 25 years
 - e) LCN 1260 Series: 20 years
 - f) LCN 1250 Series: 15 years
 - g) LCN Concealed: 15 years
 - h) Falcon SC Series: 10 years
 - i) Falcon Concealed: 5 years
 - 4) Automatic Operators
 - a) LCN: 2 years
 - b) Falcon: 1 year
 - b. Electrical Warranty
 - 1) Locks
 - a) Schlage: 1 year
 - b) Falcon: 1 year
 - 2) Exit Devices
 - a) Von Duprin: 1 year
 - 3) Closers
 - a) LCN: 2 years

1.08 MAINTENANCE

- A. Furnish complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.
- B. Turn over unused materials to Owner for maintenance purposes.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

DOOR HARDWARE

- A. Approval of manufacturers and/or products other than those listed as "Scheduled Manufacturer" or "Acceptable Manufacturers" in the individual article for the product category shall be in accordance with QUALITY ASSURANCE article, herein.
- B. Approval of products from manufacturers indicated in "Acceptable Manufacturers" is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer's product.
- C. Where specified hardware is not adaptable to finished shape or size of members requiring hardware, furnish suitable types having same operation and quality as type specified, subject to Architect's approval.

2.02 MATERIALS

- A. Fabrication
 - 1. Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. provide screws according to manufacturer's recognized installation standards for application intended.
 - 2. Finish exposed screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work including prepared for paint surfaces to receive painted finish.
 - 3. Provide concealed fasteners wherever possible for hardware units exposed when door is closed. Coordinate with "Metal Doors and Frames", "Flush Wood Doors", "Stile and Rail Wood Doors" to ensure proper reinforcements. Advise the Architect where visible fasteners, such as thru bolts, are required.
- B. Provide screws, bolts, expansion shields, drop plates and other devices necessary for hardware installation.
 - 1. Where fasteners are exposed to view: Finish to match adjacent door hardware material.
- C. Cable and Connectors:
 - 1. Where scheduled in the hardware sets, provide each item of electrified hardware and wire harnesses with number and gage of wires enough to accommodate electric function of specified hardware.
 - 2. Provide Molex connectors that plug directly into connectors from harnesses, electric locking and power transfer devices.
 - 3. Provide through-door wire harness for each electrified locking device installed in a door and wire harness for each electrified hinge, electrified continuous hinge, electrified pivot, and electric power transfer for connection to power supplies.

2.03 HINGES

- A. Manufacturers and Products:
 - 1. Scheduled Manufacturer and Product:
 - a. Ives 5BB series
 - 2. Acceptable Manufacturers and Products:
 - a. Hager BB1191/1279 series
 - b. McKinney TB series
 - c. Stanley FBB series
- B. Requirements:
 - 1. Provide hinges conforming to ANSI/BHMA A156.1.

- 2. Provide five knuckle, ball bearing hinges.
- 3. 1-3/4 inch (44 mm) thick doors, up to and including 36 inches (914 mm) wide:
 - a. Exterior: Standard weight, bronze or stainless steel, 4-1/2 inches (114 mm) high
 - b. Interior: Standard weight, steel, 4-1/2 inches (114 mm) high
- 4. 1-3/4 inch (44 mm) thick doors over 36 inches (914 mm) wide:
 - a. Exterior: Heavy weight, bronze/stainless steel, 5 inches (127 mm) high
 - b. Interior: Heavy weight, steel, 5 inches (127 mm) high
- 5. 2 inches or thicker doors:
 - a. Exterior: Heavy weight, bronze or stainless steel, 5 inches (127 mm) high
 - b. Interior: Heavy weight, steel, 5 inches (127 mm) high
- 6. Adjust hinge width for door, frame, and wall conditions to allow proper degree of opening.
- 7. Provide three hinges per door leaf for doors 90 inches (2286 mm) or less in height, and one additional hinge for each 30 inches (762 mm) of additional door height.
- 8. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
 - a. Steel Hinges: Steel pins
 - b. Non-Ferrous Hinges: Stainless steel pins
 - c. Out-Swinging Exterior Doors: Non-removable pins
 - d. Out-Swinging Interior Lockable Doors: Non-removable pins
 - e. Interior Non-lockable Doors: Non-rising pins
- 9. Provide hinges with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware. Locate electric hinge at second hinge from bottom or nearest to electrified locking component. Provide mortar guard for each electrified hinge specified.

2.04 MORTISE LOCKS

- A. Manufacturers and Products:
 - 1. Scheduled Manufacturer and Product:
 - a. Schlage L9000 series
 - 2. Acceptable Manufacturers and Products:
 - a. Accurate 9000/9100 series
 - b. Sargent 8200 series
 - c. Best 45H series
 - d. Corbin-Russwin ML2000 series
- B. Requirements:
 - 1. Provide mortise locks conforming to ANSI/BHMA A156.13 Series 1000, Grade 1, and UL Listed for 3-hour fire doors.
 - 2. Indicators: Where specified, provide indicator window measuring a minimum 2-inch x 1/2 inch with 180-degree visibility. Provide messages color-coded with full text and/or symbols, as scheduled, for easy visibility.

- 3. Provide locks manufactured from heavy gauge steel, containing components of steel with a zinc dichromate plating for corrosion resistance.
- 4. Provide lock case that is multi-function and field reversible for handing without opening case. Cylinders: Refer to "KEYING" article, herein.
- 5. Provide locks with standard 2-3/4 inches (70 mm) backset with full 3/4 inch (19 mm) throw stainless steel mechanical anti-friction latchbolt. Provide deadbolt with full 1-inch (25 mm) throw, constructed of stainless steel.
- 6. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim. Provide electrified options as scheduled in the hardware sets. Where scheduled, provide switches and sensors integrated into the locks and latches.
- 7. Provide motor based electrified locksets that comply with the following requirements:
 - a. Universal input voltage single chassis accepts 12 or 24VDC to allow for changes in the field without changing lock chassis.
 - b. Fail Safe/Fail Secure changing mode between electrically locked (fail safe) and electrically unlocked (fail secure) is field selectable without opening the lock case.
 - c. Low maximum current draw maximum 0.4 amps to allow for multiple locks on a single power supply.
 - d. Low holding current maximum 0.01 amps to produce minimal heat, eliminate "hot levers" in electrically locked applications, and to provide reliable operation in wood doors that provide minimal ventilation and air flow.
 - e. Connections provide quick-connect Molex system standard.
- 8. Lever Trim: Solid brass, bronze, or stainless steel, cast or forged in design specified, with wrought roses and external lever spring cages. Provide thru-bolted levers with 2-piece spindles.
 - a. VandIgard: Provide levers with vandal resistant technology for use at heavy traffic or abusive applications.
 - b. Lever Design: 17

2.05 EXIT DEVICES

- A. Manufacturers and Products:
 - 1. Scheduled Manufacturer and Product:
 - a. Von Duprin 99/33A series
 - 2. Acceptable Manufacturers and Products:
 - a. Detex Advantex series
 - b. Precision APEX 2000 series
 - c. Sargent 19-43-GL-80 series
- B. Requirements:
 - 1. Provide exit devices tested to ANSI/BHMA A156.3 Grade 1 and UL listed for Panic Exit or Fire Exit Hardware.
 - 2. Cylinders: Refer to "KEYING" article, herein.
 - 3. Provide grooved touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.
 - 4. Touchpad must extend a minimum of one half of door width. No plastic inserts are allowed in touchpads.
 - 5. Provide exit devices with deadlatching feature for security and for future addition of alarm kits and/or other electrified requirements.
 - 6. Provide exit devices with weather resistant components that can with stand harsh conditions of various climates and corrosive cleaners used in outdoor pool environments.
 - 7. Provide flush end caps for exit devices.
 - 8. Provide exit devices with manufacturer's approved strikes.

- 9. Provide exit devices cut to door width and height. Install exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by Architect.
- 10. Mount mechanism case flush on face of doors or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.
- 11. Provide cylinder or hex-key dogging as specified at non fire-rated openings.
- 12. Removable Mullions: 2 inches (51 mm) x 3 inches (76 mm) steel tube. Where scheduled as keyed removable mullion, provide type that can be removed by use of a keyed cylinder, which is self-locking when re-installed.
- 13. Provide factory drilled weep holes for exit devices used in full exterior application, highly corrosive areas, and where noted in hardware sets.
- 14. Provide electrified options as scheduled.
- 15. Top latch mounting: double- or single-tab mount for steel doors, face mount for aluminum doors eliminating requirement of tabs, and double tab mount for wood doors.
- 16. Provide exit devices with optional trim designs to match other lever and pull designs used on the project.

2.06 CYLINDERS

- A. Manufacturers:
 - 1. Scheduled Manufacturer and Product:
 - a. Schlage
 - b. Best
 - 2. Acceptable Manufacturers and Products:
- B. Requirements:
 - 1. Provide cylinders/cores to match Owner's existing key system, compliant with ANSI/BHMA A156.5; latest revision; cylinder face finished to match lockset, manufacturer's series as indicated. Refer to "KEYING" article, herein.

2.07 KEYING

- A. Scheduled System:
 - 1. New factory registered system:
 - a. Provide a factory registered keying system, complying with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.
 - 2. Existing factory registered system:
 - a. Provide cylinders/cores keyed into Owner's existing factory registered keying system. Comply with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.
 - 3. Existing non-factory registered system:
 - a. Provide cylinders/cores keyed into Owner's existing keying system managed by Owner's locksmith, complying with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference. Contact:
 - 1) Firm Name:
 - 2) Contact Person:
 - 3) Telephone:
- B. Requirements:

- 1. Construction Keying:
 - a. Temporary Construction Cylinder Keying.
 - 1) Provide construction cores that permit voiding construction keys without cylinder removal, furnished in accordance with the following requirements.
 - a) Split Key or Lost Ball Construction Keying System.
 - b) 3 construction control keys, and extractor tools or keys as required to void construction keying.
 - c) 12 construction change (day) keys.
 - 2) Owner or Owner's Representative will void operation of temporary construction keys.
 - b. Replaceable Construction Cores.
 - 1) Provide temporary construction cores replaceable by permanent cores, furnished in accordance with the following requirements.
 - a) 3 construction control keys
 - b) 12 construction change (day) keys.
 - 2) Owner or Owner's Representative will replace temporary construction cores with permanent cores.
- 2. Permanent Keying:
 - a. Provide permanent cylinders/cores keyed by the manufacturer according to the following key system.
 - 1) Master Keying system as directed by the Owner.
 - b. Forward bitting list and keys separately from cylinders, by means as directed by Owner. Failure to comply with forwarding requirements will be cause for replacement of cylinders/cores involved at no additional cost to Owner.
 - c. Provide keys with the following features:
 - 1) Material: Nickel silver; minimum thickness of .107-inch (2.3mm)
 - 2) Patent Protection: Keys and blanks protected by one or more utility patent(s).
 - 3) Geographically Exclusive: Where High Security or Security cylinders/cores are indicated, provide nationwide, geographically exclusive key system complying with the following restrictions.
 - d. Identification:
 - 1) Mark permanent cylinders/cores and keys with applicable blind code for identification. Do not provide blind code marks with actual key cuts.
 - 2) Identification stamping provisions must be approved by the Architect and Owner.
 - 3) Stamp cylinders/cores and keys with Owner's unique key system facility code as established by the manufacturer; key symbol and embossed or stamped with "DO NOT DUPLICATE" along with the "PATENTED" or patent number to enforce the patent protection.
 - 4) Failure to comply with stamping requirements will be cause for replacement of keys involved at no additional cost to Owner.
 - 5) Forward permanent cylinders/cores to Owner, separately from keys, by means as directed by Owner.
 - e. Quantity: Furnish in the following quantities.
 - 1) Change (Day) Keys: 3 per cylinder/core.
 - 2) Permanent Control Keys: 3.
 - 3) Master Keys: 6.

2.08 KEY CONTROL SYSTEM

- A. Manufacturers:
 - 1. Scheduled Manufacturer:

- a. Telkee
- 2. Acceptable Manufacturers:
 - a. HPC
 - b. Lund
- B. Requirements:
 - 1. Provide key control system, including envelopes, labels, tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet, all as recommended by system manufacturer, with capacity for 150% of number of locks required for Project.
 - a. Provide complete cross index system set up by hardware supplier, and place keys on markers and hooks in cabinet as determined by final key schedule.
 - b. Provide hinged-panel type cabinet for wall mounting.

2.09 DOOR CLOSERS

- A. Manufacturers and Products:
 - 1. Scheduled Manufacturer and Product:
 - a. LCN 4010/4110/4020 series
 - 2. Acceptable Manufacturers and Products:
 - a. Corbin-Russwin DC8000 series
 - b. Sargent 281 series
- B. Requirements:
 - 1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. Certify surface mounted mechanical closers to meet fifteen million (15,000,000) full load cycles. ISO 9000 certify closers. Stamp units with date of manufacture code.
 - Provide door closers with fully hydraulic, full rack and pinion action with high strength cast iron cylinder, and full complement bearings at shaft.
 - 3. Cylinder Body: 1-1/2-inch (38 mm) diameter with 11/16-inch (17 mm) diameter double heat-treated pinion journal.
 - 4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
 - 5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
 - 6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck.
 - 7. Provide closers with solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers. When closers are parallel arm mounted, provide closers which mount within 6-inch (152 mm) top rail without use of mounting plate so that closer is not visible through vision panel from pull side.
 - 8. Pressure Relief Valve (PRV) Technology: Not permitted.
 - 9. Finish for Closer Cylinders, Arms, Adapter Plates, and Metal Covers: Powder coating finish which has been certified to exceed 100 hours salt spray testing as described in ANSI/BHMA Standard A156.4 and ASTM B117, or has special rust inhibitor (SRI).
 - 10. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

2.10 DOOR TRIM

- A. Manufacturers:
 - 1. Scheduled Manufacturer:
 - a. Ives
 - 2. Acceptable Manufacturers:
 - a. Elmes
 - b. Trimco
 - c. Burns
 - d. Rockwood
- B. Requirements:
 - 1. Provide push plates, push bars, pull plates, pulls, and hands-free reversible door pulls with diameter and length as scheduled.

2.11 PROTECTION PLATES

- A. Manufacturers:
 - 1. Scheduled Manufacturer:
 - a. Ives
 - 2. Acceptable Manufacturers:
 - a. Burns
 - b. Trimco
 - c. Rockwood
- B. Requirements:
 - 1. Provide protection plates with a minimum of 0.050 inch (1 mm) thick, beveled four edges as scheduled. Furnish with sheet metal or wood screws, finished to match plates.
 - 2. Sizes plates 2 inches (51 mm) less width of door on single doors, pairs of doors with a mullion, and doors with edge guards. Size plates 1 inch (25 mm) less width of door on pairs without a mullion or edge guards.
 - 3. At fire rated doors, provide protection plates over 16 inches high with UL label.

2.12 DOOR STOPS AND HOLDERS

- A. Manufacturers:
 - 1. Scheduled Manufacturer:
 - a. Ives
 - 2. Acceptable Manufacturers:
 - a. Trimco
 - b. Burns
 - c. Rockwood
- B. Provide door stops at each door leaf:

- 1. Provide wall stops wherever possible. Provide concave type where lockset has a push button of thumbturn.
- 2. Where a wall stop cannot be used, provide universal floor stops.
- 3. Where wall or floor stop cannot be used, provide overhead stop.
- 4. Provide roller bumper where doors open into each other and overhead stop cannot be used.

2.13 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

- A. Manufacturers:
 - 1. Scheduled Manufacturer:
 - a. Zero International
 - 2. Acceptable Manufacturers:
 - a. National Guard
 - b. Reese
 - c. Legacy
 - d. Pemko
- B. Requirements:
 - 1. Provide thresholds, weather-stripping, and gasketing systems as specified and per architectural details. Match finish of other items.
 - 2. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
 - 3. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.
 - 4. Size thresholds 1/2 inch (13 mm) high by 5 inches (127 mm) wide by door width unless otherwise specified in the hardware sets or detailed in the drawings.

2.14 SILENCERS

- A. Manufacturers:
 - 1. Scheduled Manufacturer:

a. Ives

- 2. Acceptable Manufacturers:
 - a. Burns
 - b. Rockwood
 - c. Trimco
- B. Requirements:
 - 1. Provide "push-in" type silencers for hollow metal or wood frames.
 - 2. Provide one silencer per 30 inches (762 mm) of height on each single frame, and two for each pair frame.
 - 3. Omit where gasketing is specified.

2.15 FINISHES

- A. FINISH: BHMA 626/652 (US26D); EXCEPT:
 - 1. Hinges at Exterior Doors: BHMA 630 (US32D)
 - 2. Aluminum Geared Continuous Hinges: BHMA 628 (US28)
 - 3. Push Plates, Pulls, and Push Bars: BHMA 630 (US32D)
 - 4. Protection Plates: BHMA 630 (US32D)
 - 5. Overhead Stops and Holders: BHMA 630 (US32D)
 - 6. Door Closers: Powder Coat to Match
 - 7. Wall Stops: BHMA 630 (US32D)
 - 8. Latch Protectors: BHMA 630 (US32D)
 - 9. Weatherstripping: Clear Anodized Aluminum
 - 10. Thresholds: Mill Finish Aluminum

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Prior to installation of hardware, examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance. Verify doors, frames, and walls have been properly reinforced for hardware installation.
- B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
- C. Submit a list of deficiencies in writing and proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Mount door hardware units at heights to comply with the following, unless otherwise indicated or required to comply with governing regulations.
 - 1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
 - 2. Custom Steel Doors and Frames: HMMA 831.
 - 3. Interior Architectural Wood Flush Doors: ANSI/WDMA I.S. 1A
 - 4. Installation Guide for Doors and Hardware: DHI TDH-007-20
- B. Install door hardware in accordance with NFPA 80, NFPA 101 and provide post-install inspection, testing as specified in section 1.03.E unless otherwise required to comply with governing regulations.
- C. Install each hardware item in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer.
- D. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.
- E. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.
- F. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- G. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.
- H. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated.
- I. Lock Cylinders:
 - 1. Install construction cores to secure building and areas during construction period.
 - 2. Replace construction cores with permanent cores as indicated in keying section.
 - 3. Furnish permanent cores to Owner for installation.

- J. Wiring: Coordinate with Division 26, ELECTRICAL and Division 28 ELECTRONIC SAFETY AND SECURITY sections for:
 - 1. Conduit, junction boxes and wire pulls.
 - Connections to and from power supplies to electrified hardware. 2.
 - Connections to fire/smoke alarm system and smoke evacuation system. 3
 - 4 Connection of wire to door position switches and wire runs to central room or area, as directed by Architect.
 - 5. Connections to panel interface modules, controllers, and gateways.
 - 6. Testing and labeling wires with Architect's opening number.
- K. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.
- Door Closers: Mount closers on room side of corridor doors, inside of exterior doors, and stair side of L. stairway doors from corridors. Mount closers so they are not visible in corridors, lobbies and other public spaces unless approved by Architect.
- M. Closer/Holders: Mount closer/holders on room side of corridor doors, inside of exterior doors, and stair side of stairway doors.
- N. Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings or in equipment room, or alternate location as directed by Architect.
- O. Thresholds: Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."
- P. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they may impede traffic or present tripping hazard.
- Q. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
- R. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
- S. Door Bottoms and Sweeps: Apply to bottom of door, forming seal with threshold when door is closed.

3.03 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
 - 1. Spring Hinges: Adjust to achieve positive latching when door can close freely from an open position of 30 degrees.
 - 2. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.
 - Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of 3. authorities having jurisdiction.
- B. Occupancy Adjustment: Approximately three to six months after date of Substantial Completion, examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors and door hardware.

CLEANING AND PROTECTION 3.04

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items per manufacturer's instructions to restore proper function and finish.
 C. Provide final protection and maintain conditions that ensure door hardware is with out damage or deterioration at time of Substantial Completion.

3.05 DOOR HARDWARE SCHEDULE

- A. The intent of the hardware specification is to specify the hardware for interior and exterior doors, and to establish a type, continuity, and standard of quality. However, it is the door hardware supplier's responsibility to thoroughly review existing conditions, schedules, specifications, drawings, and other Contract Documents to verify the suitability of the hardware specified.
- B. Discrepancies, conflicting hardware, and missing items are to be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application.
- C. Hardware items are referenced in the following hardware schedule. Refer to the above specifications for special features, options, cylinders/keying, and other requirements.
- D. Hardware Sets:

Hardware Group No. 201R

For use on Door #(s): 266.2

Provide each SGL door(s) with the following:

			5		
QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 5 X 4.5 NRP	630	IVE
1	EA	STOREROOM LOCK	L9080T 17A	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	SURFACE CLOSER	4011/4111 X MTG BRKT, SPCR & PLATE AS REQ	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL/FLOOR STOP	WS406CCV/FS436 AS REQD	630	IVE
1	EA	GASKETING	488S PSA H & J (USE SILENCERS @ NON-RATED DOORS)	BK	ZER

Hardware Group No. 301G

For u 266.		oor #(s): 266.5	266.6	266.7	286.6					
Provide each SGL door(s) with the following:										
QTY		DESCRIPTION		CATALOG NUMBER		_	FINISH	MFR		
3	EA	HINGE		5BB1 4.5 X 4.5			652	IVE		
1	EA	PRIVACY LOCK		L9040 17A L583-363 L28 INDICATOR			626	SCH		
1	EA	SURFACE CLOSEF	R	4011/4111 X MTG BRKT PLATE AS REQ	, SPCR &		689	LCN		
1	EA	KICK PLATE		8400 10" X 2" LDW B-CS	6		630	IVE		
1	EA	WALL/FLOOR STOP	5	WS406CCV/FS436 AS F	REQD		630	IVE		
1	EA	GASKETING		488S PSA H & J (USE SILENCERS @ NON-RA DOORS)	TED		BK	ZER		
Hard	vare Gro	oup No. 401 - PASSAC	GE							
For u 282.		oor #(s):								
Provi	de each	SGL door(s) with the f	ollowing							
QTY		DESCRIPTION	0	CATALOG NUMBER			FINISH	MFR		
3	EA	HINGE		5BB1 4.5 X 4.5			652	IVE		
1	EA	PASSAGE SET		L9010 17A			626	SCH		
1	EA	GASKETING		188S H & J (USE SILEN NON-RATED DOORS)	CERS @		BK	ZER		
THIS	THIS DOOR IS A MAINTENANCE PANEL INTENDED FOR USE IN CURTAIN AREA									
Hard	Hardware Group No. 801									
Foru	se on De	oor #(s):								
For use on Door #(s): 286.1 286										
Provi	de each	SGL door(s) with the f	ollowing							
QTY		DESCRIPTION	enething	CATALOG NUMBER			FINISH	MFR		
3	EA	HINGE		5BB1HW 4.5 X 4.5			652	IVE		
1	EA	PUSH PLATE		8200 4" X 16"			630	IVE		
1	EA	PULL PLATE		8303 10" 4" X 16"			630	IVE		
1	EA	SURFACE CLOSEF	R	4011/4111 X MTG BRKT PLATE AS REQ	, SPCR &		689	LCN		
1	EA	KICK PLATE		8400 10" X 2" LDW B-CS	6		630	IVE		
1	EA	WALL/FLOOR STOP	5	WS406CCV/FS436 AS F	REQD		630	IVE		
3	EA	SILENCER		SR64			GRY	IVE		

Hardware Group No. S701C

For use on Door #(s): 270.1

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	PANIC HARDWARE	99-L-17 LENGTH AS REQ.		626	VON
1	EA	RIM CYLINDER	20-057 ICX W/CONST. CORE		626	SCH
1	EA	FSIC CORE	23-030		626	SCH
1	EA	SURFACE CLOSER	4011/4111 X MTG BRKT, SPCR & PLATE AS REQ		689	LCN
1	EA	FLOOR STOP	FS18L		BLK	IVE
	1 1 1 1 1	1 EA 1 EA 1 EA	 EA RIM CYLINDER EA FSIC CORE EA SURFACE CLOSER 	1EAPANIC HARDWARE99-L-17 LENGTH AS REQ.1EARIM CYLINDER20-057 ICX W/CONST. CORE1EAFSIC CORE23-0301EASURFACE CLOSER4011/4111 X MTG BRKT, SPCR & PLATE AS REQ	1EAPANIC HARDWARE99-L-17 LENGTH AS REQ.1EARIM CYLINDER20-057 ICX W/CONST. CORE1EAFSIC CORE23-0301EASURFACE CLOSER4011/4111 X MTG BRKT, SPCR &PLATE AS REQImage: Content of the second	1EAPANIC HARDWARE99-L-17 LENGTH AS REQ.6261EARIM CYLINDER20-057 ICX W/CONST. CORE6261EAFSIC CORE23-0306261EASURFACE CLOSER4011/4111 X MTG BRKT, SPCR & 689689PLATE AS REQPLATE AS REQ689

BASIS OF DESIGN HARDWARE SET

-FIRE RATED.

-ALL HARDWARE SPECIFIED MUST BE APPROVED/COORDINATED WITH THE STC DOOR MFR. PRIOR TO ORDERING DOORS, FRAMES AND HARDWARE.

-A STANDARD STC UNIT IS SUPPLIED WITH NECESSARY HINGES, PERIMETER GASKETING AND RETAINER, DOOR BOTTOM, LOOSE STOPS, STOP OFFSET HARDWARE BRACKETS AND ALL REQUIRED FASTENERS.

-CLOSERS WITH EDA OR CUSH (RIGID TYPE ARMS) NOT ALLOWED WITH CAM-LIFT HINGES.

Hardware Group No. S701R

For use on Door #(s):

266.1 266.3 28	2.1

Provide each SGL door(s) with the following:

QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1 EA	FIRE EXIT HARDWARE	99-L-F-17 LENGTH AS REQ	626	VON
1 EA	RIM CYLINDER	20-057 ICX W/CONST. CORE	626	SCH
1 EA	FSIC CORE	23-030	626	SCH
1 EA	SURFACE CLOSER	4011/4111 X MTG BRKT, SPCR & PLATE AS REQ	689	LCN
1 EA	FLOOR STOP	FS18L	BLK	IVE

BASIS OF DESIGN HARDWARE SET

-FIRE RATED.

-ALL HARDWARE SPECIFIED MUST BE APPROVED/COORDINATED WITH THE STC DOOR MFR. PRIOR TO ORDERING DOORS, FRAMES AND HARDWARE.

-A STANDARD STC UNIT IS SUPPLIED WITH NECESSARY HINGES, PERIMETER GASKETING AND RETAINER, DOOR BOTTOM, LOOSE STOPS, STOP OFFSET HARDWARE BRACKETS AND ALL REQUIRED FASTENERS.

-CLOSERS WITH EDA OR CUSH (RIGID TYPE ARMS) NOT ALLOWED WITH CAM-LIFT HINGES.

END OF SECTION

SECTION 088300 - MIRRORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Silvered flat glass mirrors.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Mirrors: Include description of materials and process used to produce each type of silvered flat glass mirror specified that indicates sources of glass, glass coating components, edge sealer, and quality-control provisions.
- B. Shop Drawings: Include mirror elevations, edge details, mirror hardware, and attachment details.
- C. Samples: For each type of the following:
 - 1. Mirrors: 12 inches square, including edge treatment on two adjoining edges.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance Data: For mirrors to include in maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified Installer, who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.
- B. Provide the following upon request:
 - 1. Qualification Data: For Installer.
 - 2. Product Certificates: For each type of mirror and mirror mastic.
 - 3. Preconstruction Test Reports: From mirror manufacturer indicating that mirror mastic was tested for compatibility and adhesion with mirror backing and substrates on which mirrors are installed.

1.5 PRECONSTRUCTION TESTING

- A. Preconstruction Mirror Mastic Compatibility Test: Submit mirror mastic products to mirror manufacturer for testing to determine compatibility of mastic with mirror backing.
 - 1. Testing is not required if data are submitted based on previous testing of mirror mastic products and mirror backing matching those submitted.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect mirrors in accordance with mirror manufacturer's written instructions and as needed to prevent damage to mirrors from moisture, condensation, temperature changes, direct exposure to sun, or other causes.
- B. Comply with mirror manufacturer's written instructions for shipping, storing, and handling mirrors as needed to prevent deterioration of silvering, damage to edges, and abrasion of glass surfaces and applied coatings. Store indoors.

1.7 FIELD CONDITIONS

A. Environmental Limitations: Do not install mirrors until ambient temperature and humidity conditions are maintained at levels indicated for final occupancy.

1.8 WARRANTY

- A. Special Warranty: Manufacturer agrees to replace mirrors that deteriorate within specified warranty period. Deterioration of mirrors is defined as defects developed from normal use that are not attributed to mirror breakage or to maintaining and cleaning mirrors contrary to manufacturer's written instructions. Defects include discoloration, black spots, and clouding of the silver film.
 - 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SILVERED FLAT GLASS MIRRORS

A. Mirrors, General: ASTM C1503.

- B. Annealed Monolithic Glass Mirrors: Mirror Select Quality, clear.
 1. Nominal Thickness: 6.0 mm.
- C. Safety Glazing Products: For film-backed mirrors, provide products that comply with 16 CFR 1201, Category II.

2.2 MISCELLANEOUS MATERIALS

- A. Edge Sealer: Coating compatible with glass coating and approved by mirror manufacturer for use in protecting against silver deterioration at mirrored glass edges.
- B. Mirror Mastic: An adhesive setting compound, asbestos-free, produced specifically for setting mirrors and certified by both mirror and mastic manufacturer as compatible with glass coating and substrates on which mirrors will be installed.
- C. Film Backing for Safety Mirrors: Film backing and pressure-sensitive adhesive; both compatible with mirror backing paint as certified by mirror manufacturer.

2.3 FABRICATION

- A. Shop fabricate mirrors to greatest extent possible.
- B. Fabricate cutouts for notches and holes in mirrors without marring visible surfaces. Locate and size cutouts, so they fit closely around penetrations in mirrors.
- C. Mirror Edge Treatment: Flat polished.
 - 1. Seal edges of mirrors with edge sealer after edge treatment to prevent chemical or atmospheric penetration of glass coating.
 - 2. Require mirror manufacturer to perform edge treatment and sealing in factory immediately after cutting to final sizes.
- D. Film-Backed Safety Mirrors: Apply film backing with adhesive coating over mirror backing paint, as recommended in writing by film-backing manufacturer, to produce a surface free of bubbles, blisters, and other imperfections.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, over which mirrors are to be mounted, with Installer present, for compliance with installation tolerances, substrate preparation, and other conditions affecting performance of the Work.
- B. Verify compatibility with and suitability of substrates, including compatibility of existing finishes or primers with mirror mastic.
- C. Proceed with installation only after unsatisfactory conditions have been corrected and surfaces are dry.

3.2 PREPARATION

A. Comply with mastic manufacturer's written installation instructions for preparation of substrates, including coating substrates with mastic manufacturer's special bond coating where applicable.

3.3 INSTALLATION

- A. General: Install mirrors to comply with mirror manufacturer's written instructions and with referenced National Glass Association (NGA) publications. Mount mirrors accurately in place in a manner that avoids distorting reflected images.
 - 1. NGA Publications: "Glazing Manual" and "Installation Techniques Designed to Prolong the Life of Flat Glass Mirrors."
- B. Provide a minimum airspace of 1/8 inch between back of mirrors and mounting surface for air circulation between back of mirrors and face of mounting surface.
- C. Install mirrors with mastic .
 - 1. Install mastic as follows:
 - a. Apply barrier coat to mirror backing where approved in writing by manufacturers of mirrors and backing material.
 - b. Apply mastic to comply with mastic manufacturer's written instructions for coverage and to allow air circulation between back of mirrors and face of mounting surface.
 - c. After mastic is applied, align mirrors and press into place while maintaining a minimum airspace of 1/8 inch between back of mirrors and mounting surface.

3.4 CLEANING AND PROTECTION

- A. Protect mirrors from breakage and contaminating substances resulting from construction operations.
- B. Do not permit edges of mirrors to be exposed to standing water.
- C. Maintain environmental conditions that prevent mirrors from being exposed to moisture from condensation or other sources for continuous periods of time.
- D. Clean exposed surface of mirrors not more than four days before date scheduled for inspections that establish date of Substantial Completion. Clean mirrors as recommended in writing by mirror manufacturer and NGA's publication "Proper Procedures for Cleaning Flat Glass Mirrors."

END OF SECTION

SECTION 090190.52 - MAINTENANCE REPAINTING

PART1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes maintenance repainting as follows:
 - 1. Patching substrates.
 - 2. Repainting.

1.3 DEFINITIONS

- A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- C. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- D. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- E. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- F. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
- G. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 SEQUENCING AND SCHEDULING

- A. Perform maintenance repainting in the following sequence, which includes work specified in this and other Sections:
 - 1. Dismantle existing surface-mounted objects and hardware except items indicated to remain in place. Tag items with location identification and protect.
 - 2. Verify that temporary protections have been installed.
 - 3. Examine condition of surfaces to be painted.
 - 4. Remove existing paint to the degree required for each substrate and surface condition of existing paint.
 - 5. Apply paint system.
 - 6. Reinstall dismantled surface-mounted objects and hardware unless otherwise indicated.

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include recommendations for product application and use.
 - 2. Include test data substantiating that products comply with requirements.

1.7 INFORMATIONAL SUBMITTALS

A. Color Matching Certificate: For computer-matched colors.

1.8 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra paint materials, from the same production run, that match products applied and that are packaged with protective covering for storage and identified with labels describing contents, including material, finish, source, and location on building.
 - 1. Quantity: Furnish Owner with an additional 3 percent, but not less than 1 gal. or one case, as appropriate, of each material and color applied.

1.9 QUALITY ASSURANCE

A. Color Matching: Custom computer-match paint colors to colors indicated on Drawings. For colors indicated by a standardized coding system, obtain a color chip for each color indicated from the color-coding-system company; computer match paint colors to the color chips.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
 - 1. Maintain containers in clean condition, free of foreign materials and residue.
 - 2. Remove rags and waste daily.

1.11 FIELD CONDITIONS

- A. Weather Limitations: Proceed with maintenance repainting only when existing and forecasted weather conditions are within the environmental limits set by each manufacturer's written instructions and specified requirements.
- B. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- C. Do not apply paint in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.
 - 1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer for surface preparation and during paint application and drying periods.

PART 2 - PRODUCTS

2.1 PREPARATORY CLEANING MATERIALS

A. Mildewcide: Commercial proprietary mildewcide or a job-mixed solution prepared by mixing 1/3 cup of household detergent that contains no ammonia, 1 quart of 5 percent sodium hypochlorite bleach, and 3 quarts of warm water.

2.2 PAINT, GENERAL

- A. Material Compatibility:
 - 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- B. Colors: As selected by Architect from full range of industry colors.

2.3 PAINT MATERIALS, GENERAL

- A. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction and, for interior paints and coatings applied at Project site, the following VOC limits, exclusive of colorants added to a tint base:
 - 1. Flat Paints and Coatings: 50 g/L.
 - 2. Nonflat Paints and Coatings: 150 g/L.
 - 3. Primers, Sealers, and Undercoaters: 200 g/L.
 - 4. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
 - 5. Pretreatment Wash Primers: 420 g/L.
 - 6. Floor Coatings: 100 g/L.
 - 7. Clear Wood Finishes, Varnishes: VOC not more than 350 g/L.
 - 8. Shellacs, Clear: 730 g/L.
 - 9. Shellacs, Pigmented: 550 g/L.
 - 10. Stains: 250 g/L.

2.4 PATCHING MATERIALS

A. Gypsum-Plaster Patching Compound: Finish coat plaster and bonding compound according to ASTM C 842 and manufacturer's written instructions.

PART 3 - EXECUTION

3.1 PROTECTION

- A. Comply with each manufacturer's written instructions for protecting building and other surfaces against damage from exposure to its products. Prevent chemical solutions from coming into contact with people, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.
 - 1. Cover adjacent surfaces with materials that are proven to resist chemical solutions being used unless the solutions will not damage adjacent surfaces. Use protective materials that are UV resistant and waterproof. Apply masking agents to comply with manufacturer's written instructions. Do not apply liquid masking agent to painted or porous surfaces. When no longer needed, promptly remove masking to prevent adhesive staining.
 - 2. Do not apply chemical solutions during winds of sufficient force to spread them to unprotected surfaces.
 - 3. Neutralize and collect alkaline and acid wastes before disposal.
 - 4. Dispose of runoff from operations by legal means and in a manner that prevents soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors.

3.2 MAINTENANCE REPAINTING, GENERAL

- A. Maintenance Repainting Appearance Standard: Completed work is to have a uniform appearance as viewed by Architect from building interior at 5 feet away from painted surface and from building exterior at 20 feet away from painted surface.
- B. Execution of the Work: In repainting surfaces, disturb them as minimally as possible and as follows:
 - 1. Remove failed coatings and corrosion and repaint.
 - 2. Verify that substrate surface conditions are suitable for repainting.
 - 3. Allow other trades to repair items in place before repainting.
- C. Mechanical Abrasion: Where mechanical abrasion is needed for the work, use gentle methods, such as scraping and lightly hand sanding, that will not abrade softer substrates, reducing clarity of detail.
- D. Heat Processes: Do not use torches, heat guns, or heat plates.

3.3 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of painting work. Comply with paint manufacturer's written instructions for inspection.
- B. Maximum Moisture Content of Substrates: Do not begin application of coatings unless moisture content of exposed surface is below the maximum value recommended in writing by paint manufacturer and not greater than the following maximum values when measured with an electronic moisture meter appropriate to the substrate material:
 - 1. Gypsum Board: 12 percent.
 - 2. Portland Cement Plaster: 12 percent.
- C. Alkalinity: Do not begin application of coatings unless surface alkalinity is within range recommended in writing by paint manufacturer. Conduct alkali testing with litmus paper on exposed plaster, cementitious, and masonry surfaces.
- D. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
 - 1. If existing surfaces cannot be prepared to an acceptable condition for proper finishing by using specified surface-preparation methods, notify Architect in writing.
- E. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
 1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.4 PREPARATORY CLEANING

- A. General: Use the gentlest, appropriate method necessary to clean surfaces in preparation for painting. Clean all surfaces, corners, contours, and interstices.
- B. Mildew: Clean off existing mildew, algae, moss, plant material, loose paint, grease, dirt, and other debris by scrubbing with bristle brush or sponge and detergent solution. Scrub mildewed areas with mildewcide. Rinse with water applied by clean rags or sponges.

3.5 SUBSTRATE REPAIR

- A. General: Repair substrate surface defects that are inconsistent with the surface appearance of adjacent materials and finishes.
- B. Gypsum-Plaster and Gypsum-Board Substrates:
 - 1. Repair defects including dents and chips more than 1/8 inch in size and all holes and cracks by filling with gypsum-plaster patching compound and sanding smooth. Remove protruding fasteners.
 - 2. Rout out surface cracks to remove loose, unsound material; fill with patching compound and sand smooth.

3.6 PAINT APPLICATION, GENERAL

- A. Comply with manufacturers' written instructions for application methods unless otherwise indicated in this Section.
- B. Prepare surfaces to be painted according to the Surface-Preparation Schedule and with manufacturer's written instructions for each substrate condition.
- C. Apply a transition coat over incompatible existing coatings.
- D. Blending Painted Surfaces: When painting new substrates patched into existing surfaces or touching up missing or damaged finishes, apply coating system specified for the specific substrate. Apply final finish coat over entire surface from edge to edge and corner to corner.

3.7 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

END OF SECTION

SECTION 090413 - COMMON SUBMITTAL REQUIREMENTS FOR FINISHES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes supplementary administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals specific to the work of this Division.
- B. Related Requirements:
 - 1. Division 01 submittal requirements.

1.2 DEFINITIONS

- A. Contractor: Refers to an entity in direct Contract with the Owner to furnish and/or perform any portion of the Work of the Contract, including but not limited to a Construction Manager.
 - 1. Contractor shall review and approve Product Submittals prior to fowarding them to the Architect.
- B. Product Submittals: In general, Product Submittals show characteristics of the proposed construction in one of the following forms:
 - 1. Shop Drawings.
 - 2. Product Data.
 - 3. Samples.
- C. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- D. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."
- E. Submittal Review Sheet: Specific form required to accompany each submittal. Obtain Submittal Review Sheet from the SmithGroup Project Manager.

1.3 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Requirements specified for submittals are intended to provide efficient handling, while permitting review responsibilities to be carried out.
- B. Avoidable Resubmittals: The first two reviews of each specified submittal will be processed without cost to the Contractor. After the second review, the Owner may charge the Contractor for the cost of such additional processing, unless the processing results from approved Change Orders causing revisions to previously approved submittals.
- C. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 - 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 - 4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect reserve the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- D. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
 - 1. Initial Review: Allow 10 business days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required.

- 2. When a large volume of submittal materials is scheduled, additional review time may be required. Similarly, a particular submittal may require review completion in less than the agreed normal time. Due to variations in submittal volume and processing needs, agreed review time is not intended to apply to extreme conditions.
- 3. Resubmittal Review: Allow 10 business days for review of each resubmittal.
- 4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 15 business days for initial review of each submittal.
- E. Maintain at the Project Site ready access to the latest reviewed Shop Drawings and Product Data, and one set of samples.

1.4 DELEGATED-DESIGN SERVICES

A. Definitions:

- 1. Delegated Design: A portion or component of the Work identified by the Contract Documents to be designed by the Contractor, or an entity assigned by the Contractor, to satisfy performance and design criteria specified in the Contract Documents for that portion or component.
- 2. Registered Design Professional: Design professional, assigned by the Contractor, who is responsible for providing the delegated design work, and for certifying that the work is in compliance with the specified performance requirements and design criteria. Design professional shall be legally qualified to practice in jurisdiction where Project is located and shall be experienced in providing delegated design services of the kind indicated. Delegated design services are defined as those performed for installation of the system, assembly or product that are similar in material, design, and extent to those indicated for this Project.
- B. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- C. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Combine with Submittal Review Sheet before submitting to Architect .
- B. Project Closeout and Maintenance Material Submittals: See requirements in Division 01.
- C. Be responsible for quantities, weights, and dimensions to be confirmed and correlated at the site; for information that pertains solely to the fabrication processes and to the means, methods, techniques, sequences, and procedures of construction; and for coordination of the work of every trade, supplier, and subcontractor.
- D. Be responsible for each submittal to be in conformance with information given and the design intent expressed in the Contract Documents.
- E. Provide with each submittal specific written notice of any variation from the requirements of the Contract Documents by causing a specific notation to be made on the Submittal Review Sheet and Submittal Transmittal.

3.2 ARCHITECT'S AND GENERAL CONTRACTOR'S ACTION

- A. General: Architect will not review submittals that do not include the Submittal Review Sheet.
- B. Action Submittals: Architect's staff and consultants will review the submittal, and mark the Submittal Review Sheet with an action code. The code meanings are described below.

- C. Additional codes may be provided within comments or as an electronic submittal review stamp and shall be used in help indicating return of partial submittals.
- D. The Final Review Code on the Submittal Review Sheet prevails and governs the action of the overall submittal.
- E. Review Code meanings are as follows:
 - 1. Action Codes Permitting Use:
 - a. When an action code permitting use is assigned to a submittal, it does not authorize work that does not comply with the requirements of the Contract Documents. Acceptance of the Work will depend on compliance.
 - b. Code AP Approved: The Work covered by the submittal item may proceed, provided it complies with Contract Document requirements.
 - c. Code AN Approved as Noted: The Work covered by the submittal item may proceed, provided it complies with the Architect's notations and Contract Document requirements.
 - d. Code AN-R Approved as Noted Resubmit: Do not deliver or install the related work until the resubmittal has received Code AP or AN. However, fabrication and other off-site work covered by the submittal item may proceed, at the Contractor's risk, provided it complies with the Architect's notations and Contract Document requirements.
 - 2. Action Code Prohibiting Use:
 - a. Action Code REJ Not Approved: The Work covered by the submittal item, including purchasing, fabrication, delivery, and other activity, shall not proceed. Revise the submittal item or prepare a new item in accordance with the Architect's notations. Resubmit the corrected or new item without delay; do not permit submittal items marked "Not Approved" to be used. Work incorporating such items will be rejected.
 - 3. Action Code for Items Not Required:
 - a. Action Code X Not Requested by Contract Documents: The submittal item is not called for by the Contract Documents and is being returned unreviewed by the Architect except to the extent necessary to determine its status.
- F. Informational Submittals: For Architect's information only. Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
 - 1. Action Code for Information Only:
 - a. Action Code INF Information Only Received: The submittal item is not called for a return with a reviewed action code by the Contract Documents and is being returned un-reviewed by the Architect except to the extent necessary to determine its status.
- G. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- H. Incomplete submittals are not acceptable, will be considered non-responsive, and will be returned without review.
- I. Architect will return without review submittals received from sources other than the Contractor.
- J. Submittals not required by the Contract Documents may be returned by the Architect without action.
 - 1. Do not submit Material Safety Data Sheets. They will be returned without review.

3.3 SUBMITTAL TRANSMITTAL REQUIREMENTS

- A. Submittal Transmittal shall be a PDF file in electronic format. It is recommended, to expedite the submittal review, the electronic form be emailed for review to the Architect as early as possible.
 - 1. Submittal Numbering: See below.
 - 2. Contact Information: Full Name, Phone Number and Email Address.
- B. Submittal Definition
 - 1. Each submittal consists of items from only ONE Specifications section.
 - 2. Complete Submittal: If ALL the items required by the Specifications section are listed on one Submittal Form (including continuation sheet), it is a complete submittal.
 - 3. Partial Submittals: If it is necessary to divide the required items of a given Specifications section into two or more submittals to meet schedule or handling requirements, the separate submittals are partial submittals. All partial submittals have the same submittal number, and are differentiated by sequential P-numbers (see below).
 - 4. All items in each submittal, whether complete or partial, will be processed together: Individual items will not be 'broken out' for special handling. Arrange submittals accordingly.

C. Submittal Numbering

- 1. Number submittals as described below to assist tracking.
- 2. Number each submittal in the format nnnnn-nn.
 - a. The 6-digit number is the number of the section that requires the submittal. For example, 044200.
 - b. The 2-digit number is based on the numerical sequence of submittals from that section. In other words, for each section, the first submittal is 01, the second is 02, and so on. The 2-digit number does not change for partial or re-submittals, so that the submittal can be tracked.
 - c. P-Number for Partial Submittals: Number each partial submittal in the pee space, beginning with P1, and increasing by one for each partial submittal of that submittal. If the submittal is a complete submittal, leave the P space blank.
 - d. R-Number for Re-submittals: Number each re-submittal in the arr space, beginning with R1, and increasing by one for each re-submittal of that submittal. Do not include an R-Number for the initial submittal.
 - e. Examples:
 - 1) Initial Complete Submittal: 044200-01. First Re-Submittal: 044200-01-R1.
 - 2) Initial Partial Submittal: 044200-01-P1. Second Partial Submittal: 0044200-01-P2. First Re-submittal of Second Partial Submittal: 044200-R1-P2.

3.4 SUBMITTAL REVIEW SHEET REQUIREMENTS

- A. Provide Submittal Review Sheet in PDF format. Submit as the page after the Submittal Transmittal.
- B. When attached, the Submittal Review Sheet shall not obscure information contained in the submittal.
- C. Do not edit any of the information contained within the Submittal Review Sheet except as follows:
 1. Submittal Number: See Submittal Numbering in Submittal Transmittal Requirements paragraph.
- D. The Contractor shall submit the PDF file in a manner that will allow editing of the Submittal Review Sheet fields by SmithGroup and its consultants.

END OF SECTION

SECTION 090561.13 - MOISTURE VAPOR EMISSION CONTROL

PART1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Fluid-applied, resin-based, membrane-forming systems that control the moisture-vapor-emission rate of high-moisture, interior concrete to prepare it for floor covering installation.
- B. Contractor's Responsibility: Suitability of concrete slab to meet vapor emission limits as required by scheduled floor finish materials is the responsibility of the Contractor. Where concrete slab vapor emission exceeds limits, apply topical vapor retarders specified in this section.
- C. Related Requirements:
 - 1. Section 096816 "Sheet Carpeting."

1.3 UNIT PRICES

A. Work of this Section is affected by Moisture Vapor Emission Control Unit Price. Provide uit price cost per square-foot.

1.4 DEFINITIONS

- A. MVE: Moisture vapor emission.
- B. MVER: Moisture vapor emission rate.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Employs factory-trained personnel who are available for consultation and Project-site inspection.
- B. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.
- C. Provide the following upon request:
 - 1. Qualification Data: For installer and manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating directions for storage and mixing with other components.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Comply with MVE-control system manufacturer's written instructions for substrate and ambient temperatures, humidity, ventilation, and other conditions affecting system installation.
 - 1. Store system components in a temperature-controlled environment and protected from weather and at ambient temperature of not less than 65 deg F and not more than 85 deg F at least 48 hours before use.
 - 2. Maintain ambient temperature and relative humidity in installation areas within range recommended in writing by MVE-control system manufacturer, but not less than 65 deg F or more than 85 deg F and not less than 40 or more than 60 percent relative humidity, for 48 hours before installation, during installation, and for 48 hours after installation unless longer period is recommended in writing by manufacturer.
 - 3. Install MVE-control systems where concrete surface temperatures will remain a minimum of 5 deg F higher than the dew point for ambient temperature and relative humidity conditions in installation areas for 48 hours before installation, during installation, and for 48 hours after installation unless longer period is recommended in writing by manufacturer.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. MVE-Control System Capabilities: Capable of suppressing MVE without failure where installed on concrete that exhibits the following conditions:
 - 1. MVER: Maximum 25 lb of water/1000 sq. ft. when tested according to ASTM F1869.
 - 2. Relative Humidity: Maximum 100 percent when tested according to ASTM F2170 using in situ probes.

2.2 MVE-CONTROL SYSTEM

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Advanced Moisture Control, Inc.
 - 2. ARDEX Americas.
 - 3. Dependable, LLC.
 - 4. Floor Seal Technology, Inc.
 - 5. ISE Logik Industries
 - 6. LATICRETE SUPERCAP, LLC.
 - 7. MAPEI Corporation.
 - 8. USG Corporation.
- B. MVE-Control System: ASTM F3010-qualified, fluid-applied, two-component, epoxy-resin, membrane-forming system; formulated for application on concrete substrates to reduce MVER to level required for installation of floor coverings indicated and acceptable to manufacturers of floor covering products indicated, including adhesives.
 - 1. Substrate Primer: Provide MVE-control system manufacturer's concrete-substrate primer if required for system indicated by substrate conditions.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for maximum moisture content, installation tolerances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
 1. Installation of system indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Preinstallation Testing:
 - 1. Alkalinity Testing: Perform pH testing according to ASTM F710. Install MVE-control system in areas where pH readings are less than 7.0 and in areas where pH readings are greater than 8.5.
 - 2. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft., and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
 - a. Anhydrous Calcium Chloride Test: ASTM F1869. Install MVE-control system in locations where concrete substrate MVER exceeds 3 lb of water/1000 sq. ft. in 24 hours.
 - b. Internal Relative Humidity Test: Using in situ probes, ASTM F2170. Install MVE-control system in locations where concrete substrates exhibit relative humidity level greater than 75 percent.
 - 3. Tensile-Bond-Strength Testing: For typical locations indicated to receive installation of MVE-control system, install minimum 100-sq. ft. area of MVE-control system to prepared concrete substrate and test according to ASTM D7234.
 - a. Proceed with installation only where tensile bond strength is greater than 200 psi with failure in the concrete.
- B. Concrete Substrates: Prepare and clean substrates according to MVE-control system manufacturer's written instructions to ensure adhesion of system to concrete.
 - 1. Remove coatings and other substances that are incompatible with MVE-control system and that contain soap, wax, oil, or silicone, using mechanical methods recommended in writing by MVE-control system manufacturer. Do not use solvents.

- 2. Provide concrete surface profile complying with ICRI 310.2R CSP 3 by shot blasting using apparatus that abrades the concrete surface with shot, contains the dispensed shot within the apparatus, and recirculates the shot by vacuum pickup.
- 3. After shot blasting, repair damaged and deteriorated concrete according to MVE-control system manufacturer's written instructions.
- 4. Protect substrate voids and joints to prevent resins from flowing into or leaking through them.
- 5. Fill surface depressions and irregularities with patching and leveling material.
- 6. Fill surface cracks, grooves, control joints, and other nonmoving joints with crack-filling material.
- 7. Allow concrete to dry, undisturbed, for period recommended in writing by MVE-control system manufacturer after surface preparation, but not less than 24 hours.
- 8. Before installing MVE-control systems, broom sweep and vacuum prepared concrete.
- C. Protect walls, floor openings, electrical openings, door frames, and other obstructions during installation.

3.3 INSTALLATION

- A. Install MVE-control system according to ASTM F3010 and manufacturer's written instructions to produce a uniform, monolithic surface free of surface deficiencies such as pin holes, fish eyes, and voids.
 Install primers as required to comply with manufacturer's written instructions.
- B. Do not apply MVE-control system across substrate expansion, isolation, and other moving joints.
- C. Apply system, including component coats if any, in thickness recommended in writing by MVE-control system manufacturer for MVER indicated by preinstallation testing.
- D. Cure MVE-control system components according to manufacturer's written instructions. Prevent contamination or other damage during installation and curing processes.
- E. After curing, examine MVE-control system for surface deficiencies. Repair surface deficiencies according to manufacturer's written instructions.
- F. Install cementitious underlayment over cured membrane if required to maintain manufacturer's warranty and in thickness required to maintain the warranty.

3.4 PROTECTION

- A. Protect MVE-control system from damage, wear, dirt, dust, and other contaminants before floor covering installation. Use protective methods and materials, including temporary coverings, recommended in writing by MVE-control system manufacturer.
- B. Do not allow subsequent preinstallation examination and testing for floor covering installation to damage, puncture, or otherwise compromise the MVE-control system membrane.

END OF SECTION

SECTION 092216 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Non-load-bearing steel framing systems for interior partitions.
 - 2. Suspension systems for interior ceilings and soffits.
 - 3. Grid suspension systems for gypsum board ceilings.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 QUALITY ASSURANCE

- A. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Certified Steel Stud Association, the Steel Framing Industry Association, the Steel Stud Manufacturers Association or the Supreme Steel Framing System Association.
- B. Provide the following upon request:
 - 1. Product Certificates: For each type of code-compliance certification for studs and tracks.
 - 2. Evaluation Reports: For embossed, high-strength steel studs and tracks firestop tracks post-installed anchors, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Notify manufacturer of damaged materials received prior to installation.
- B. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- C. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling as required by AISI S202, "Code of Standard Practice for Cold-Formed Steel Structural Framing."

PART 2 - PRODUCTS

2.1 FRAMING SYSTEMS

- A. Framing Members, General: Comply with AISI S220 for conditions indicated.
 - 1. Steel Sheet Components: Comply with AISI S220 requirements for metal unless otherwise indicated
 - 2. Protective Coating: Comply with AISI S220; ASTM A653/A653M, G60; or coating with equivalent corrosion resistance. Galvannealed products are unacceptable.
- B. Studs and Track: AISI S220.
 - 1. Minimum Base-Steel Thickness: As indicated on Drawings.
 - 2. Depth: As indicated on Drawings.
- C. Slip-Type Head Joints: Where indicated, provide one of the following:
 - 1. Clip System: Clips designed for use in head-of-wall deflection conditions that provide a positive attachment of studs to tracks while allowing 1-1/2-inch minimum vertical movement.
 - 2. Single Long-Leg Track System: ASTM C645 top track with 2-inch- deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top track and with continuous bridging located within 12 inches of the top of studs to provide lateral bracing.
 - 3. Double-Track System: ASTM C645 top outer tracks, inside track with 2-inch- deep flanges in thickness not less than indicated for studs and fastened to studs, and outer track sized to friction-fit over inner track.
 - 4. Deflection Track: Steel sheet top track manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
- D. Cold-Rolled Channel Bridging: Steel, 0.0538-inch minimum base-steel thickness, with minimum 1/2-inchwide flanges.
 - 1. Depth: As indicated on Drawings.

1.

- 2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch- thick, galvanized steel.
- E. Hat-Shaped, Rigid Furring Channels: ASTM C645.
 - Minimum Base-Steel Thickness: 0.0296 inch .
 - a. Provide 20 gauge channels where sound isolation clips are required.
 - 2. Depth: As indicated on Drawings.
- F. Sound Isolation Clips:
 - 1. Basis-of-Design Product: Kinetics Noise Control; IsoMax Sound Isolation Clips or approved comparable product.
- G. Cold-Rolled Furring Channels: 0.053-inch uncoated-steel thickness, with minimum 1/2-inch- wide flanges.
 1. Depth: As indicated on Drawings.
 - 2. Furring Brackets: Adjustable, corrugated-edge-type steel sheet with minimum uncoated-steel thickness of 0.0329 inch.
 - 3. Tie Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.062-inch- diameter wire, or double strand of 0.048-inch- diameter wire.
- H. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, minimum uncoated-steel thickness of 0.0179 inch, and depth required to fit insulation thickness indicated.

2.2 SUSPENSION SYSTEMS

- A. Tie Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.062-inch- diameter wire, or double strand of 0.048-inch- diameter wire.
- B. Hanger Attachments to Concrete:
 - 1. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01, AC193, AC58 or AC308 as appropriate for the substrate.
 - a. Uses: Securing hangers to structure.
 - b. Type: Torque-controlled, expansion anchor, torque-controlled, adhesive anchor or adhesive anchor.
 - c. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B633 or ASTM F1941, Class Fe/Zn 5, unless otherwise indicated.
- C. Wire Hangers: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.16 inch in diameter.
- D. Carrying Channels (Main Runners): Cold-rolled, commercial-steel sheet with a base-steel thickness of 0.0538 inch and minimum 1/2-inch- wide flanges.
 - 1. Depth: As indicated on Drawings.
- E. Carrying Channels: 1-1/2 inch hot-rolled channels weighing 1.12 pounds per foot.
- F. Furring Channels (Furring Members):
 - 1. Cold-Rolled Channels: 0.0538-inch uncoated-steel thickness, with minimum 1/2-inch- wide flanges, 3/4 inch deep.
 - 2. Steel Studs and Tracks: ASTM C645.
 - a. Minimum Base-Steel Thickness: As indicated on Drawings.
 - b. Depth: As indicated on Drawings.
 - 3. Hat-Shaped, Rigid Furring Channels: ASTM C645, 7/8 inch deep.
 - a. Minimum Base-Steel Thickness: As indicated on Drawings.
 - 4. Resilient Furring Channels: 1/2-inch- deep members designed to reduce sound transmission.
 - a. Configuration: Asymmetrical or hat shaped.
- G. Grid Suspension System for Gypsum Board Ceilings: ASTM C645, direct-hung system composed of main beams and cross-furring members that interlock.

2.3 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards.
 - 1. Fasteners for Steel Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.
- B. Isolation Strip at Exterior Walls: Provide one of the following:
 - 1. Asphalt-Saturated Organic Felt: ASTM D226/D226M, Type I (No. 15 asphalt felt), nonperforated.
 - 2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.
 - 1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.
- B. Coordination with Sprayed Fire-Resistive Materials:
 - 1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling tracks to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches o.c.
 - 2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistive materials below that are required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

3.3 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C754.
 - 1. Gypsum Board Assemblies: Also comply with requirements in ASTM C840 that apply to framing installation.
- B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.
- C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- D. Install bracing at terminations in assemblies.
- E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.4 INSTALLING FRAMED ASSEMBLIES

- A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
- B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- C. Install studs so flanges within framing system point in same direction.
- D. Install tracks at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.
 - 1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
 - 2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install track section (for cripple studs) at head and secure to jamb studs.
 - a. Install two studs at each jamb unless otherwise indicated.
 - b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
 - c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
 - 3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.

E. Direct Furring:

- 1. Screw to wood framing.
- 2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
- F. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

3.5 INSTALLING SOUND ISOLATION CLIPS

- A. Install in locations indicated on Drawings in accordance with clip manufacturer's written instructions.
- B. Maximum Spacing of Isolation Clips: 36 inches o.c.
- C. Maximum Spacing of Furring Channels: 18 inches o.c.
- D. Seal around potential sound leaks, including gaps around outlets, window and door frames, pipe penetrations and other locations with acoustic putty pads or acoustic insulation as appropriate.

3.6 INSTALLING CEILING SUSPENSION SYSTEMS

- A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
- B. Install in accordance with DSA IR 25-3.
 - 1. Hangers: 48 inches o.c.
 - 2. Carrying Channels (Main Runners): 48 inches o.c.
 - 3. Furring Channels (Furring Members): 16 inches o.c.
- C. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.
- D. Suspend hangers from building structure as follows:
 - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
 - a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 - 2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
 - a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.
 - 3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 - 4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 - 5. Do not attach hangers to steel roof deck.
 - 6. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
 - 7. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
 - 8. Do not connect or suspend steel framing from ducts, pipes, or conduit.
- E. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.
- F. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Interior gypsum board.
 - 2. Tile backing panels.
- B. Related Requirements:
 - 1. Section 092216 "Non-Structural Metal Framing" for non-structural steel framing and suspension systems that support gypsum board panels.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.1. Review requirements for control joint locations.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For the following products:
 - 1. Trim Accessories: Full-size Sample in 12-inch- long length for each trim accessory indicated.

1.4 DELIVERY, STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.5 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C840 requirements or gypsum board manufacturer's written instructions, whichever are more stringent.
- B. Do not install panels that are wet, moisture damaged, and mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.

2.2 INTERIOR GYPSUM BOARD

- A. Gypsum Board, Type X: ASTM C1396/C1396M.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Certainteed; SAINT-GOBAIN.
 - b. Continental Building Products, LLC.
 - c. Georgia-Pacific Gypsum LLC.
 - d. National Gypsum Company.
 - e. PABCO Gypsum.
 - f. USG Corporation[; EcoSmart Panels Firecode X (Basis-of-Design].
 - 2. Thickness: 5/8 inch.
 - 3. Long Edges: Tapered Tapered and featured (rounded or beveled) for prefilling.
- B. Mold-Resistant Gypsum Board: ASTM C1396/C1396M. With moisture- and mold-resistant core and paper surfaces.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. American Gypsum.
 - b. Certainteed; SAINT-GOBAIN.

- Continental Building Products, LLC, c.
- d. Georgia-Pacific Gypsum LLC.
- National Gypsum Company. e.
- f. PABCO Gypsum.
- USG Corporation. g.
- 2. Core: 5/8 inch, Type X.
- 3. Long Edges: Tapered.
- Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274. 4

2.3 SPECIALTY GYPSUM BOARD

- Α. Glass-Mat Interior Gypsum Board: ASTM C1658/C1658M, With fiberglass mat laminated to both sides. Specifically designed for interior use.
 - Manufacturers: Subject to compliance with requirements, provide products by the following:
 - Continental Building Products, LLC. a.
 - b. Georgia-Pacific Gypsum LLC.
 - National Gypsum Company. c.
 - PABCO Gypsum. d.
 - USG Corporation. e.
 - Core: 5/8 inch, Type X.
 - 2. Long Edges: Tapered. 3
 - Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274. 4

TILE BACKING PANELS 2.4

- Α. Glass-Mat, Water-Resistant Backing Board: ASTM C1178/C1178M, with manufacturer's standard edges.
 - Manufacturers: Subject to compliance with requirements, provide products by one of the following: 1.
 - Certainteed; SAINT-GOBAIN. a.
 - Georgia-Pacific Gypsum LLC. b.
 - National Gypsum Company. c.
 - d. USG Corporation. Core: 5/8 inch, Type X.
 - 2. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274. 3

2.5 TRIM ACCESSORIES

- Α. Interior Trim: ASTM C1047.
 - 1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized-steel sheet.
 - 2. Shapes:
 - Cornerbead. a.
 - LC-Bead: J-shaped; exposed long flange receives joint compound. b.
 - L-Bead: L-shaped; exposed long flange receives joint compound. c.

2.6 JOINT TREATMENT MATERIALS

- Α. General: Comply with ASTM C475/C475M.
- Β. Joint Tape:
 - Interior Gypsum Board: Paper. 1.
 - 2. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
 - Tile Backing Panels: As recommended by panel manufacturer. 3.
- C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.
 - 1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
 - Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, 2. use compound.
 - Use setting-type compound for installing paper-faced metal trim accessories. a.
 - Fill Coat: For second coat, use setting-type, sandable topping compound.
 - 4. Finish Coat: For third coat, use setting-type, sandable topping compound.
 - 5. Skim Coat: For final coat of Level 5 finish, use high-build interior coating product designed for application by airless sprayer and to be used instead of skim coat to produce Level 5 finish.
- D. Joint Compound for Backing Panels:
 - Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer. 1.

3.

2.7 AUXILIARY MATERIALS

- A. Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.
- B. Steel Drill Screws: ASTM C1002 unless otherwise indicated.
 - 1. Use screws complying with ASTM C954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
 - 2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
- C. Sound-Attenuation Blankets: ASTM C665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
- D. Sound-Attenuation Boards: ASTM C612, Types IA, IB, unfaced, 3 pcf semi-rigid board produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
- E. Acoustical Sealant: As specified in Section 079219 "Acoustical Joint Sealants."
- F. Firestop Putty Pads for Electrical Boxes: Listed intumescent moldable firestop putty pads. Product: Subject to compliance with requirements, provide one of the following:
 - 1. Hilti Corporation; CP 617 6" x 7" Putty Pad or CP 617L 7" x 7" Putty Pad.
 - 2. Kinetics Noise Control; IsoBacker.
 - 3. RectorSeal Firestop Solutions
 - 4. Specified Technologies Inc. (STI); SpecSeal Series SSP Putty Pad.
- G. Acoustic Putty Pads for Electrical Boxes: Asbestos-free, putty pads composed of polybutene-butyl and inert fillers. Subject to compliance with requirements, provide one of the following:
 - 1. Kinetics Noise Control; IsoBacker.
 - 2. QuietRock; QuietPutty.
 - 3. RectorSeal Firestop Solutions; Metacaulk Putty
 - 4. Specified Technologies Inc. (STI); SpecSeal Series SSP Putty Pad.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates including welded hollow-metal frames and support framing, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION AND FINISHING OF PANELS, GENERAL

- A. Comply with ASTM C840.
- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.
- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- E. Form control and expansion joints with space between edges of adjoining gypsum panels.
- F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
 - 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
 - 2. Fit gypsum panels around ducts, pipes, and conduits.
 - 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.

- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch- wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- I. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C919 and with manufacturer's written instructions for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.
- J. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 INSTALLATION OF INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:
 - 1. Wallboard Type: Vertical surfaces unless otherwise indicated.
 - 2. Ceiling Type: Ceiling surfaces.
 - 3. Mold-Resistant Type: Vertical and horizontal surfaces unless indicated otherwise.
 - 4. Glass-Mat Interior Type: [As indicated on Drawings][and where gypsum board must be installed prior to building being enclosed and conditioned] <Insert requirements>.
- B. Single-Layer Application:
 - 1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
 - On partitions/walls, apply gypsum panels vertically (parallel to framing) or horizontally (perpendicular to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
 - 3. On Z-shaped furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
 - 4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.
- C. Multilayer Application:
 - 1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
 - 2. On Z-shaped furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.

3.4 INSTALLATION OF TILE BACKING PANELS

- A. Glass-Mat, Water-Resistant Backing Panels: Comply with manufacturer's written installation instructions and install at non-wet locations indicated to receive tile or other indicated finish materials. Install with 1/4-inch gap where panels abut other construction or penetrations.
- B. Where backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.5 INSTALLATION OF TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Install control joints according to ASTM C 840, including compliance with ASTM 20.3.1 -20.4 for control joint spacing, whether or not such joints are indicated on Drawings, in specific locations approved by Architect for visual effect and as follows.
 - 1. Install at changes in backup material.
 - 2. Framed Openings (Both Sides of Partition):
 - a. Doors: Install above both jambs unless indicated or directed otherwise.

- b. Glazed Openings: Install above and below both jambs unless indicated or directed otherwise.
- 3. Install at other locations indicated on Drawings.
- C. Interior Trim: Install in the following locations:
 - 1. Cornerbead: Use at outside corners unless otherwise indicated.
 - 2. LC-Bead: Use at exposed panel edges.
 - 3. L-Bead: Use where indicated on Drawings.
- D. Aluminum Trim: Install in locations indicated on Drawings.
- E. Firestop Putty Pads: Install at power, audio/visual, data, light and similar boxes located in fire-rated partitions. Install in accordance with pad manufacturer's instructions.
- F. Acoustic Putty Pads: Install at power, audio/visual, data, light and similar boxes located in acoustic-rated partitions. Install in accordance with pad manufacturer's instructions.

3.6 FINISHING OF GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints, rounded or beveled edges, and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C840:
 - 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
 - 2. Level 2: Panels that are substrate for tile.
 - 3. Level 3: Panels that are substrate for medium- or heavy-texture finishes or for heavy grade wall coverings.
 - 4. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated .
 - a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."
 5. Level 5: At panel surfaces scheduled to receive gloss or semigloss paint finish and other surfaces
 - subject to severe or critical natural or artificial side lighting as indicated on Drawings . a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."
- E. Glass-Mat Faced Panels: Finish according to manufacturer's written instructions.

3.7 PROTECTION

- A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
- B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

SECTION 093013 - CERAMIC TILING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Ceramic tile.
 - 2. Porcelain tile.
 - 3. Metal edge strips.

B. Related Requirements:

- 1. Section 079200 "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.
- 2. Section 092900 "Gypsum Board" for glass-mat, water-resistant backer board

1.3 DEFINITIONS

- A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.
- B. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are contained in its "Specifications for Installation of Ceramic Tile."
- C. Face Size: Actual tile size, excluding spacer lugs.
- D. Large Format Tile: Tile with a face dimension of 15 inches or more in either direction.
- E. Module Size: Actual tile size plus joint width indicated.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review requirements in ANSI A108.01 for substrates and for preparation by other trades.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.
- C. Samples for Verification:
 - 1. Full-size units of each type and composition of tile and for each color and finish required.
 - 2. Assembled samples mounted on a rigid panel, with grouted joints, for each type and composition of tile and for each color and finish required. Make samples at least 12 inches square , but not fewer than four tiles. Use grout of type and in color or colors approved for completed Work.
 - Full-size units of each type of trim and accessory for each color and finish required.
 - 4. Metal edge strips in 6-inch lengths.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.
 - 2. Grout: Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications:Comply with at least one of the following:
 - 1. Installer is a Five-Star member of the National Tile Contractors Association or a Trowel of Excellence member of the Tile Contractors' Association of America.

- 2. Installer's supervisor for Project holds the International Masonry Institute's Foreman Certification.
- 3. Installer employs only Ceramic Tile Education Foundation Certified Installers or installers recognized by the U.S. Department of Labor as Journeyman Tile Layers for Project.
- 4. Installer employs at least one installer for Project that has completed the Advanced Certification for Tile Installers (ACT) certification for installation of membranes and large format tile.
- B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Build mockup of floor tile installation.
 - 2. Build mockup of wall tile installation.
- C. Provide the following upon request:
 - 1. Qualification Data: For Installer.
 - 2. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer.
 - 3. Product Certificates: For each type of product.
 - 4. Product Test Reports: For tile-setting and -grouting products[and certified porcelain tile].
- D. Minimizing Tile Lippage: Tile greater than 12 inches in either dimension shall be installed with a leveling system designed to control lippage and other related installation control activities. Refer to ANSI A108.03; Section 4.3.7.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.
- B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.
- D. Store liquid materials in unopened containers and protected from freezing.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Tile: Obtain tile of each type and color or finish from single source or producer.
 1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.

2.2 PRODUCTS, GENERAL

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.
 - 1. Provide tile complying with Standard grade requirements unless otherwise indicated.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.
- C. Dynamic Coefficient of Friction: Provide tile installed on walkway surfaces with dynamic coefficient of friction indicated as determined by testing identical products per ANSI A137.1 DCOF AcuTest procedure.
 1. Dynamic Coefficient of Friction: Not less than 0.42.
- D. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.
- E. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer unless otherwise indicated.

1. Where tile is indicated for installation in wet areas, do not use back- or edge-mounted tile assemblies unless tile manufacturer specifies in writing that this type of mounting is suitable for installation indicated and has a record of successful in-service performance.

2.3 TILE BACKING PRODUCTS

- A. Ceramic and Porcelain Tile Type (TL-1) and (TL-2):
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to those indicated in the Finish Schedule

2.4 TILE BACKING PANELS

A. Tile Backing Panels: Specified in Section 092900 "Gypsum Board."

2.5 CRACK ISOLATION MEMBRANE

- A. General: Manufacturer's standard product, selected from the following, that complies with ANSI A118.12 for standard performance and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.
- B. Crack Isolation Membrane and Tile-Setting Adhesive: One-part, fluid-applied product intended for use as both a crack isolation membrane and tile-setting adhesive in a two-step process.
 - Manufacturers: Subject to compliance with requirements, provide products by one of the following: a. Boiardi Products Corporation; a QEP company.
 - b. Bostik, Inc.
 - 2. Adhesives shall have a VOC content of 65 g/L or less.

2.6 SETTING MATERIALS

1.

- A. Medium-Bed, Modified Dry-Set Mortar: Comply with requirements in ANSI A118.4. Provide product that is approved by manufacturer for application thickness of 5/8 inch.
- B. Improved Modified Dry-Set Mortar (Thinset): ANSI A118.15.
 - 1. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.15.

2.7 GROUT MATERIALS

1.

A. Water-Cleanable Epoxy Grout: ANSI A118.3, with a VOC content of 65 g/L or less.

2.8 MISCELLANEOUS MATERIALS

- A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
- B. Metal Edge Strips: Angle or L-shaped, height to match tile and setting-bed thickness.
 - Manufacturers: Subject to compliance with requirements, provide products by one of the following: a. Blanke Corporation.
 - b. Ceramic Tool Company, Inc.
 - c. Schluter Systems L.P.
- C. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

2.9 MIXING MORTARS AND GROUT

- A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.
- B. Add materials, water, and additives in accurate proportions.
- C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 - 1. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
 - 2. Verify that concrete substrates for tile floors installed with thinset mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.
 - a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
 - b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.
 - 3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
 - 4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thinset mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.
- B. Where indicated, prepare substrates to receive waterproof membrane by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot toward drains.
- C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 INSTALLATION OF CERAMIC TILE

- A. Comply with TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.
 - 1. For the following installations, follow procedures in the ANSI A108 series of tile installation standards for providing 95 percent mortar coverage:
 - a. Tile floors consisting of tiles 8 by 8 inches or larger.
 - b. Tile floors consisting of rib-backed tiles.
- B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.
- E. Where accent tile differs in thickness from field tile, vary setting-bed thickness so that tiles are flush.
- F. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.
 - 1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
 - 2. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
 - 3. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.

- G. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.
- H. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
 - 1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.
- I. Metal Edge Strips: Install at locations indicated.

3.4 INSTALLATION OF CRACK ISOLATION MEMBRANE

- A. Install crack isolation membrane to comply with ANSI A108.17 and manufacturer's written instructions to produce membrane of uniform thickness that is bonded securely to substrate.
- B. Allow crack isolation membrane to cure before installing tile or setting materials over it.

3.5 ADJUSTING AND CLEANING

- A. Remove and replace tile that is damaged or that does not match adjoining tile. Provide new matching units, installed as specified and in a manner to eliminate evidence of replacement.
- B. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
 - 1. Remove grout residue from tile as soon as possible.
 - 2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

3.6 PROTECTION

a.

- A. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.
- B. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.
- C. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

3.7 INTERIOR CERAMIC TILE INSTALLATION SCHEDULE

- A. Interior Floor Installations, Concrete Subfloor:
 - 1. Porcelain Tile Installation (TL-1): TCNA F125-Full; thinset mortar on crack isolation membrane.
 - Thinset Mortar: Improved modified dry- mortar.
 - 1) Use medium-bed, modified dry-set mortar at large format tile if recommended by tile manufacturer.
 - b. Grout: Water-cleanable epoxy.
- B. Interior Wall Installations, Metal Studs or Furring:
 - Ceramic Tile Installation (TL-2): TCNA W245 or TCNA W248; thinset mortar on glass-mat, water-resistant gypsum backer board.
 - a. Thinset Mortar: Improved modified dry-set mortar.
 - b. Grout: Water-cleanable epoxy.

SECTION 095113 - ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes acoustical panels and exposed suspension systems for interior ceilings.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For acoustical panel ceilings.
 - 1. Include reflected ceiling plans, sections, and details, drawn to scale, showing the following:
 - a. Ceiling patterns and joints.
 - b. Ceiling suspension members.
 - c. Method of attaching hangers to building structure and locations of cast-in-place anchors,
 - clips, and other ceiling attachment devices whose installation is specified in other Sections.
 Ceiling-mounted items including, but not limited to, light fixtures, diffusers, grilles, speakers,
 - sprinklers, and access panels.
 - e. Ceiling perimeter and penetrations through ceiling; trim and moldings.
- C. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of sizes indicated below:
 - 1. Acoustical Panels: Set of 6-inch- square Samples of each type, color, pattern, and texture.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For finishes to include in maintenance manuals.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Acoustical Ceiling Units: Full-size panels equal to 2 percent of quantity installed.
 - 2. Suspension-System Components: Quantity of each exposed component equal to 2 percent of quantity installed.

1.6 QUALITY ASSURANCE

- A. Provide the following upon request:
 - 1. Product Test Reports: For each acoustical panel ceiling, for tests performed by manufacturer and witnessed by a qualified testing agency.
 - 2. Evaluation Reports: For each acoustical panel ceiling suspension system and anchor and fastener type, from ICC-ES.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical panels, suspension-system components, and accessories to Project site and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
 - 1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical panel ceiling installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain each type of acoustical ceiling panel and its supporting suspension system from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: Class A according to ASTM E 1264.
 - 2. Smoke-Developed Index: 50 or less.

2.3 ACOUSTICAL PANELS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Armstrong World Industries, Inc.
 - 2. CertainTeed Corporation.
 - 3. Chicago Metallic Corporation.
 - 4. United States Gypsum Company.
- B. Basis-of-Design Products: As scheduled; refer to Finish Schedule.
- C. Acoustical Panel Standard: Provide manufacturer's standard panels according to ASTM E 1264 and designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.
- D. Acoustical Panel Ceiling Type (ACT-1):
 - 1. Basis-of-Design Product:
 - a. Acoustical Panel Ceiling: As scheduled, see room finish schedule .
 - b. Metal Suspension System: As scheduled, see room finish schedule .
 - 2. Classification: Provide panels as follows:
 - a. Pattern: D (fine fissured).
 - 3. Color: As indicated on Drawings.
 - 4. Ceiling Attenuation Class (CAC): Not less than 35.
 - 5. Noise Reduction Coefficient (NRC): Not less than 0.70.
 - 6. Edge/Joint Detail: Square.
 - 7. Thickness: 3/4 inch .
 - 8. Modular Size: 24 by 24 inches .

2.4 METAL SUSPENSION SYSTEM

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Armstrong World Industries, Inc.
 - 2. CertainTeed Corporation.
 - 3. Chicago Metallic Corporation.
 - 4. United States Gypsum Company.
- B. Metal Suspension-System Standard: Provide manufacturer's standard, direct-hung, metal suspension system and accessories according to ASTM C 635/C 635M and designated by type, structural classification, and finish indicated.
- C. Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip galvanized, G30 coating designation; with prefinished 15/16-inch- wide metal caps on flanges.
 - 1. Structural Classification: Intermediate -duty system.
 - 2. End Condition of Cross Runners: Override (stepped) or butt-edge type.
 - 3. Face Design: Flat, flush.
 - 4. Cap Material: Cold-rolled steel or aluminum.
 - 5. Cap Finish: Painted to match color of acoustical unit.

2.5 ACCESSORIES

A. Attachment Devices: Size for five times the design load indicated in ASTM C 635/C 635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

- Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing according to ASTM E 488/E 488M or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency.
 - a. Type: Postinstalled expansion or Postinstalled bonded anchors.
 - b. Corrosion Protection: Components fabricated from nickel-copper-alloy rods complying with ASTM B 164 for UNS No. N04400 alloy.
- B. Wire Hangers, Braces, and Ties: Provide wires as follows:
 - 1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
 - Size: Wire diameter sufficient for its stress at three times hanger design load (ASTM C 635/C 635M, Table 1, "Direct Hung") will be less than yield stress of wire, but not less than 0.106-inch- diameter wire.
 - 3. Armstrong World Industries, Inc.
 - 4. CertainTeed Corporation.
 - 5. Chicago Metallic Corporation.
 - 6. Fry Reglet Corporation.

2.6 ACOUSTICAL SEALANT

A. Acoustical Sealant: As specified in Section 079219 "Acoustical Joint Sealants".

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.
- B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders unless otherwise indicated, and comply with layout shown on reflected ceiling plans.
- B. Layout openings for penetrations centered on the penetrating items.

3.3 INSTALLATION

- A. Install acoustical panel ceilings according to ASTM C 636/C 636M and manufacturer's written instructions.
- B. Suspend ceiling hangers from building's structural members and as follows:
 - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
 - 2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 - 3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
 - 4. Secure wire hangers to ceiling-suspension members and to supports above with a minimum of three tight turns. Connect hangers directly to structure or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.

- 5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both the structure to which hangers are attached and the type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
- 6. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
- 7. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
- 8. Do not attach hangers to steel deck tabs.
- 9. Do not attach hangers to steel roof deck. Attach hangers to structural members.
- 10. Space hangers not more than 48 inches o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
- 11. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
- C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.
- D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
 - 1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
 - 2. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends. Miter corners accurately and connect securely.
 - 3. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- E. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- F. Install acoustical panels with undamaged edges and fit accurately into suspension-system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide precise fit.
 - 1. Arrange directionally patterned acoustical panels as follows:
 - a. As indicated on reflected ceiling plans.
 - 2. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension-system runners and moldings.
 - 3. For reveal-edged panels on suspension-system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
 - 4. Paint cut edges of panel remaining exposed after installation; match color of exposed panel
 - surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.
 Protect lighting fixtures and air ducts according to requirements indicated for fire-resistance-rated assembly.

3.4 ERECTION TOLERANCES

- A. Suspended Ceilings: Install main and cross runners level to a tolerance of 1/8 inch in 12 feet, non-cumulative.
- B. Moldings and Trim: Install moldings and trim to substrate and level with ceiling suspension system to a tolerance of 1/8 inch in 12 feet, non-cumulative.

3.5 CLEANING

- A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension-system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage.
- B. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

SECTION 096513 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Resilient base.
 - 2. Resilient molding accessories.
- B. Related Requirements:
 1. Section 090561.13 "Moisture Vapor Emission Control."

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified, not less than 12 inches long.
- C. Product Schedule: For resilient base and accessory products. Use same designations indicated on Drawings.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

1.6 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive resilient products during the following time periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 VINYL BASE (RB-1)

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Armstrong World Industries, Inc.
 - 2. Burke Mercer Flooring Products, Division of Burke Industries Inc.
 - 3. Flexco.
 - 4. Johnsonite; A Tarkett Company (Basis-of-Design).
 - 5. Roppe Corporation, USA.
 - 6. VPI, LLC, Floor Products Division.
- B. Product Standard: ASTM F 1861, Type TV (vinyl).
 - 1. Style and Location: As scheduled, see Finish Schedule
- C. Height: As indicated on Drawings.

- D. Outside Corners: Job formed.
- E. Inside Corners: Job formed.
- F. Colors and Patterns: As indicated by manufacturer's designations, see Finish Schedule .

2.2 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
 - 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
 1. Installation of resilient products indicates acceptance of surfaces and conditions.

3.2 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.
- F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
- G. Preformed Corners: Install preformed corners before installing straight pieces.
- H. Job-Formed Corners:

2.

- 1. Outside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.
 - a. Form without producing discoloration (whitening) at bends.
 - Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.
 - a. Miter corners to minimize open joints.

3.3 RESILIENT ACCESSORY INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient accessories.
- B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor covering that would otherwise be exposed.

3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.
- B. Perform the following operations immediately after completing resilient-product installation:
 - 1. Remove adhesive and other blemishes from exposed surfaces.
 - 2. Sweep and vacuum horizontal surfaces thoroughly.
 - 3. Damp-mop horizontal surfaces to remove marks and soil.
- C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Cover resilient products subject to wear and foot traffic until Substantial Completion.

SECTION 096519 - RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Solid vinyl floor tile.
- B. Related Requirements:
 - 1. Section 090561.13 "Moisture Vapor Emission Control."
 - 2. Section 096513 "Resilient Base and Accessories" for resilient base, reducer strips, and other accessories installed with resilient floor coverings.

1.3 ACTION SUBMITTALS

- A. Submittal Compliance Form: If Basis-of-Design products are provided, Submittal Compliance Form may be submitted in lieu of required Product Data submittal and Samples submittal. Ensure compliance with requirements included in Section 090413 "Common Submittal Requirements for Finishes."
- B. Shop Drawings: For each type of floor tile. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.

1.4 INFORMATIONAL SUBMITTALS

A. Certifications: Submit a certification signed by the manufacturer and installerstating that the resilient flooring has been installed as specified and in accordance with fire-test response characteristics.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of floor tile to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Floor Tile: Furnish one box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor tile installation and seaming method indicated.
 - 1. Engage an installer who employs workers for this Project who are trained or certified by floor tile manufacturer for installation techniques required.
- B. Provide the following upon request:
 - 1. Qualification Data: For Installer.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F. Store floor tiles on flat surfaces.

1.9 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive floor tile during the following time periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.

- C. Close spaces to traffic during floor tile installation.
- D. Close spaces to traffic for 48 hours after floor tile installation.
- E. Install floor tile after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For resilient tile flooring, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
 - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

2.2 SOLID VINYL FLOOR TILE (LVT-1)

- A. Basis-of-Design Products: As scheduled; refer to Finish Schedule.
- B. Colors and Patterns: As indicated by manufacturer's designations.

2.3 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by floor tile manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
 - 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates: Prepare according to ASTM F 710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor tile manufacturer. Do not use solvents.
 - 3. Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
 - 4. Moisture Testing: Proceed with installation only after substrates pass testing according to floor tile manufacturer's written recommendations, but not less stringent than the following:
 - a. Perform anhydrous calcium chloride test according to ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
 - b. Perform relative humidity test using in situ probes according to ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level.
 - 5. If water moisture tests exceed stated limits, apply vapor retarder for moisture vapor emission control as specified in Section 090561.13.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install floor tiles until they are the same temperature as the space where they are to be installed.
 - 1. At least 48 hours in advance of installation, move resilient floor tile and installation materials into spaces where they will be installed.

E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

3.3 FLOOR TILE INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor tile.
- B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
 - 1. Lay tiles in pattern indicated.
- Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
 Lay tiles in pattern of colors and sizes indicated.
- D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.
- G. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting floor tile.
- B. Perform the following operations immediately after completing floor tile installation:
 - 1. Remove adhesive and other blemishes from exposed surfaces.
 - 2. Sweep and vacuum surfaces thoroughly.
 - 3. Damp-mop surfaces to remove marks and soil.
- C. Protect floor tile from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Cover floor tile until Substantial Completion.

SECTION 096813 - TILE CARPETING

PART1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Modular carpet tile.
- B. Related Requirements:
 - 1. Section 024119 "Selective Demolition" for removing existing floor coverings.
 - 2. Section 090561.13 "Moisture Vapor Emission Control."
 - 3. Section 096513 "Resilient Base and Accessories" for resilient wall base and accessories installed with carpet tile.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to carpet tile installation including, but not limited to, the following:
 - a. Review delivery, storage, and handling procedures.
 - b. Review ambient conditions and ventilation procedures.
 - c. Review subfloor preparation procedures.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
 - 2. Include manufacturer's written installation recommendations for each type of substrate.
- B. Shop Drawings: For carpet tile installation, plans showing the following:
 - 1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
 - 2. Carpet tile type, color, and dye lot.
 - 3. Type of subfloor.
 - 4. Type of installation.
 - 5. Pattern of installation.
 - 6. Pattern type, location, and direction.
 - 7. Pile direction.
 - 8. Type, color, and location of insets and borders.
 - 9. Type, color, and location of edge, transition, and other accessory strips.
 - 10. Transition details to other flooring materials.
- C. Samples for Verification: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.
 - 1. Carpet Tile: Full-size Sample.
 - 2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch- long Samples.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:
 - 1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
 - 2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Carpet Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is certified by the International Certified Floorcovering Installers Association at the Commercial II or Master II certification level.
- B. Provide the following upon request:
 - 1. Qualification Data: For Installer.
 - 2. Product Test Reports: For carpet tile, for tests performed by a qualified testing agency.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Comply with the Carpet and Rug Institute's CRI 104.

1.9 FIELD CONDITIONS

- A. Comply with the Carpet and Rug Institute's CRI 104 for temperature, humidity, and ventilation limitations.
- B. Environmental Limitations: Do not deliver or install carpet tiles until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at levels planned for building occupants during the remainder of the construction period.
- C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.
- D. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

1.10 WARRANTY

- A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.
 - 1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
 - 2. Failures include, but are not limited to, the following:
 - a. More than 10 percent edge raveling, snags, and runs.
 - b. Dimensional instability.
 - c. Excess static discharge.
 - d. Loss of tuft-bind strength.
 - e. Loss of face fiber.
 - f. Delamination.
 - 3. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CARPET TILE (CPT-2)

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, those indicated in the Finish Legend:

2.2 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.
- B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that comply with flammability requirements for installed carpet tile, and are recommended by carpet tile manufacturer for releasable installation.
 - 1. Adhesives shall have a VOC content of 50 g/L or less.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance.
- B. Examine carpet tile for type, color, pattern, and potential defects.

- C. Concrete Slabs: Verify that finishes comply with requirements specified in Section 033000 "Cast-in-Place Concrete" and that surfaces are free of cracks, ridges, depressions, scale, and foreign deposits.
 - 1. Moisture Testing: Perform tests so that each test area does not exceed 1000 sq. ft., and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
 - a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
 - b. Relative Humidity Test: Using in situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
 - c. Perform additional moisture tests recommended in writing by adhesive and carpet tile manufacturers. Proceed with installation only after substrates pass testing.
 - d. If water moisture tests exceed stated limits, apply vapor retarder for moisture vapor emission control as specified in Section 090561.13.

3.2 PREPARATION

- A. General: Comply with the Carpet and Rug Institute's CRI 104 and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile.
- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch wide or wider, and protrusions more than 1/32 inch unless more stringent requirements are required by manufacturer's written instructions.
- C. Concrete Substrates: Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by adhesive and carpet tile manufacturers.
- D. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.3 INSTALLATION

- A. General: Comply with the Carpet and Rug Institute's CRI 104, Section 10, "Carpet Tile," and with carpet tile manufacturer's written installation instructions.
- B. Installation Method: As recommended in writing by carpet tile manufacturer.
- C. Maintain dye-lot integrity. Do not mix dye lots in same area.
- D. Maintain pile-direction patterns recommended in writing by carpet tile manufacturer.
- E. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.
- F. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- G. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on carpet tile as marked on subfloor. Use nonpermanent, nonstaining marking device.
- H. Install pattern parallel to walls and borders.

3.4 CLEANING AND PROTECTION

- A. Perform the following operations immediately after installing carpet tile:
 - 1. Remove excess adhesive and other surface blemishes using cleaner recommended by carpet tile manufacturer.
 - 2. Remove yarns that protrude from carpet tile surface.
 - 3. Vacuum carpet tile using commercial machine with face-beater element.
- B. Protect installed carpet tile to comply with the Carpet and Rug Institute's CRI 104, Section 13.7.
- C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

SECTION 096816 - SHEET CARPETING

PART1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Broadloom carpet.
- B. Related Requirements:
 - 1. Section 096513 "Resilient Base and Accessories" for resilient wall base and accessories installed with carpet.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include manufacturer's written data on physical characteristics and durability.
 - 2. Include manufacturer's written installation recommendations for each type of substrate.
- B. Shop Drawings: For carpet installation, showing the following:
 - 1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet.
 - 2. Carpet type, color, and dye lot.
 - 3. Seam locations, types, and methods.
 - 4. Type of subfloor.
 - 5. Type of installation.
 - 6. Pattern type, repeat size, location, direction, and starting point.
 - 7. Pile direction.
 - 8. Types, colors, and locations of edge, transition, and other accessory strips.
 - 9. Transition details to other flooring materials.
- C. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.
 - 1. Carpet: 12-inch- square Sample.
 - 2. Carpet Seam: 6-inch Sample.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For carpet to include in maintenance manuals. Include the following:
 - 1. Methods for maintaining carpet, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
 - 2. Precautions for cleaning materials and methods that could be detrimental to carpet.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Carpet: Full-width rolls equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd..

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is certified by the International Certified Floorcovering Installers Association at the Commercial II or Master II certification level.
- B. Provide the following upon request:
 - 1. Qualification Data: For Installer.
 - 2. Product Test Reports: For carpet, for tests performed by a qualified testing agency.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Comply with the Carpet and Rug Institute's CRI 104.

Β. Deliver carpet in original mill protective covering with mill register numbers and tags attached.

FIELD CONDITIONS 1.8

- Comply with the Carpet and Rug Institute's CRI 104 for temperature, humidity, and ventilation limitations. Α.
- Environmental Limitations: Do not deliver or install carpet until spaces are enclosed and weathertight. Β. wet-work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at levels planned for building occupants during the remainder of the construction period.
- C. Do not install carpet over concrete slabs until slabs have cured, are sufficiently dry to bond with adhesive, and have pH range recommended by carpet manufacturer.
- D. Where demountable partitions or other items are indicated for installation on top of carpet, install carpet before installing these items.

1.9 WARRANTY

- Α. Special Warranty for Carpet: Manufacturer agrees to repair or replace components of carpet installation that fail in materials or workmanship within specified warranty period.
 - Warranty does not include deterioration or failure of carpet due to unusual traffic, failure of 1. substrate, vandalism, or abuse. 2.
 - Failures include, but are not limited to, the following:
 - More than 10 percent loss of face fiber, edge raveling, snags, and runs. a.
 - Loss of tuft bind strength. b.
 - Excess static discharge. C.
 - d. Delamination.
 - 3. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 **BROADLOOM CARPET (CPT-1)**

Α. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to those indicated in the Finish Legend.

INSTALLATION ACCESSORIES 2.2

- Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation Α. provided or recommended by carpet manufacturer.
- Β. Seam Adhesive: Hot-melt adhesive tape or similar product recommended by carpet manufacturer for sealing and taping seams and butting cut edges at backing to form secure seams and to prevent pile loss at seams.

PART 3 - EXECUTION

EXAMINATION 3.1

- Α. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet performance.
- Β. Examine carpet for type, color, pattern, and potential defects.
- Concrete Slabs: Verify that finishes comply with requirements specified in Section 033000 "Cast-in-Place C. Concrete" and that surfaces are free of cracks, ridges, depressions, scale, and foreign deposits.
 - Moisture Testing: Perform tests so that each test area does not exceed 1000 sq. ft., and perform 1. no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
 - Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after a. substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours
 - Relative Humidity Test: Using in situ probes, ASTM F2170. Proceed with installation only b. after substrates have a maximum 75 percent relative humidity level measurement.
 - Perform additional moisture tests recommended in writing by adhesive and carpet c. manufacturers. Proceed with installation only after substrates pass testing.
 - If water moisture tests exceed stated limits, apply vapor retarder for moisture vapor d. emission control as specified in Section 090561.13.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. General: Comply with the Carpet and Rug Institute's CRI 104 and with carpet manufacturer's written installation instructions for preparing substrates.
- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch wide or wider, and protrusions more than 1/32 inch, unless more stringent requirements are required by manufacturer's written instructions.
- C. Concrete Substrates: Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by adhesive and carpet manufacturers.
- D. Broom and vacuum clean substrates to be covered immediately before installing carpet.

3.3 INSTALLATION

- A. Comply with the Carpet and Rug Institute's CRI 104 and carpet manufacturer's written installation instructions for the following:
 - 1. Direct-glue-down installation.
 - 2. Stair installation.
- B. Comply with carpet manufacturer's written instructions and Shop Drawings for seam locations and direction of carpet; maintain uniformity of carpet direction and lay of pile. At doorways, center seams under the door in closed position.
- C. Do not bridge building expansion joints with carpet.
- D. Cut and fit carpet to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet manufacturer.
- E. Extend carpet into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on carpet as marked on subfloor. Use nonpermanent, nonstaining marking device.

3.4 CLEANING AND PROTECTION

- A. Perform the following operations immediately after installing carpet:
 - 1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet manufacturer.
 - 2. Remove yarns that protrude from carpet surface.
 - 3. Vacuum carpet using commercial machine with face-beater element.
- B. Protect installed carpet to comply with the Carpet and Rug Institute's CRI 104.
- C. Protect carpet against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods recommended in writing by carpet manufacturer and carpet adhesive manufacturer.

SECTION 098433 - SOUND-ABSORBING AND DIFFUSING WALL UNITS

PART1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes shop-fabricated, acoustical panel units tested for acoustical performance, including the following:
 - 1. Sound-absorbing wall panels.
 - 2. Sound-diffusing wall panels.

1.3 DEFINITIONS

A. NRC: Noise Reduction Coefficient.

1.4 ACTION SUBMITTALS

- A. Submittal Compliance Form: If Basis-of-Design products are provided, Submittal Compliance Form may be submitted in lieu of required Product Data submittal. Ensure compliance with requirements included in Section 090413 "Common Submittal Requirements for Finishes."
- B. Product Data: For each type of product.
 - 1. Include fabric facing, panel edge, core material, and mounting indicated.
- C. Shop Drawings: For unit assembly and installation.
 - 1. Include plans, elevations, sections, and mounting devices and details.
 - 2. Include details at panel head, base, joints, and corners; and details at ceiling, floor base, and wall intersections. Indicate panel edge profile and core materials.
 - 3. Include details at cutouts and penetrations for other work.
 - 4. Include direction of fabric weave and pattern matching.
- D. Samples for Initial Selection: For each type of fabric facing.
 - 1. Include Samples of hardware and accessories involving color or finish selection.
- E. Samples for Verification: For the following products:
 - 1. Fabric: Full-width by approximately 36-inch- long Sample, but not smaller than required to show complete pattern repeat, from dye lot to be used for the Work, and with specified treatments applied. Mark top and face of fabric.
 - 2. Panel Edge: 12-inch- long Sample(s) showing each edge profile, corner, and finish.
 - 3. Core Material: 12-inch- square Sample at corner.
 - 4. Mounting Devices: Full-size Samples.
 - 5. Assembled Panels: Approximately 36 by 36 inches, including joints and mounting methods.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Elevations and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 - 1. Electrical outlets, switches, and thermostats.
 - 2. Items penetrating or covered by units including the following:
 - a. Lighting fixtures.
 - b. Air outlets and inlets.
 - c. Speakers.
 - d. Alarms.
 - e. Sprinklers.
 - 3. Show operation of hinged and sliding components covered by or adjacent to units.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of unit to include in maintenance manuals. Include fabric manufacturers' written cleaning and stain-removal instructions.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials from same production run that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Fabric: For each fabric, color, and pattern installed, provide length equal to 10 percent of amount installed, but no fewer than 10 sq. yd., full width of bolt.
 - 2. Mounting Devices: Full-size units equal to 5 percent of amount installed, but no fewer than five devices, including unopened adhesives.

1.8 QUALITY ASSURANCE

- A. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials, fabrication, and installation.
 - 1. Build mockups of size and in locations as directed by Architect.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Comply with fabric and unit manufacturers' written instructions for minimum and maximum temperature and humidity requirements for shipment, storage, and handling.
- B. Deliver materials and units in unopened bundles and store in a temperature-controlled dry place with adequate air circulation.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Do not install units until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work at and above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Lighting: Do not install units until a permanent level of lighting is provided on surfaces to receive the units.
- C. Air-Quality Limitations: Protect units from exposure to airborne odors, such as tobacco smoke, and install units under conditions free from odor contamination of ambient air.
- D. Field Measurements: Verify unit locations and actual dimensions of openings and penetrations by field measurements before fabrication, and indicate them on Shop Drawings.

1.11 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace units and components that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to the following:
 - a. Acoustical performance.
 - b. Fabric sagging, distorting, or releasing from panel edge.
 - c. Warping of core.
 - 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

1.

2.1 MANUFACTURERS

A. Source Limitations: Obtain wall units specified in this Section from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: Units shall comply with "Surface-Burning Characteristics" or "Fire Growth Contribution" Subparagraph below, or both, as determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - Surface-Burning Characteristics: Comply with ASTM E 84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 450 or less.

2.3 SOUND-ABSORBING WALL UNITS

- Α. Sound-Absorbing Wall Panel (Type H): Manufacturer's standard panel construction consisting of facing material stretched over front face of edge-framed core and bonded or attached to edges and back of frame.
 - Manufacturers: Subject to compliance with requirements, provide products by one of the following: 1.
 - RPG Acoustical Systems, Modex Plate (Basis-of-Design). a.
 - Acoustics First Corporation b.
 - Acoustical Panel Systems (APS, Inc.). C.
 - d. Acoustical Solutions, Inc.
 - e. Golterman & Sabo.
 - Wenger Corporation. f.
 - 2. Panel Shape: Flat.
 - Mounting: Back mounted with manufacturer's standard wall cleats, secured to substrate. 3.
 - 4. Core: Manufacturer's standard open weave, Class A, polyester .
 - Core-Face Layer: Manufacturer's standard .
 - 5. Edge Construction: Manufacturer's standard .
 - Edge Profile: Square. 6.
 - 7. Corner Detail in Elevation: Square with continuous edge profile indicated.
 - Reveals between Panels: as indicated on Drawings. 8
 - Facing Material: Acoustic fabric wrap. As indicated on Drawings. 9.
 - Acoustical Performance: Sound absorption NRC of 0.65 to 0.75 according to ASTM C 423 for 10. Type A mounting according to ASTM E 795.
 - 11. Nominal Overall Panel Thickness: 6 inches .
 - 12. Panel Width: 33-1/4 inches.
 - 13. Panel Height: 49-1/4 inches.
- В. Sound-Absorbing Wall Panel (Type G): Manufacturer's standard panel construction consisting of facing material stretched over front face of edge-framed core and bonded or attached to edges and back of frame.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following: Armstrong World Industries; Soundsoak 85. а
 - Golterman & Sabo; Acousti-Panels (Basis-of-Design). b.
 - Kinetics Noise Control: Hardside C.
 - 2. Panel Shape: Flat.
 - Mounting: Back mounted with manufacturer's standard wall cleats, secured to substrate. 3.
 - Core: Glass-fiber board; 6 to 7 pcf density . 4.
 - Core-Face Layer: Manufacturer's standard . a.
 - 5. Edge Construction: Manufacturer's standard chemically hardened edges .
 - Edge Profile: Square. 6.
 - Corner Detail in Elevation: Square with continuous edge profile indicated. 7.
 - Reveals between Panels: Projecting as indicated on Drawings. 8.
 - Facing Material: Acoustic fabric wrap, As indicated on Drawings. 9.
 - 10. Acoustical Performance: Sound absorption NRC of 1.05 for 2 inches thickness and 1.15 for 4 inches thickness 0.65 to 0.75 according to ASTM C 423 for Type A mounting according to ASTM E 795.
 - 11. Nominal Overall Panel Thickness: 2 inches and 4 inches .
 - 12. Panel Width: As indicated on Drawings.
 - 13. Panel Height: As indicated on Drawings.

SOUND-DIFFUSING WALL UNITS 2.4

- Α. Sound-Diffusing Wall Panel (Type F) : Manufacturer's standard panel construction consisting of fiber glass .
 - Manufacturers: Subject to compliance with requirements, provide products by the following: 1.
 - Acoustical Panel Systems (APS, Inc.). a.
 - Conwed Designscape; an Owens Corning company; Barrel Diffuser. b.
 - Golterman & Sabo. C.
 - Wenger Corporation; Type I Wall Diffuser Panel (Basis-of-Design). d.
 - Panel Shape: Convex .
 - 2. 3. Mounting: Back mounted with manufacturer's standard wall cleats, secured to substrate.

- 4. Core: Manufacturer's standard lined with 1-1/2 inch fiber glass blanket, prepared for required acoustical performance.
- 5. Edge Construction: Manufacturer's standard Extruded-aluminum or zinc-coated, rolled-steel frame.
- 6. Facing Material: As indicated on Drawings.
- 7. Nominal Thickness: 6 inches
- 8. Panel Nominal Width : 24 inches .
- 9. Panel Nominal Height: 24 inches .
- 10. Color: Black
- B. Sound-Diffusing Wall Panel (Type E) : Manufacturer's standard panel construction consisting of fiberglass corrugated material.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following: a. Enduro Composites; Enduro Tuff (Basis-of-Design).
 - 2. Panel Shape: Corrugated.
 - 3. Mounting: Back mounted with resilient channel , secured to substrate.
 - 4. Corrugated-Profile: Alternating curved ribs saved at 4.2 inches. o.c. across width of panel.
 - 5. Nominal Thickness: 1.06 inch
 - 6. Panel Coverage: 42 inches
 - 7. Color: Black

2.5 MATERIALS

- A. Core Materials:
 - 1. Glass-Fiber Board: ASTM C 612; of type standard with manufacturer; nominal density of 6 to 7 lb/cu. ft., unfaced, and dimensionally stable, molded rigid board; and with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.
 - 2. Wood and Plywood: Manufacturer's standard plywood or clear, vertical grain, straight, kiln-dried hardwood.
 - a. Fire-retardant treated by pressure process with a flame-spread index of 25 or less when tested according to ASTM E 84 or UL 723, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

2.6 FABRICATION

- A. Standard Construction: Use manufacturer's standard construction unless otherwise indicated; with facing material applied to face, edges, and back border of dimensionally stable core; and with rigid edges to reinforce panel perimeter against warpage and damage.
- B. Edge Hardening: For glass-fiber board cores, chemically harden core edges and areas of core where mounting devices are attached.
- C. Facing Material: Apply fabric facing fully covering visible surfaces of unit; with material stretched straight, on the grain, tight, square, and free from puckers, ripples, wrinkles, sags, blisters, seams, adhesive, or other visible distortions or foreign matter.
 - 1. Square Corners: Tailor corners.
 - 2. Radius and Other Nonsquare Corners: Attach facing material so there are no seams or gathering of material.
 - 3. Fabrics with Directional or Repeating Patterns or Directional Weave: Mark fabric top and attach fabric in same direction so pattern or weave matches in adjacent units.
- D. Dimensional Tolerances of Finished Units: Plus or minus 1/16 inch for the following:
 - 1. Thickness.
 - 2. Edge straightness.
 - 3. Overall length and width.
 - 4. Squareness from corner to corner.
 - 5. Chords, radii, and diameters.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine fabric, fabricated units, substrates, areas, and conditions for compliance with requirements, installation tolerances, and other conditions affecting unit performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install units in locations indicated. Unless otherwise indicated, install units with vertical surfaces and edges plumb, top edges level and in alignment with other units, faces flush, and scribed to fit adjoining work accurately at borders and at penetrations.
- B. Comply with manufacturer's written instructions for installation of units using type of mounting devices indicated. Mount units securely to supporting substrate.
- C. Align fabric pattern and grain as indicated on Drawings.

3.3 INSTALLATION TOLERANCES

- A. Variation from Plumb and Level: Plus or minus 1/16 inch in 48 inches , noncumulative.
- B. Variation of Joint Width: Not more than 1/16-inch variation from hairline in 48 inches, noncumulative.

3.4 CLEANING

- A. Clip loose threads; remove pills and extraneous materials.
- B. Clean panels on completion of installation to remove dust and other foreign materials according to manufacturer's written instructions.

SECTION 098436 - SOUND-ABSORBING AND REFLECTING CEILING UNITS

PART1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes shop-fabricated, acoustical panel units tested for acoustical performance, including the following:
 - 1. Sound-absorbing ceiling panels.
 - 2. Sound-reflecting ceiling panels.

1.3 DEFINITIONS

A. NRC: Noise Reduction Coefficient.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include fabric facing, panel edge, core material, and mounting indicated.
- B. Shop Drawings: For unit assembly and installation.
 - 1. Include reflected ceiling plans, elevations, sections, and mounting devices and details.
 - 2. Include details at joints and corners; and details at ceiling intersections and intersections with walls. Indicate panel edge profile and core materials.
- C. Samples for Verification: For the following products:
 - 1. Fabric: Full-width by approximately 36-inch- long Sample, but not smaller than required to show complete pattern repeat, from dye lot to be used for the Work, and with specified treatments applied. Mark top and face of fabric.
 - 2. Assembled Panels: Approximately 36 by 36 inches, including joints and mounting methods.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 - 1. Electrical outlets.
 - 2. Suspended ceiling components above ceiling units.
 - 3. Structural members to which suspension devices will be attached.
 - 4. Items penetrating or covered by units including the following:
 - a. Lighting fixtures.
 - b. Air outlets and inlets.
 - c. Speakers.
 - d. Alarms.
 - e. Sprinklers.
 - f. Access panels.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of unit to include in maintenance manuals. Include fabric manufacturer's written cleaning and stain-removal instructions.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Fabric: For each fabric, color, and pattern installed, furnish length equal to 10 percent of amount installed, but no fewer than 10 sq. yd., full width of bolt.
 - 2. Mounting Devices: Full-size units equal to 5 percent of amount installed, but no fewer than five devices.

1.8 QUALITY ASSURANCE

A. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials, fabrication, and installation.

- 1. Build mockup of typical ceiling area as shown on Drawings . Include intersection of wall and ceiling, corners, and perimeters.
- 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Comply with fabric and unit manufacturers' written instructions for minimum and maximum temperature and humidity requirements for shipment, storage, and handling.
- B. Deliver materials and units in unopened bundles and store in a temperature-controlled dry place with adequate air circulation.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Do not install units until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work at and above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Lighting: Do not install units until a lighting level of not less than 50 fc is provided on surfaces to receive the units.
- C. Air-Quality Limitations: Protect units from exposure to airborne odors, such as tobacco smoke, and install units under conditions free from odor contamination of ambient air.
- D. Field Measurements: Verify unit locations and actual dimensions of openings and penetrations by field measurements before fabrication, and indicate them on Shop Drawings.

1.11 WARRANTY

1.

- A. Special Warranty: Manufacturer agrees to repair or replace units and components that fail in materials or workmanship within specified warranty period.
 - Failures include, but are not limited to, the following:
 - a. Acoustical performance.
 - b. Fabric sagging, distorting, or releasing from panel edge.
 - c. Warping of core.
 - 2. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain ceiling units specified in this Section and wall units specified in Section 098433 "Sound-Absorbing Wall Units" from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: Units shall comply with "Surface-Burning Characteristics" or "Fire Growth Contribution" Subparagraph below, or both, as determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - 1. Surface-Burning Characteristics: Comply with ASTM E 84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 450 or less.
 - 2. Fire Growth Contribution: Comply with acceptance criteria of local code and authorities having jurisdiction when tested according to NFPA 286.

2.3 SOUND-ABSORBING CEILING UNITS

- A. Sound-Absorbing Ceiling Panel (Type I) : Manufacturer's standard panel construction consisting of facing material stretched over front face of edge-framed core and bonded or attached to edges and back of frame.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following: a. GIK Acoustics; Soffit Bass Traps (Basis-of-Design)
 - b. Acoustical Panel Systems (APS, Inc.).
 - c. Acoustical Solutions, Inc.
 - d. Armstrong World Industries.
 - e. AVL Systems, Inc.
 - f. Benton Brothers Solutions, Inc.

2.

- g. Conwed Designscape; an Owens Corning company.
- h. Decoustics Limited; a Saint Gobain company.
- i. Golterman & Sabo.
- j. Lamvin, Inc.
- k. MBI Products Company, Inc.
- I. Wenger Corporation.
- m. Working Walls, Inc.
- Panel Shape: Rectangular.
- 3. Mounting: Back mounted with manufacturer's standard metal clips, secured to substrate.
- 4. Core: Glass-fiber board filled with Glass-fiber blanket .
- 5. Edge Profile: Mitered (beveled to a point).
- 6. Corner Detail in Elevation: Square with continuous edge profile indicated.
- 7. Reveals between Panels: Flush reveals as indicated on Drawings.
- 8. Facing Material: As indicated on Drawings.
- 9. Nominal Thickness: As indicated on Drawings.
- 10. Panel Width: As indicated on Drawings.
- 11. Panel Height: As indicated on Drawings.

2.4 SOUND-REFLECTING CEILING UNITS

- A. Sound-Reflecting Ceiling Panel (Type M) : Custom-fabricated ceiling panels.
 - 1. Panel Shape: Radially curved flat panel.
 - 2. Suspension Point and Bowing system: 1/8-inch steel angle painted black and 1/4 inch diameter tensioning rods mounted on the top (unexposed) side of the reflector panel. Faced panels shall have concealed attachment. Panels shall be flexed to a specified radius before installation
 - 3. Mounting: suspension system with stiffening, back-support angles.
 - 4. Core: Gypsum board over Plywood and Glass-fiber blanket with a reflective component on top side of panel, prepared for required acoustical performance.
 - 5. Facing Material: Acoustic Felt; as indicated on Drawings.
 - 6. Acoustical Performance: Sound absorption NRC of 0.05 to 0.10 according to ASTM C 423 for Type J mounting according to ASTM E 795.
 - 7. Panel Width: As indicated on Drawings.
 - 8. Panel Height: As indicated on Drawings.

2.5 MATERIALS

- A. Core Materials:
 - 1. Glass-Fiber Blanket: ASTM C 612, ASTM C 553, or ASTM C 665; of type standard with manufacturer; nominal density of 3 to 4 lb/cu. ft.; flexible; and with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.
 - 2. Wood and Plywood: Plywood or clear, vertical grain, straight, kiln-dried hardwood.
 - a. Fire-retardant treated by pressure process with a flame-spread index of 25 or less when tested according to ASTM E 84 or UL 723, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
 - 1) Treated material shall have a moisture content of 28 percent or less when tested according to ASTM D 3201/D 3201M at 92 percent relative humidity.
 - 2) Kiln-dry material after treatment to 19 percent or less for lumber and 15 percent or less for plywood.
- B. Facing Material : Fabric from same dye lot; color and pattern as indicated on Drawings.
- C. Mounting Devices: Concealed on back or top edge of unit, recommended by manufacturer to support weight of unit.

2.6 FABRICATION

- A. Measure each area and establish layout of panels and joints of sizes indicated on Drawings within a given area.
- B. Facing Material: Apply fabric facing fully covering visible surfaces of unit; with material stretched straight, on the grain, tight, square, and free from puckers, ripples, wrinkles, sags, blisters, seams, adhesive, or other visible distortions or foreign matter.

- 1. Radius and Other Nonsquare Corners: Attach facing material so there are no seams or gathering of material.
- C. Dimensional Tolerances of Finished Units: Plus or minus 1/16 inch for the following:
 - 1. Thickness.
 - 2. Edge straightness.
 - 3. Overall length and width.
 - 4. Squareness from corner to corner.
 - 5. Chords, radii, and diameters.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine fabric, fabricated units, substrates, areas, and conditions for compliance with requirements, installation tolerances, and other conditions affecting unit performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install units in locations indicated. Unless otherwise indicated, install units with edges in alignment with walls and other units, faces flush, and scribed to fit adjoining work accurately at borders and at penetrations.
- B. Comply with manufacturer's written instructions for installation of units using type of mounting devices indicated. Mount units securely to supporting substrate.
- C. Align fabric pattern and grain as indicated on Drawings.

3.3 INSTALLATION TOLERANCES

- A. Variation from Alignment with Surfaces: Plus or minus 1/16 inch in 48 inches , noncumulative.
- B. Variation from Level or Slope: Plus or minus 1/16 inch .
- C. Variation of Joint Width: Not more than 1/16 inch wide from hairline in 48 inches , noncumulative.

3.4 CLEANING

- A. Clip loose threads; remove pills and extraneous materials.
- B. Clean panels on completion of installation to remove dust and other foreign materials according to manufacturer's written instructions.

SECTION 099123 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes surface preparation and the application of paint systems on interior substrates.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
 1. Indicate VOC content.
- B. Samples for Initial Selection: For each type of topcoat product.
- C. Product List: Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Paint: 5 percent, but not less than 1 gal. of each material and color applied.

1.5 QUALITY ASSURANCE

- A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Architect will select one surface to represent surfaces and conditions for application of each paint system.
 - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft..
 - b. Other Items: Architect will designate items or areas required.
 - 2. Final approval of color selections will be based on mockups.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
 - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
 - 1. Maintain containers in clean condition, free of foreign materials and residue.
 - 2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Benjamin Moore & Co.
 - 2. Kelly-Moore Paint Company Inc.
 - 3. PPG Architectural Coatings.

- 4. Pratt & Lambert.
- 5. Sherwin-Williams Company (The).

2.2 PAINT, GENERAL

- A. Material Compatibility:
 - 1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
- B. VOC Content: For field applications that are inside the weatherproofing system, paints and coatings shall comply with VOC content limits of authorities having jurisdiction and the following VOC content limits:
 - 1. Flat Paints and Coatings: 50 g/L.
 - 2. Nonflat Paints and Coatings: 150 g/L.
 - 3. Dry-Fog Coatings: 400 g/L.
 - 4. Primers, Sealers, and Undercoaters: 200 g/L.
 - 5. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
 - 6. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
 - 7. Pretreatment Wash Primers: 420 g/L.
 - 8. Shellacs, Clear: 730 g/L.
 - 9. Shellacs, Pigmented: 550 g/L.
- C. Colors: As indicated in a Finish Schedule.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 1. Fiber-Cement Board: 12 percent.
 - 2. Gypsum Board: 12 percent.
- C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- D. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
- E. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.
- E. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer

- F. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- G. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- H. Cotton or Canvas Insulation Covering Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."
 1. Use applicators and techniques suited for paint and substrate indicated.
 - 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 - 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 - 4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 - 5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
 - 6. Paint latex sealants color as directed by Architect.
- B. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- C. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- D. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
 - 1. Paint the following work where exposed in equipment rooms:
 - a. Equipment, including panelboards.
 - b. Uninsulated metal piping.
 - c. Uninsulated plastic piping.
 - d. Pipe hangers and supports.
 - e. Metal conduit.
 - f. Plastic conduit.
 - g. Tanks that do not have factory-applied final finishes.
 - h. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
 - 2. Paint the following work where exposed in occupied spaces:
 - a. Equipment, including panelboards.
 - b. Uninsulated metal piping.
 - c. Uninsulated plastic piping.
 - d. Pipe hangers and supports.
 - e. Metal conduit.
 - f. Plastic conduit.
 - g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
 - h. Other items as directed by Architect.
 - 3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.4 FIRE-RATED AND SMOKE CONTAINMENT ASSEMBLIES

- A. Fire walls, fire barriers, fire partitions, smoke barriers and smoke partitions or any other wall required to have protected openings or penetrations shall be effectively and permanently identified with signs or stenciling. Such identification shall:
 - 1. Be located in accessible concealed floor, floor-ceiling or attic spaces; and
 - 2. Be located within 15 feet of each end of each wall and repeated at intervals not exceeding 30 feet measured horizontally along both sides of the wall or partition; and

3. Include lettering not less than 3 inches in height, incorporating the suggested wording: " FIRE AND/OR SMOKE BARRIER-PROTECT ALL OPENINGS" or other wording approved or required by AHJ (Authority Having Jurisdiction).

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

SECTION 100413 - COMMON SUBMITTAL REQUIREMENTS FOR SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes supplementary administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals specific to the work of this Division.
- B. Related Requirements:
 - 1. Division 01 submittal requirements.

1.2 DEFINITIONS

- A. Contractor: Refers to an entity in direct Contract with the Owner to furnish and/or perform any portion of the Work of the Contract, including but not limited to a Construction Manager.
 - 1. Contractor shall review and approve Product Submittals prior to fowarding them to the Architect.
- B. Product Submittals: In general, Product Submittals show characteristics of the proposed construction in one of the following forms:
 - 1. Shop Drawings.
 - 2. Product Data.
 - 3. Samples.
- C. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- D. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."
- E. Submittal Review Sheet: Specific form required to accompany each submittal. Obtain Submittal Review Sheet from the SmithGroup Project Manager.

1.3 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Requirements specified for submittals are intended to provide efficient handling, while permitting review responsibilities to be carried out.
- B. Avoidable Resubmittals: The first two reviews of each specified submittal will be processed without cost to the Contractor. After the second review, the Owner may charge the Contractor for the cost of such additional processing, unless the processing results from approved Change Orders causing revisions to previously approved submittals.
- C. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 - 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 - 4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect reserve the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- D. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
 - 1. Initial Review: Allow 10 business days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required.

- 2. When a large volume of submittal materials is scheduled, additional review time may be required. Similarly, a particular submittal may require review completion in less than the agreed normal time. Due to variations in submittal volume and processing needs, agreed review time is not intended to apply to extreme conditions.
- 3. Resubmittal Review: Allow 10 business days for review of each resubmittal.
- 4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 15 business days for initial review of each submittal.
- E. Maintain at the Project Site ready access to the latest reviewed Shop Drawings and Product Data, and one set of samples.

1.4 DELEGATED-DESIGN SERVICES

A. Definitions:

- 1. Delegated Design: A portion or component of the Work identified by the Contract Documents to be designed by the Contractor, or an entity assigned by the Contractor, to satisfy performance and design criteria specified in the Contract Documents for that portion or component.
- 2. Registered Design Professional: Design professional, assigned by the Contractor, who is responsible for providing the delegated design work, and for certifying that the work is in compliance with the specified performance requirements and design criteria. Design professional shall be legally qualified to practice in jurisdiction where Project is located and shall be experienced in providing delegated design services of the kind indicated. Delegated design services are defined as those performed for installation of the system, assembly or product that are similar in material, design, and extent to those indicated for this Project.
- B. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- C. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Combine with Submittal Review Sheet before submitting to Architect .
- B. Project Closeout and Maintenance Material Submittals: See requirements in Division 01.
- C. Be responsible for quantities, weights, and dimensions to be confirmed and correlated at the site; for information that pertains solely to the fabrication processes and to the means, methods, techniques, sequences, and procedures of construction; and for coordination of the work of every trade, supplier, and subcontractor.
- D. Be responsible for each submittal to be in conformance with information given and the design intent expressed in the Contract Documents.
- E. Provide with each submittal specific written notice of any variation from the requirements of the Contract Documents by causing a specific notation to be made on the Submittal Review Sheet and Submittal Transmittal.

3.2 ARCHITECT'S AND GENERAL CONTRACTOR'S ACTION

- A. General: Architect will not review submittals that do not include the Submittal Review Sheet.
- B. Action Submittals: Architect's staff and consultants will review the submittal, and mark the Submittal Review Sheet with an action code. The code meanings are described below.

- C. Additional codes may be provided within comments or as an electronic submittal review stamp and shall be used in help indicating return of partial submittals.
- D. The Final Review Code on the Submittal Review Sheet prevails and governs the action of the overall submittal.
- E. Review Code meanings are as follows:
 - 1. Action Codes Permitting Use:
 - a. When an action code permitting use is assigned to a submittal, it does not authorize work that does not comply with the requirements of the Contract Documents. Acceptance of the Work will depend on compliance.
 - b. Code AP Approved: The Work covered by the submittal item may proceed, provided it complies with Contract Document requirements.
 - c. Code AN Approved as Noted: The Work covered by the submittal item may proceed, provided it complies with the Architect's notations and Contract Document requirements.
 - d. Code AN-R Approved as Noted Resubmit: Do not deliver or install the related work until the resubmittal has received Code AP or AN. However, fabrication and other off-site work covered by the submittal item may proceed, at the Contractor's risk, provided it complies with the Architect's notations and Contract Document requirements.
 - 2. Action Code Prohibiting Use:
 - a. Action Code REJ Not Approved: The Work covered by the submittal item, including purchasing, fabrication, delivery, and other activity, shall not proceed. Revise the submittal item or prepare a new item in accordance with the Architect's notations. Resubmit the corrected or new item without delay; do not permit submittal items marked "Not Approved" to be used. Work incorporating such items will be rejected.
 - 3. Action Code for Items Not Required:
 - a. Action Code X Not Requested by Contract Documents: The submittal item is not called for by the Contract Documents and is being returned unreviewed by the Architect except to the extent necessary to determine its status.
- F. Informational Submittals: For Architect's information only. Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
 - 1. Action Code for Information Only:
 - a. Action Code INF Information Only Received: The submittal item is not called for a return with a reviewed action code by the Contract Documents and is being returned un-reviewed by the Architect except to the extent necessary to determine its status.
- G. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- H. Incomplete submittals are not acceptable, will be considered non-responsive, and will be returned without review.
- I. Architect will return without review submittals received from sources other than the Contractor.
- J. Submittals not required by the Contract Documents may be returned by the Architect without action.
 - 1. Do not submit Material Safety Data Sheets. They will be returned without review.

3.3 SUBMITTAL TRANSMITTAL REQUIREMENTS

- A. Submittal Transmittal shall be a PDF file in electronic format. It is recommended, to expedite the submittal review, the electronic form be emailed for review to the Architect as early as possible.
 - 1. Submittal Numbering: See below.
 - 2. Contact Information: Full Name, Phone Number and Email Address.
- B. Submittal Definition
 - 1. Each submittal consists of items from only ONE Specifications section.
 - 2. Complete Submittal: If ALL the items required by the Specifications section are listed on one Submittal Form (including continuation sheet), it is a complete submittal.
 - 3. Partial Submittals: If it is necessary to divide the required items of a given Specifications section into two or more submittals to meet schedule or handling requirements, the separate submittals are partial submittals. All partial submittals have the same submittal number, and are differentiated by sequential P-numbers (see below).
 - 4. All items in each submittal, whether complete or partial, will be processed together: Individual items will not be 'broken out' for special handling. Arrange submittals accordingly.

C. Submittal Numbering

- 1. Number submittals as described below to assist tracking.
- 2. Number each submittal in the format nnnnn-nn.
 - a. The 6-digit number is the number of the section that requires the submittal. For example, 044200.
 - b. The 2-digit number is based on the numerical sequence of submittals from that section. In other words, for each section, the first submittal is 01, the second is 02, and so on. The 2-digit number does not change for partial or re-submittals, so that the submittal can be tracked.
 - c. P-Number for Partial Submittals: Number each partial submittal in the pee space, beginning with P1, and increasing by one for each partial submittal of that submittal. If the submittal is a complete submittal, leave the P space blank.
 - d. R-Number for Re-submittals: Number each re-submittal in the arr space, beginning with R1, and increasing by one for each re-submittal of that submittal. Do not include an R-Number for the initial submittal.
 - e. Examples:
 - 1) Initial Complete Submittal: 044200-01. First Re-Submittal: 044200-01-R1.
 - 2) Initial Partial Submittal: 044200-01-P1. Second Partial Submittal: 0044200-01-P2. First Re-submittal of Second Partial Submittal: 044200-R1-P2.

3.4 SUBMITTAL REVIEW SHEET REQUIREMENTS

- A. Provide Submittal Review Sheet in PDF format. Submit as the page after the Submittal Transmittal.
- B. When attached, the Submittal Review Sheet shall not obscure information contained in the submittal.
- C. Do not edit any of the information contained within the Submittal Review Sheet except as follows:
 1. Submittal Number: See Submittal Numbering in Submittal Transmittal Requirements paragraph.
- D. The Contractor shall submit the PDF file in a manner that will allow editing of the Submittal Review Sheet fields by SmithGroup and its consultants.

SECTION 102113.19 - PLASTIC TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Solid-plastic toilet compartments.
- B. Related Requirements:
 - 1. Section 061000 "Rough Carpentry" for blocking.
 - 2. Section 102800 "Toilet, Bath, and Laundry Accessories" for accessories mounted on toilet compartments.

1.2 COORDINATION

A. Coordinate requirements for overhead supports, blocking, reinforcing, and other supports concealed within wall.

1.3 ACTION SUBMITTALS

- A. Shop Drawings: For solid-plastic toilet compartments.
 - 1. Include plans, elevations, sections, details, and attachment details.
 - 2. Show locations of cutouts for compartment-mounted toilet accessories.
 - 3. Show locations of centerlines of toilet fixtures.
 - 4. Show locations of floor drains.
 - 5. Show ceiling grid, ceiling-mounted items, and overhead support or bracing locations.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For toilet compartments.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Extra Stock Material: Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Door Hinges: One hinge with associated fasteners.
 - 2. Latch and Keeper: One latch and keeper with associated fasteners.
 - 3. Door Bumper: One bumper with associated fasteners.
 - 4. Door Pull: One door pull with associated fasteners.
 - 5. Fasteners: 10 fasteners of each size and type.

1.6 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements, and coordinate before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire Performance: Tested in accordance with, and pass the acceptance criteria of, NFPA 286.
- B. Regulatory Requirements: Comply with applicable provisions in the U.S. Department of Justice "2010 ADA Standards for Accessible Design" and Texas Accessibility Standards (TSA) for toilet compartments designated as accessible.

2.2 SOLID-PLASTIC TOILET COMPARTMENTS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. AJW Architectural Products.
 - 2. American Sanitary Partition Corporation.
 - 3. ASI Accurate Partitions.
 - 4. ASI Global Partitions.
 - 5. Scranton Products, Hiny Hiders; (Basis-of-Design).
- B. Toilet-Enclosure Style: Overhead braced Floor anchored.
- C. Entrance-Screen Style: Overhead braced Floor anchored.
- D. Urinal-Screen Style: Wall hung.

- E. Door, Panel, and Pilaster Construction: Solid, high-density polyethylene (HDPE) panel material, not less than 1 inch thick, seamless, with eased edges, no-sightline system, and with homogenous color and pattern throughout thickness of material.
 - 1. Color and Pattern: Nickel Finish, Hammered Texture.
- F. Entrance-Screen Construction: Matching panel construction.
- G. Urinal-Screen Construction: Matching panel construction.
- H. Pilaster Shoes: Manufacturer's standard design; stainless steel.
- I. Pilaster Sleeves (Caps): Manufacturer's standard design; stainless steel.
- J. Urinal-Screen Post: Manufacturer's standard post design of material matching the thickness and construction of pilasters or 1-3/4-inch- square aluminum tube with satin finish; with shoe and sleeve (cap) matching that on the pilaster.
- K. Brackets (Fittings):
 - 1. Stirrup Type: Ear or U-brackets, stainless steel.

2.3 HARDWARE AND ACCESSORIES

- A. Hardware and Accessories, Standard Duty: Manufacturer's standard operating hardware and accessories.
 - 1. Material: Stainless steel.
 - 2. Hinges: Manufacturer's standard paired, self-closing type that can be adjusted to hold doors open at any angle up to 90 degrees, allowing emergency access by lifting door.
 - 3. Latch and Keeper: Manufacturer's standard surface-mounted latch unit, designed for emergency access, and with combination rubber-faced door strike and keeper. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible.
 - 4. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent inswinging door from hitting compartment-mounted accessories.
 - 5. Door Bumper: Manufacturer's standard rubber-tipped bumper at outswinging doors and entrance-screen doors.
 - 6. Door Pull: Manufacturer's standard unit at outswinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible.
 - 7. Door Stop: Manufacturer's standard unit at outswinging doors that complies with regulatory requirements for accessibility. Provide units of doors at compartments designated as accessible.

2.4 MATERIALS

- A. Aluminum Castings: ASTM B26/B26M.
- B. Aluminum Extrusions: ASTM B221.
- C. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304, stretcher-leveled standard of flatness.
- D. Stainless Steel Castings: ASTM A743/A743M.

2.5 FABRICATION

- A. Fabrication, General: Fabricate toilet compartment components to sizes indicated. Coordinate requirements and provide cutouts for through-partition toilet accessories where required for attachment of toilet accessories.
- B. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.
- C. Floor-Anchored Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at pilasters for structural connection to floor. Provide shoes at pilasters to conceal anchorage.
- D. Urinal-Screen Posts: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at tops and bottoms of posts. Provide shoes and sleeves (caps) at posts to conceal anchorage.
- E. Door Size and Swings: Unless otherwise indicated, provide 24-inch- wide, inswinging doors for standard toilet compartments and 36-inch- wide, outswinging doors with a minimum 32-inch- wide, clear opening for compartments designated as accessible.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for fastening, support, alignment, operating clearances, and other conditions affecting performance of the Work.
 1. Confirm location and adequacy of blocking and supports required for installation.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF PLASTIC TOILET COMPARTMENTS

- A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.
 - 1. Maximum Clearances:
 - a. Pilasters and Panels: 1/2 inch.
 - b. Panels and Walls: 1 inch.
 - 2. Stirrup Brackets: Secure panels to walls and to pilasters with no fewer than two brackets attached near top and bottom of panel.
 - a. Locate wall brackets, so holes for wall anchors occur in masonry or tile joints.
 - b. Align brackets at pilasters with brackets at walls.
- B. Urinal Screens: Attach with anchoring devices to suit supporting structure. Set units level and plumb, rigid, and secured to resist lateral impact.

3.3 ADJUSTING

A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on inswinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on outswinging doors and doors in entrance screens to return doors to fully closed position.

SECTION 102800 - TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Public-use washroom accessories.
 - 2. Underlavatory guards.
- B. Related Requirements:
 - 1. Section 088300 "Mirrors" for frameless mirrors.
 - 2. Section 093013 "Ceramic Tiling" for ceramic toilet .

1.2 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
 - 2. Include anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
- B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
 - 1. Identify locations using room designations indicated.
 - 2. Identify accessories using designations indicated.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For accessories to include in maintenance manuals.

1.5 WARRANTY

- A. Manufacturer's Special Warranty for Mirrors: Manufacturer agrees to repair or replace mirrors that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, visible silver spoilage defects.
 - 2. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

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2.1 OWNER-FURNISHED MATERIALS

- A. Owner-Furnished Materials: The following accessories are Owner-furnished, Contractor-installed (OFCI).
 1. Soap dispenser (TA-02)
 - 2. Toilet paper dispenser (TA-03)

2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a registered design professional, as defined in Section 013573 "Delegated Design Requirements and Procedures" to design structural connections for grab bars.
 - Structural Performance: Design accessories and fasteners to comply with the following requirements:
 Grab Bars: Installed units are able to resist 250 lbf concentrated load applied in any direction and at any point.

2.3 PUBLIC-USE WASHROOM ACCESSORIES

- A. Combination Towel (Folded) Dispenser/Waste Receptacle (TA-01):
 - Manufacturers: Subject to compliance with requirements, provide products by one of the following: a. AJW Architectural Products.
 - b. American Specialties, Inc. (ASI).

- c. Bobrick Washroom Equipment, Inc.; B-3944 (Basis-of-Design)
- d. Bradley Corporation.
- e. GAMCO Specialty Accessories; a division of Bobrick.
- f. Tubular Specialties Manufacturing, Inc.
- 2. Mounting: Recessed.
 - a. Designed for nominal 4-inch wall depth.
- 3. Minimum Towel-Dispenser Capacity: 600 C-fold or 800 multifold paper towels.
- 4. Minimum Waste-Receptacle Capacity: 12 gal..
- 5. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
- 6. Liner: Reusable, vinyl waste-receptacle liner.
- 7. Lockset: Tumbler type for towel-dispenser compartment and waste receptacle.
- B. Grab Bar (TA-05) and (TA-06):
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AJW Architectural Products.
 - b. American Specialties, Inc. (ASI).
 - c. Bobrick Washroom Equipment, Inc.
 - d. Bradley Corporation.
 - e. Brey-Krause Manufacturing Co.
 - f. GAMCO Specialty Accessories; a division of Bobrick.; B-5806 Series (Basis-of-Design)
 - g. Tubular Specialties Manufacturing, Inc.
 - 2. Mounting: Flanges with concealed fasteners.
 - 3. Material: Stainless steel, 0.05 inch thick.
 - 4. Outside Diameter: 1-1/4 inches.
 - 5. Configuration and Length: As indicated on Drawings.
- C. Sanitary-Napkin Disposal Unit (TA-04); Option 1:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AJW Architectural Products.
 - b. American Specialties, Inc. (ASI).
 - c. Bobrick Washroom Equipment, Inc.; B-35303 (Basis-of-Design)
 - d. Bradley Corporation.
 - e. Brey-Krause Manufacturing Co.
 - f. GAMCO Specialty Accessories; a division of Bobrick.
 - g. Tubular Specialties Manufacturing, Inc.
 - 2. Mounting: Recessed.
 - 3. Door or Cover: Self-closing, disposal-opening cover and fill-length steel piano-hinge hinged face panel with tumbler lockset].
 - 4. Waste Receptacle: Removable.
- D. Material Finish: Stainless steel, No. 4 finish (satin).
- E. Sanitary-Napkin Disposal Unit (TA-04); Option 2:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AJW Architectural Products.
 - b. American Specialties, Inc. (ASI).
 - c. Bobrick Washroom Equipment, Inc.; B-354 (Basis-of-Design)
 - d. Bradley Corporation.
 - e. Brey-Krause Manufacturing Co.
 - f. GAMCO Specialty Accessories; a division of Bobrick.
 - g. Tubular Specialties Manufacturing, Inc.
 - 2. Mounting: Partition mounted, dual access.
 - 3. Door or Cover: Self-closing, disposal-opening cover and hinged face panel with tumbler lockset.
 - 4. Waste Receptacle: Removable.
 - 5. Material and Finish: Stainless steel, No. 4 finish (satin).
- F. Mirror Unit (TA-08), (TA-09) and (TA-10):

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- Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AJW Architectural Products.
 - b. American Specialties, Inc. (ASI).
 - c. Bobrick Washroom Equipment, Inc.
 - d. Bradley Corporation.
 - e. Brey-Krause Manufacturing Co.

- f. GAMCO Specialty Accessories: a division of Bobrick.
- Tubular Specialties Manufacturing, Inc. g. Tubular Specialties Manu Size: As indicated on Drawings.
- 2.
- G. Hook (TA-06):
 - Manufacturers: Subject to compliance with requirements, provide products by one of the following: 1.
 - AJW Architectural Products. a.
 - b. American Specialties, Inc. (ASI).
 - Bobrick Washroom Equipment, Inc.; B-542 (Basis-of-Design) c.
 - d. Bradlev Corporation.
 - Brev-Krause Manufacturing Co. e.
 - GAMCO Specialty Accessories; a division of Bobrick. f.
 - Tubular Specialties Manufacturing, Inc. q.
 - 2. Description: Single-prong unit.
 - Mounting: Concealed. 3.
 - Material and Finish: Stainless steel, No. 4 finish (satin). 4.

2.4 UNDERLAVATORY GUARDS

- Α. Underlavatory Guard : 1.
 - Manufacturers: Subject to compliance with requirements, provide products by one of the following: Plumberex Specialty Products. Inc. a.
 - Truebro by IPS Corporation. b.
 - Description: Insulating pipe covering for supply and drain piping assemblies that prevents direct 2. contact with and burns from piping; allow service access without removing coverings.
 - Material and Finish: Antimicrobial, molded plastic, color as selected by Architect. 3.

2.5 MATERIALS

- Stainless Steel: ASTM A240/A240M or ASTM A666, Type 304, 0.031-inch- minimum nominal thickness Α. unless otherwise indicated.
- В. Fasteners: Screws, bolts, and other devices of same material as accessory unit, unless otherwise recommended by manufacturer or specified in this Section, and tamper and theft resistant where exposed, and of stainless or galvanized steel where concealed.
- C. Mirrors: ASTM C1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.

2.6 FABRICATION

- General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access Α. panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.
- Β. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

- Α. Install accessories in accordance with manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
 - Remove temporary labels and protective coatings. 1
- В. Grab Bars: Install to comply with specified structural-performance requirements.

3.2 ADJUSTING AND CLEANING

- Α. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- Β. Clean and polish exposed surfaces in accordance with manufacturer's written instructions.

SECTION 110413 - COMMON SUBMITTAL REQUIREMENTS FOR EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes supplementary administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals specific to the work of this Division.
- B. Related Requirements:
 - 1. Division 01 submittal requirements.

1.2 DEFINITIONS

- A. Contractor: Refers to an entity in direct Contract with the Owner to furnish and/or perform any portion of the Work of the Contract, including but not limited to a Construction Manager.
 - 1. Contractor shall review and approve Product Submittals prior to fowarding them to the Architect.
- B. Product Submittals: In general, Product Submittals show characteristics of the proposed construction in one of the following forms:
 - 1. Shop Drawings.
 - 2. Product Data.
 - 3. Samples.
- C. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
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- E. Submittal Review Sheet: Specific form required to accompany each submittal. Obtain Submittal Review Sheet from the SmithGroup Project Manager.

1.3 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Requirements specified for submittals are intended to provide efficient handling, while permitting review responsibilities to be carried out.
- B. Avoidable Resubmittals: The first two reviews of each specified submittal will be processed without cost to the Contractor. After the second review, the Owner may charge the Contractor for the cost of such additional processing, unless the processing results from approved Change Orders causing revisions to previously approved submittals.
- C. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 - 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 - 4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect reserve the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
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- E. Maintain at the Project Site ready access to the latest reviewed Shop Drawings and Product Data, and one set of samples.

1.4 DELEGATED-DESIGN SERVICES

A. Definitions:

- 1. Delegated Design: A portion or component of the Work identified by the Contract Documents to be designed by the Contractor, or an entity assigned by the Contractor, to satisfy performance and design criteria specified in the Contract Documents for that portion or component.
- 2. Registered Design Professional: Design professional, assigned by the Contractor, who is responsible for providing the delegated design work, and for certifying that the work is in compliance with the specified performance requirements and design criteria. Design professional shall be legally qualified to practice in jurisdiction where Project is located and shall be experienced in providing delegated design services of the kind indicated. Delegated design services are defined as those performed for installation of the system, assembly or product that are similar in material, design, and extent to those indicated for this Project.
- B. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- C. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Combine with Submittal Review Sheet before submitting to Architect .
- B. Project Closeout and Maintenance Material Submittals: See requirements in Division 01.
- C. Be responsible for quantities, weights, and dimensions to be confirmed and correlated at the site; for information that pertains solely to the fabrication processes and to the means, methods, techniques, sequences, and procedures of construction; and for coordination of the work of every trade, supplier, and subcontractor.
- D. Be responsible for each submittal to be in conformance with information given and the design intent expressed in the Contract Documents.
- E. Provide with each submittal specific written notice of any variation from the requirements of the Contract Documents by causing a specific notation to be made on the Submittal Review Sheet and Submittal Transmittal.

3.2 ARCHITECT'S AND GENERAL CONTRACTOR'S ACTION

- A. General: Architect will not review submittals that do not include the Submittal Review Sheet.
- B. Action Submittals: Architect's staff and consultants will review the submittal, and mark the Submittal Review Sheet with an action code. The code meanings are described below.

- C. Additional codes may be provided within comments or as an electronic submittal review stamp and shall be used in help indicating return of partial submittals.
- D. The Final Review Code on the Submittal Review Sheet prevails and governs the action of the overall submittal.
- E. Review Code meanings are as follows:
 - 1. Action Codes Permitting Use:
 - a. When an action code permitting use is assigned to a submittal, it does not authorize work that does not comply with the requirements of the Contract Documents. Acceptance of the Work will depend on compliance.
 - b. Code AP Approved: The Work covered by the submittal item may proceed, provided it complies with Contract Document requirements.
 - c. Code AN Approved as Noted: The Work covered by the submittal item may proceed, provided it complies with the Architect's notations and Contract Document requirements.
 - d. Code AN-R Approved as Noted Resubmit: Do not deliver or install the related work until the resubmittal has received Code AP or AN. However, fabrication and other off-site work covered by the submittal item may proceed, at the Contractor's risk, provided it complies with the Architect's notations and Contract Document requirements.
 - 2. Action Code Prohibiting Use:
 - a. Action Code REJ Not Approved: The Work covered by the submittal item, including purchasing, fabrication, delivery, and other activity, shall not proceed. Revise the submittal item or prepare a new item in accordance with the Architect's notations. Resubmit the corrected or new item without delay; do not permit submittal items marked "Not Approved" to be used. Work incorporating such items will be rejected.
 - 3. Action Code for Items Not Required:
 - a. Action Code X Not Requested by Contract Documents: The submittal item is not called for by the Contract Documents and is being returned unreviewed by the Architect except to the extent necessary to determine its status.
- F. Informational Submittals: For Architect's information only. Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
 - 1. Action Code for Information Only:
 - a. Action Code INF Information Only Received: The submittal item is not called for a return with a reviewed action code by the Contract Documents and is being returned un-reviewed by the Architect except to the extent necessary to determine its status.
- G. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- H. Incomplete submittals are not acceptable, will be considered non-responsive, and will be returned without review.
- I. Architect will return without review submittals received from sources other than the Contractor.
- J. Submittals not required by the Contract Documents may be returned by the Architect without action.
 - 1. Do not submit Material Safety Data Sheets. They will be returned without review.

3.3 SUBMITTAL TRANSMITTAL REQUIREMENTS

- A. Submittal Transmittal shall be a PDF file in electronic format. It is recommended, to expedite the submittal review, the electronic form be emailed for review to the Architect as early as possible.
 - 1. Submittal Numbering: See below.
 - 2. Contact Information: Full Name, Phone Number and Email Address.
- B. Submittal Definition
 - 1. Each submittal consists of items from only ONE Specifications section.
 - 2. Complete Submittal: If ALL the items required by the Specifications section are listed on one Submittal Form (including continuation sheet), it is a complete submittal.
 - 3. Partial Submittals: If it is necessary to divide the required items of a given Specifications section into two or more submittals to meet schedule or handling requirements, the separate submittals are partial submittals. All partial submittals have the same submittal number, and are differentiated by sequential P-numbers (see below).
 - 4. All items in each submittal, whether complete or partial, will be processed together: Individual items will not be 'broken out' for special handling. Arrange submittals accordingly.

C. Submittal Numbering

- 1. Number submittals as described below to assist tracking.
- 2. Number each submittal in the format nnnnn-nn.
 - a. The 6-digit number is the number of the section that requires the submittal. For example, 044200.
 - b. The 2-digit number is based on the numerical sequence of submittals from that section. In other words, for each section, the first submittal is 01, the second is 02, and so on. The 2-digit number does not change for partial or re-submittals, so that the submittal can be tracked.
 - c. P-Number for Partial Submittals: Number each partial submittal in the pee space, beginning with P1, and increasing by one for each partial submittal of that submittal. If the submittal is a complete submittal, leave the P space blank.
 - d. R-Number for Re-submittals: Number each re-submittal in the arr space, beginning with R1, and increasing by one for each re-submittal of that submittal. Do not include an R-Number for the initial submittal.
 - e. Examples:
 - 1) Initial Complete Submittal: 044200-01. First Re-Submittal: 044200-01-R1.
 - 2) Initial Partial Submittal: 044200-01-P1. Second Partial Submittal: 0044200-01-P2. First Re-submittal of Second Partial Submittal: 044200-R1-P2.

3.4 SUBMITTAL REVIEW SHEET REQUIREMENTS

- A. Provide Submittal Review Sheet in PDF format. Submit as the page after the Submittal Transmittal.
- B. When attached, the Submittal Review Sheet shall not obscure information contained in the submittal.
- C. Do not edit any of the information contained within the Submittal Review Sheet except as follows:
 1. Submittal Number: See Submittal Numbering in Submittal Transmittal Requirements paragraph.
- D. The Contractor shall submit the PDF file in a manner that will allow editing of the Submittal Review Sheet fields by SmithGroup and its consultants.

SECTION 116143 - STAGE CURTAINS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Stage curtains, scrims, and drops.
 - 2. Draw-curtain tracks.
 - 3. Draw-curtain machines for motorized operation.
 - 4. Curtain rigging.
- B. Related Requirements:
 - 1. Section 055000 "Metal Fabrications" for steel framing and supports for stage-curtain systems.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product and the following:
 - 1. Draw-Curtain Machines: Include rated capacities, operating characteristics, and electrical characteristics.
 - 2. Tracks: Capability of each track to support the weight and operation of curtains that it supports.
- B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data.
 - 1. Include plans, elevations, sections, and attachment details of curtains.
 - 2. Include fabric assembly and hanging details.
 - 3. Dimension operating clearances.
 - 4. Include documentation of capacity of each batten, track, attachment, and rigging component to support loads.
 - 5. Points of attachment for proscenium curtain and the corresponding static and dynamic loads imposed on structure.
 - 6. Locations of equipment components, switches, and controls. Differentiate between manufacturer-installed and field-installed wiring.
 - 7. Wiring Diagrams: For power, signal, and control wiring.
- C. Samples for Verification: Full width by minimum 12-inch- long section of each fabric from dye lot to be used for the Work, with specified treatments applied. Show complete pattern repeat. Mark top and face of fabric.
- D. Delegated-Design Submittal: Refer to Section 013573 "Delegated Design Requirements and Procedures" for delegated design submittal procedures and requirements.
 - 1. Provide delegated-design submittals for the following:
 - a. Stage curtains.
 - b. Attachment to structure.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For stage curtains and rigging to include in operation and maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer of stage curtains.
- B. Provide the following upon request:
 - Product Certificates: For the following, from manufacturer:
 - a. Fabric: Provide name of flame-retardant chemical used, identification of applicator, treatment method, application date, allowable life span for treatment, and details of any restrictions and limitations.
 - b. Rigging: Compliance of suspended tracks with requirements.

1.

1.6 FIELD CONDITIONS

- Α. Environmental Limitations: Do not install stage curtains until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work at and above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- Field Measurements: Verify locations of supporting structural elements and construction contiguous with Β. stage curtains and rigging by field measurements before fabrication and indicate measurements on Shop Drawings.

1.7 WARRANTY

- A. Manufacturer's Special Warranty: Manufacturer agrees to repair or replace components of stage-curtain systems that fail in materials or workmanship within specified warranty period.
 - Failures include, but are not limited to, faulty operation of rigging. 1.
 - 2. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 **STAGE-CURTAIN SYSTEMS**

- Α. Description: Complete stage-curtain systems, including stage curtains, tracks, draw-curtain machines, and rigging; with necessary accessories for support and operation. 1.
 - Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Mainstage Theatrical Supply, Inc.
 - b. S&K Theatrical Draperies, Inc.: (Basis-of-Design)
 - c. Stagecraft Industries. Inc.
 - Tru-Roll, Inc.; a division of Advanced Entertainment Technology. d.
- Β. Source Limitations: Obtain stage-curtain systems from single manufacturer. Obtain each color, grade, finish, type, and variety of fabric from single source with resources to provide materials of consistent quality in appearance and physical properties.

PERFORMANCE REQUIREMENTS 2.2

- A. Delegated Design: Engage a registered design professional, as defined in Section 013573 "Delegated Design Requirements and Procedures" to design stage-curtain systems, including comprehensive engineering analysis and attachments to building structure, using performance requirements. 1. Material properties indicated in this Section shall be considered as minimum properties.
- Β. Structural Performance: Stage-curtain systems and attachments to structure shall withstand the effects of gravity and operational loads and the following loads and stresses:
 - Design Loads: Weight of curtains and track. 1
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.3 **CURTAIN FABRICS**

- General: Provide fabrics inherently and permanently flame resistant or chemically flame resistant by Α. immersion treatment according to performance requirements indicated. Provide fabrics of each type and color from same dye lot.
- Heavyweight Polyester Velour: Napped fabric of 100 percent polyester weighing not less than 26 oz./linear Β. yd., with pile height approximately 75 mils; inherently and permanently flame resistant; 54-inch minimum width.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - S&K Theatrical Draperies.; Opera Velour; (Basis-of-Design) a.
 - Dazian LLC; Angelo. b.
 - JB Martin Company; Dante. C.
 - KM Fabrics, Inc.; Prestige. d.
 - Milliken & Company; Encore. е
 - 2. Color/Texture/Pattern: Black.

2.4 LINING

A. Polyester Lining: 100 percent polyester fabric; inherently and permanently flame resistant; 54-inch minimum width; black.

2.5 CURTAIN-BOTTOM WEIGHTS

- A. Individual Weights: Curtain manufacturer's standard segmented weights to suit each curtain type and location.
- B. Pipe or Conduit Weight and Stiffener: Curtain manufacturer's standard or recommended stiffening pipe or conduit that slides into bottom hem, suitable for curtain type and location indicated.

2.6 CURTAIN FABRICATION

- A. General: Affix permanent label, stating compliance with requirements of authorities having jurisdiction, in accessible location on fabric not visible to audience. Provide vertical seams unless otherwise indicated. Arrange vertical seams so they do not fall on faces of pleats. Do not use fabric cuts less than one-half width. Orient velour fabric with the fabric nap down.
- B. Vertical and Top Hems: Machine sew hems as follows unless otherwise indicated:
 - 1. Vertical Hems: Minimum 2 inches wide, and not less than 4 inches wide at borders, valance, teasers, and tormentors, with not less than a 1-inch tuck and with no selvage material visible from front of curtain. Sew open ends of hems closed.
 - 2. Turnbacks: Provide leading- and trailing-edge turnbacks for traveler curtains, formed by folding back not less than 12 inches of face fabric, with not less than a 1-inch tuck, and vertically secured by sewing.
 - 3. Top Hems: Reinforced by double-stitching 3-1/2-inch- wide, heavy, jute or laminated synthetic webbing to top edge on back side of curtain with not less than 2 inches of face fabric turned under.
- C. Fullness:
 - 1. 100 Percent Fullness: Provide fullness, exclusive of turnbacks and hems, by sewing additional material into 6-inch double-stitched, flat, box pleats spaced at 12 inches o.c. tying or hooking together adjacent grommets 6 inches apart into round pleats spaced at 6 inches o.c.along top hem reinforcement.
- D. Grommets: Brass, No. 3, or No. 4.
 - 1. Black Curtains: Provide brass or aluminum grommets with black finish.
 - 2. Pleated Curtains: Double grommets for each round pleat and place 1 inch from corner of curtain; for snap hooks or S-hooks.
- E. Bottom Hems: Machine sew hems as follows unless otherwise indicated:
 - 1. For Curtains With Fullness:
 - a. Floor-Length Curtains: Hems not less than 6 inches deep, with individual weights in individual closed pockets sewn above finished bottom edge of curtain, and with open ends of hems sewn closed.
 - 2. Lining: Where indicated, provide lining for curtain in same fullness as face fabric and finished 2 inches shorter than face fabric. Sew or otherwise securely attach lining to top hem of face fabric. Attach lining to face fabric along bottom and side seams with 4-inch- long strips of heavy woven cotton tape. Sew lining to bottom edge of curtain allowing sufficient lining fabric for tucking to prevent shrinkage.

2.7 CURTAIN ACCESSORIES

- A. S-Hooks: Manufacturer's standard heavy-duty plated-wire hooks, not less than 2 inches long.
- B. Snap Hooks: Manufacturer's standard heavy-duty hooks, attached to top hem with nylon strap secured by rivets.

2.8 ALUMINUM CURTAIN TRACK

- A. Aluminum Track: Extruded aluminum, ASTM B 221; alloy and temper as recommended by manufacturer for strength and corrosion resistance; black paint finish; complete with necessary accessories for support and operation.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Automatic Devices Company; 500 series, Patriarc.; (Basis-of-Design)
 - b. H & H Specialties Inc.; 500 series.

- B. Track-Lap Clamp: Metal to match track channel for attaching two tracks at center overlap.
- C. Folding Guide: Where indicated, equip carriers with rear-fold or backpack guide and rubber spacers to fold curtain from the offstage end of the track; sized for use with operating line if any.
- D. Motorized Operation: Fabricate curtain track with cord and pulleys.
 - 1. Operating Line: 1/4-inch- diameter, stretch-resistant operating cable consisting of braided synthetic-fiber jacket over galvanized wire cable.
 - 2. End Pulleys: One single dead-end and one double live-end pulley. Provide sheave(s) with shielded ball bearing(s), housed in plated-steel body finished to match track. Provide with bracket for securing off-stage curtain end.

2.9 DRAW-CURTAIN MACHINES

- A. General: Operating machine of size and capacity recommended and provided by track manufacturer for each motorized curtain specified; complete with electric motor and factory-prewired motor controls, starter, gear-reduction unit, brake, and control station.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Automatic Devices Company; Silver Service Model No. 2950.
- B. Operator Type: Cable drum with grooved drum and cable tension device to automatically take up cable slack and retain cable in grooves.
- C. Motor Characteristics: Size sufficient to start, accelerate, and operate curtain in either direction from any position at indicated speeds without exceeding nameplate rating or service factor; complying with NEMA MG 1 and the following:
 - Electrical Characteristics:
 - a. Phase: Single phase.
 - b. Volts: NEMA standard voltage selected to operate on nominal circuit voltage to which motor is connected.
- D. Controllers, Disconnect Switches, Wiring Devices, and Wiring: Manufacturer's standard unless otherwise indicated.
- E. Coordinate wiring requirements and electrical characteristics of motors and other electrical devices with building electrical system and each location where installed.

2.10 CURTAIN RIGGING

1.

- A. Supports, Clamps, and Anchors: ASTM A 153/A 153M, Class B, galvanized sheet steel in manufacturer's standard thicknesses, galvanized after fabrication.
- B. Trim and Support Cable: 1/4-inch- diameter, 7x19 galvanized-steel cable with a breaking strength of 7000 lb. Provide fittings according to cable manufacturer's written instructions for size, number, and method of installation, including a drop-forged galvanized turnbuckle to allow for leveling.
- C. Trim and Support Chain: ASTM A 391/A 391M, Grade 80, hardened alloy steel chain rated for overhead lifting.
- D. Inserts, Bolts, Rivets, and Fasteners: Manufacturer's standard corrosion-resistant units.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for supporting members, blocking, installation tolerances, clearances, and other conditions affecting performance of stage-curtain work.
- B. Examine inserts, clips, blocking, or other supports required to be installed by others to support tracks and battens.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Install stage-curtain system according to curtain and track manufacturer's written instructions.

3.3 TRACK INSTALLATION

- A. Beam-Mounted Track: Install track by suspending from beam clamps securely mounted to I-beam structure at track-support spacing, according to manufacturer's written instructions.
- B. Track-Support Spacing: According to manufacturer's recommendations for applied loads, but not exceeding the following dimensions between supports:
 1. Heavy-Duty Track: 72 inches.
- C. Install track for center-parting curtains with not less than 24-inch overlap of track sections at center, supported by track lap clamps.

3.4 CURTAIN INSTALLATION

A. Track Hung: Secure curtains to track carriers with S-hooks or snap hooks.

3.5 DRAW-CURTAIN-MACHINE INSTALLATION

- A. Install each draw-curtain machine by securely mounting to the supporting construction, according to manufacturer's written instructions.
- B. Adjust each installation to function smoothly and lubricate as recommended by manufacturer.

SECTION 120413 - COMMON SUBMITTAL REQUIREMENTS FOR FURNISHINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes supplementary administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals specific to the work of this Division.
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A. Definitions:

- 1. Delegated Design: A portion or component of the Work identified by the Contract Documents to be designed by the Contractor, or an entity assigned by the Contractor, to satisfy performance and design criteria specified in the Contract Documents for that portion or component.
- 2. Registered Design Professional: Design professional, assigned by the Contractor, who is responsible for providing the delegated design work, and for certifying that the work is in compliance with the specified performance requirements and design criteria. Design professional shall be legally qualified to practice in jurisdiction where Project is located and shall be experienced in providing delegated design services of the kind indicated. Delegated design services are defined as those performed for installation of the system, assembly or product that are similar in material, design, and extent to those indicated for this Project.
- B. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- C. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Combine with Submittal Review Sheet before submitting to Architect .
- B. Project Closeout and Maintenance Material Submittals: See requirements in Division 01.
- C. Be responsible for quantities, weights, and dimensions to be confirmed and correlated at the site; for information that pertains solely to the fabrication processes and to the means, methods, techniques, sequences, and procedures of construction; and for coordination of the work of every trade, supplier, and subcontractor.
- D. Be responsible for each submittal to be in conformance with information given and the design intent expressed in the Contract Documents.
- E. Provide with each submittal specific written notice of any variation from the requirements of the Contract Documents by causing a specific notation to be made on the Submittal Review Sheet and Submittal Transmittal.

3.2 ARCHITECT'S AND GENERAL CONTRACTOR'S ACTION

- A. General: Architect will not review submittals that do not include the Submittal Review Sheet.
- B. Action Submittals: Architect's staff and consultants will review the submittal, and mark the Submittal Review Sheet with an action code. The code meanings are described below.

- C. Additional codes may be provided within comments or as an electronic submittal review stamp and shall be used in help indicating return of partial submittals.
- D. The Final Review Code on the Submittal Review Sheet prevails and governs the action of the overall submittal.
- E. Review Code meanings are as follows:
 - 1. Action Codes Permitting Use:
 - a. When an action code permitting use is assigned to a submittal, it does not authorize work that does not comply with the requirements of the Contract Documents. Acceptance of the Work will depend on compliance.
 - b. Code AP Approved: The Work covered by the submittal item may proceed, provided it complies with Contract Document requirements.
 - c. Code AN Approved as Noted: The Work covered by the submittal item may proceed, provided it complies with the Architect's notations and Contract Document requirements.
 - d. Code AN-R Approved as Noted Resubmit: Do not deliver or install the related work until the resubmittal has received Code AP or AN. However, fabrication and other off-site work covered by the submittal item may proceed, at the Contractor's risk, provided it complies with the Architect's notations and Contract Document requirements.
 - 2. Action Code Prohibiting Use:
 - a. Action Code REJ Not Approved: The Work covered by the submittal item, including purchasing, fabrication, delivery, and other activity, shall not proceed. Revise the submittal item or prepare a new item in accordance with the Architect's notations. Resubmit the corrected or new item without delay; do not permit submittal items marked "Not Approved" to be used. Work incorporating such items will be rejected.
 - 3. Action Code for Items Not Required:
 - a. Action Code X Not Requested by Contract Documents: The submittal item is not called for by the Contract Documents and is being returned unreviewed by the Architect except to the extent necessary to determine its status.
- F. Informational Submittals: For Architect's information only. Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
 - 1. Action Code for Information Only:
 - a. Action Code INF Information Only Received: The submittal item is not called for a return with a reviewed action code by the Contract Documents and is being returned un-reviewed by the Architect except to the extent necessary to determine its status.
- G. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- H. Incomplete submittals are not acceptable, will be considered non-responsive, and will be returned without review.
- I. Architect will return without review submittals received from sources other than the Contractor.
- J. Submittals not required by the Contract Documents may be returned by the Architect without action.
 - 1. Do not submit Material Safety Data Sheets. They will be returned without review.

3.3 SUBMITTAL TRANSMITTAL REQUIREMENTS

- A. Submittal Transmittal shall be a PDF file in electronic format. It is recommended, to expedite the submittal review, the electronic form be emailed for review to the Architect as early as possible.
 - 1. Submittal Numbering: See below.
 - 2. Contact Information: Full Name, Phone Number and Email Address.
- B. Submittal Definition
 - 1. Each submittal consists of items from only ONE Specifications section.
 - 2. Complete Submittal: If ALL the items required by the Specifications section are listed on one Submittal Form (including continuation sheet), it is a complete submittal.
 - 3. Partial Submittals: If it is necessary to divide the required items of a given Specifications section into two or more submittals to meet schedule or handling requirements, the separate submittals are partial submittals. All partial submittals have the same submittal number, and are differentiated by sequential P-numbers (see below).
 - 4. All items in each submittal, whether complete or partial, will be processed together: Individual items will not be 'broken out' for special handling. Arrange submittals accordingly.

C. Submittal Numbering

- 1. Number submittals as described below to assist tracking.
- 2. Number each submittal in the format nnnnn-nn.
 - a. The 6-digit number is the number of the section that requires the submittal. For example, 044200.
 - b. The 2-digit number is based on the numerical sequence of submittals from that section. In other words, for each section, the first submittal is 01, the second is 02, and so on. The 2-digit number does not change for partial or re-submittals, so that the submittal can be tracked.
 - c. P-Number for Partial Submittals: Number each partial submittal in the pee space, beginning with P1, and increasing by one for each partial submittal of that submittal. If the submittal is a complete submittal, leave the P space blank.
 - d. R-Number for Re-submittals: Number each re-submittal in the arr space, beginning with R1, and increasing by one for each re-submittal of that submittal. Do not include an R-Number for the initial submittal.
 - e. Examples:
 - 1) Initial Complete Submittal: 044200-01. First Re-Submittal: 044200-01-R1.
 - 2) Initial Partial Submittal: 044200-01-P1. Second Partial Submittal: 0044200-01-P2. First Re-submittal of Second Partial Submittal: 044200-R1-P2.

3.4 SUBMITTAL REVIEW SHEET REQUIREMENTS

- A. Provide Submittal Review Sheet in PDF format. Submit as the page after the Submittal Transmittal.
- B. When attached, the Submittal Review Sheet shall not obscure information contained in the submittal.
- C. Do not edit any of the information contained within the Submittal Review Sheet except as follows:
 1. Submittal Number: See Submittal Numbering in Submittal Transmittal Requirements paragraph.
- D. The Contractor shall submit the PDF file in a manner that will allow editing of the Submittal Review Sheet fields by SmithGroup and its consultants.

SECTION 126100 - FIXED AUDIENCE SEATING

PART1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes fixed audience seating with the following:
 - 1. Pedestal mounting.
 - 2. Upholstered chairs with wood arms and back.

1.3 DEFINITIONS

- A. Pan: An exposed, supporting seat bottom made of steel.
- B. Shell: An exposed, supporting seat bottom or back made of materials other than steel.
- C. Tablet Arm: A flat surface attached to a chair that has the primary function to support tasks such as writing and short-term reference-material handling.

1.4 COORDINATION

- A. Coordinate layout and installation of electrical wiring and devices with seating layout to ensure that floor junction boxes for electrical devices are accurately located to allow connection without exposed conduit.
- B. Coordinate layout and installation of diffuser pedestals with HVAC work and with properties of diffuser pedestals to ensure alignment, proper air diffusion, and correct seat locations.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of components, and finishes for fixed audience seating.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - 1. Seating Layout: Show seating layout, aisle widths, aisle-end alignment or stepping, row-lettering and chair-numbering scheme, chair widths, and chair spacing in each row.
 - 2. Accessories: Show locations and features of accessories, including left- and right-hand tablet arms, row letter, seat number and accessibility provisions.
- C. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:
 - 1. Wood and Plywood Materials and Finishes: Manufacturer's standard-size unit, not less than 3 inches square.
 - 2. Upholstery Fabric: Full width by 36-inch- long section of fabric from dye lot to be used for the Work, with specified treatments applied. Show complete pattern repeat. Mark top and face of fabric.
 - 3. Row-Letter and Chair-Number Plates: Full-size units with letters and numbers marked.
 - 4. Aisle Lighting: Full-size unit.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For fixed audience seating to include in operation and maintenance manuals.
 - 1. Include the following:
 - a. Methods for maintaining upholstery fabric.
 - b. Precautions for cleaning materials and methods that could be detrimental to seating finishes and performance.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials from the same production run that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Chair Seats and Backs: 5 percent of quantity installed for each type and size of chair seat and back.
 - 2. Tablet Arms: 5 percent of quantity installed for each type and size of tablet arm; left-hand mounted.
 - 3. Armrests: 5 percent of quantity installed for each type of armrest.
 - 4. Chair Seat Hinges: 5 percent of quantity installed.

5. Aisle-Lighting Fixture Bulbs: 5 percent of quantity installed.

1.8 QUALITY ASSURANCE

- A. Provide the following upon request:
 - 1. Product Certificates: For each type of fixed audience seating.
 - 2. Material Certificates: For each type of flame-retardant treatment of fabric.
 - 3. Field quality-control reports.

1.9 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of fixed audience seating that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including standards, and pedestals.
 - b. Faulty operation of self-rising seat mechanism.
 - c. Wear and deterioration of fabric and stitching beyond normal use.
 - d. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
 - 2. Warranty Periods: As follows, from date of Substantial Completion.
 - a. Structural: 10 years.
 - b. Operating Mechanisms: Five years.
 - c. Plastic, Wood, and Paint Components: One year.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Source Limitations: Obtain each type of seating required, including accessories and mounting components, from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Strength and Durability Performance: Chairs and components shall pass testing according to BIFMA X5.4.

2.3 FIXED AUDIENCE SEATING

- A. Fixed Audience Seating: Assembly-space seating in permanent arrangement as shown on Drawings.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Sedia Systems, J30, (Basis-of-Design)
 - b. American Seating Company.
 - c. Hussey Seating Company.
 - d. Irwin Seating Company.
 - e. Kl.
- B. Chair Mounting Standards: Floor attached of the following material:
 - 1. Steel: One-piece, heavy-tube or reinforced sheet with welded mounting plate and welded connections for seat pivots, backs, armrests, and end panels.
- C. Chair Mounting Pedestal: Floor-attached pedestal, manufacturer's standard .
- D. End Panels:
 - 1. Material: Steel andwood-veneer plywood.
 - 2. Style: Tapered with rounded corners.
- E. Fabric Upholstered Chairs:
 - 1. Front:
 - a. Padding Thickness: Minimum 1-1/4 inches.
 - b. Outer Back Surface: wood-veneer plywood, with concealed fasteners.
 - c. Top Corners: Rounded.
 - 2. Seat: Two part, top and bottom construction and as follows:
 - a. Top Padding Thickness: Minimum 1-1/2 inches at front and rear edges.
 - b. Seat Bottom: Fabric upholstered.
- F. Chair Width: Vary chair widths to optimize sightlines and row lengths, with chair width of 20 inches-26 inches from center to center of armrests.
- G. Back Height: High -style backs, 36-1/2 inches high.

- H. Back Pitch: Fixed.
 - 1. Back Angle: Angle for optimum viewing comfort.
- I. Chair Seat Hinges: Self-lubricating, with noiseless self-rising seat mechanism , positive internal stops cushioned with rubber or neoprene, and requiring no maintenance.
 1. Self-Rising Seat Mechanism: Gravity actuated, full fold.
- J. Armrests: Wood inside and outside vertical faces, molded plastic armrest cap with rounded edges and concealed mounting.
 - 1. Folding Armrests: Equip seating with folding center armrests.
- K. Tablet Arms: Manufacturer's standard-size, foldaway tablet arm with pheonolic writing surface over medium-density fiberboard or plywood core and with rounded, matching PVC edges.
 - 1. Mounting: Left-hand mounted unless otherwise indicated.
 - 2. Fold-Away Mechanism: Cast-iron or steel hinge and swivel mechanism that give positive support in open position and semiautomatic return to stored position below arm block and parallel to chair.
- L. Row-Letter and Chair-Number Plates: Manufacturer's standard.
 - 1. Material: Aluminum silver finish with black embossed characters.
 - 2. Row Letter Location: row letter on side of aisle armrest.
 - 3. Chair Number Plate Location: chair number on front edge of seat.
 - 4. Attachment: Manufacturer's standard method .
- M. Accessibility-Logo Plates: Manufacturer's standard.
 - 1. Material: Aluminum with black embossed characters.
 - 2. Location: As indicated on Drawings.
 - 3. Attachment: Manufacturer's standard method .

2.4 MATERIALS AND FINISHES

- A. Hardwood Lumber and Veneer Faces: Cherry selected to be free of visible defects.
 - 1. Stain and Finish: Manufacturer's standard, transparent, ultraviolet (UV)-resistant, protective finish As selected by Architect from manufacturer's full range
 - a. Stain: Parlor Cherry.
- B. Molded Plastic: High-density polyethylene or polypropylene, blow or injection molded, with surface that is mar and dent resistant.
 - 1. Provide with UV inhibitors to retard fading.
 - 2. Color : Black.
- Fabric: Manufacturer's standard 100 percent polyester with flame-retardant treatment.
 Color and Pattern: X2, Camira Arithmetic AK018.
- D. Upholstery Padding: Flexible, cellular, slab polyurethane foam.
- E. Metal Finish: Finish exposed metal parts with manufacturer's standard minimum 1.5-mil- thick, polyester baked-on powder coating.
 - 1. Color: Black.

2.5 FABRICATION

- A. Floor Attachments: Fabricate to conform to floor slope so that standards and pedestals are plumb and chairs are maintained at same angular relationship to vertical throughout Project.
- B. Upholstery: Fabricate fabric-covered cushions with molded padding beneath fabric and with fabric covering free of welts, creases, stretch lines, and wrinkles. For each upholstered component, install pile and pattern run in a consistent direction.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine floors, risers, and other adjacent work and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install seating in locations indicated and fasten securely to substrates according to manufacturer's written installation instructions.
 - 1. Install fixed audience seating with each chair capable of complying with performance requirements without failure or other conditions that might impair the chair's usefulness.
 - 2. Install standards and pedestals plumb.
 - 3. Install seating so moving components operate smoothly and quietly.
- B. Install chairs in curved rows at a constant radius.

3.3 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
 - 1. Inspect components, assemblies, and equipment, including connections, to verify proper, complete, and sturdy installation according to manufacturer's written instructions and product specifications.
 - 2. Verify that seats return to correct and uniform at-rest position.

3.4 ADJUSTING

- A. Adjust chair backs so that they are at proper angles and aligned with each other in uniform rows.
- B. Adjust hardware and moving parts to function smoothly so they operate easily. Lubricate bearings and sliding parts as recommended in writing by manufacturer.
- C. Repair minor abrasions and imperfections in finishes with coating that matches factory-applied finish.
- D. Replace damaged and malfunctioning components that cannot be acceptably repaired.
- E. Replace upholstery fabric damaged during installation or work of other trades.

SECTION 140413 - COMMON SUBMITTAL REQUIREMENTS FOR CONVEYING EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes supplementary administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals specific to the work of this Division.
- B. Related Requirements:
 - 1. Division 01 submittal requirements.

1.2 DEFINITIONS

- A. Contractor: Refers to an entity in direct Contract with the Owner to furnish and/or perform any portion of the Work of the Contract, including but not limited to a Construction Manager.
 - 1. Contractor shall review and approve Product Submittals prior to fowarding them to the Architect.
- B. Product Submittals: In general, Product Submittals show characteristics of the proposed construction in one of the following forms:
 - 1. Shop Drawings.
 - 2. Product Data.
 - 3. Samples.
- C. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- D. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."
- E. Submittal Review Sheet: Specific form required to accompany each submittal. Obtain Submittal Review Sheet from the SmithGroup Project Manager.

1.3 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Requirements specified for submittals are intended to provide efficient handling, while permitting review responsibilities to be carried out.
- B. Avoidable Resubmittals: The first two reviews of each specified submittal will be processed without cost to the Contractor. After the second review, the Owner may charge the Contractor for the cost of such additional processing, unless the processing results from approved Change Orders causing revisions to previously approved submittals.
- C. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 - 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 - 4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect reserve the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- D. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
 - 1. Initial Review: Allow 10 business days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required.

- 2. When a large volume of submittal materials is scheduled, additional review time may be required. Similarly, a particular submittal may require review completion in less than the agreed normal time. Due to variations in submittal volume and processing needs, agreed review time is not intended to apply to extreme conditions.
- 3. Resubmittal Review: Allow 10 business days for review of each resubmittal.
- 4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 15 business days for initial review of each submittal.
- E. Maintain at the Project Site ready access to the latest reviewed Shop Drawings and Product Data, and one set of samples.

1.4 DELEGATED-DESIGN SERVICES

A. Definitions:

- 1. Delegated Design: A portion or component of the Work identified by the Contract Documents to be designed by the Contractor, or an entity assigned by the Contractor, to satisfy performance and design criteria specified in the Contract Documents for that portion or component.
- 2. Registered Design Professional: Design professional, assigned by the Contractor, who is responsible for providing the delegated design work, and for certifying that the work is in compliance with the specified performance requirements and design criteria. Design professional shall be legally qualified to practice in jurisdiction where Project is located and shall be experienced in providing delegated design services of the kind indicated. Delegated design services are defined as those performed for installation of the system, assembly or product that are similar in material, design, and extent to those indicated for this Project.
- B. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- C. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Combine with Submittal Review Sheet before submitting to Architect .
- B. Project Closeout and Maintenance Material Submittals: See requirements in Division 01.
- C. Be responsible for quantities, weights, and dimensions to be confirmed and correlated at the site; for information that pertains solely to the fabrication processes and to the means, methods, techniques, sequences, and procedures of construction; and for coordination of the work of every trade, supplier, and subcontractor.
- D. Be responsible for each submittal to be in conformance with information given and the design intent expressed in the Contract Documents.
- E. Provide with each submittal specific written notice of any variation from the requirements of the Contract Documents by causing a specific notation to be made on the Submittal Review Sheet and Submittal Transmittal.

3.2 ARCHITECT'S AND GENERAL CONTRACTOR'S ACTION

- A. General: Architect will not review submittals that do not include the Submittal Review Sheet.
- B. Action Submittals: Architect's staff and consultants will review the submittal, and mark the Submittal Review Sheet with an action code. The code meanings are described below.

- C. Additional codes may be provided within comments or as an electronic submittal review stamp and shall be used in help indicating return of partial submittals.
- D. The Final Review Code on the Submittal Review Sheet prevails and governs the action of the overall submittal.
- E. Review Code meanings are as follows:
 - 1. Action Codes Permitting Use:
 - a. When an action code permitting use is assigned to a submittal, it does not authorize work that does not comply with the requirements of the Contract Documents. Acceptance of the Work will depend on compliance.
 - b. Code AP Approved: The Work covered by the submittal item may proceed, provided it complies with Contract Document requirements.
 - c. Code AN Approved as Noted: The Work covered by the submittal item may proceed, provided it complies with the Architect's notations and Contract Document requirements.
 - d. Code AN-R Approved as Noted Resubmit: Do not deliver or install the related work until the resubmittal has received Code AP or AN. However, fabrication and other off-site work covered by the submittal item may proceed, at the Contractor's risk, provided it complies with the Architect's notations and Contract Document requirements.
 - 2. Action Code Prohibiting Use:
 - a. Action Code REJ Not Approved: The Work covered by the submittal item, including purchasing, fabrication, delivery, and other activity, shall not proceed. Revise the submittal item or prepare a new item in accordance with the Architect's notations. Resubmit the corrected or new item without delay; do not permit submittal items marked "Not Approved" to be used. Work incorporating such items will be rejected.
 - 3. Action Code for Items Not Required:
 - a. Action Code X Not Requested by Contract Documents: The submittal item is not called for by the Contract Documents and is being returned unreviewed by the Architect except to the extent necessary to determine its status.
- F. Informational Submittals: For Architect's information only. Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
 - 1. Action Code for Information Only:
 - a. Action Code INF Information Only Received: The submittal item is not called for a return with a reviewed action code by the Contract Documents and is being returned un-reviewed by the Architect except to the extent necessary to determine its status.
- G. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- H. Incomplete submittals are not acceptable, will be considered non-responsive, and will be returned without review.
- I. Architect will return without review submittals received from sources other than the Contractor.
- J. Submittals not required by the Contract Documents may be returned by the Architect without action.
 - 1. Do not submit Material Safety Data Sheets. They will be returned without review.

3.3 SUBMITTAL TRANSMITTAL REQUIREMENTS

- A. Submittal Transmittal shall be a PDF file in electronic format. It is recommended, to expedite the submittal review, the electronic form be emailed for review to the Architect as early as possible.
 - 1. Submittal Numbering: See below.
 - 2. Contact Information: Full Name, Phone Number and Email Address.
- B. Submittal Definition
 - 1. Each submittal consists of items from only ONE Specifications section.
 - 2. Complete Submittal: If ALL the items required by the Specifications section are listed on one Submittal Form (including continuation sheet), it is a complete submittal.
 - 3. Partial Submittals: If it is necessary to divide the required items of a given Specifications section into two or more submittals to meet schedule or handling requirements, the separate submittals are partial submittals. All partial submittals have the same submittal number, and are differentiated by sequential P-numbers (see below).
 - 4. All items in each submittal, whether complete or partial, will be processed together: Individual items will not be 'broken out' for special handling. Arrange submittals accordingly.

C. Submittal Numbering

- 1. Number submittals as described below to assist tracking.
- 2. Number each submittal in the format nnnnn-nn.
 - a. The 6-digit number is the number of the section that requires the submittal. For example, 044200.
 - b. The 2-digit number is based on the numerical sequence of submittals from that section. In other words, for each section, the first submittal is 01, the second is 02, and so on. The 2-digit number does not change for partial or re-submittals, so that the submittal can be tracked.
 - c. P-Number for Partial Submittals: Number each partial submittal in the pee space, beginning with P1, and increasing by one for each partial submittal of that submittal. If the submittal is a complete submittal, leave the P space blank.
 - d. R-Number for Re-submittals: Number each re-submittal in the arr space, beginning with R1, and increasing by one for each re-submittal of that submittal. Do not include an R-Number for the initial submittal.
 - e. Examples:
 - 1) Initial Complete Submittal: 044200-01. First Re-Submittal: 044200-01-R1.
 - 2) Initial Partial Submittal: 044200-01-P1. Second Partial Submittal: 0044200-01-P2. First Re-submittal of Second Partial Submittal: 044200-R1-P2.

3.4 SUBMITTAL REVIEW SHEET REQUIREMENTS

- A. Provide Submittal Review Sheet in PDF format. Submit as the page after the Submittal Transmittal.
- B. When attached, the Submittal Review Sheet shall not obscure information contained in the submittal.
- C. Do not edit any of the information contained within the Submittal Review Sheet except as follows:
 1. Submittal Number: See Submittal Numbering in Submittal Transmittal Requirements paragraph.
- D. The Contractor shall submit the PDF file in a manner that will allow editing of the Submittal Review Sheet fields by SmithGroup and its consultants.

SECTION 144200 - WHEELCHAIR LIFTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Vertical platform lifts, unenclosed .

1.2 DEFINITIONS

A. Definitions in ASME A18.1 apply to Work of this Section.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components, and finishes for lifts.
 - 2. Include rated capacities, operating characteristics, electrical characteristics, safety features, controls, finishes, and accessories.
- B. Shop Drawings: For each lift.
 - 1. Include plans, elevations, sections, attachment details, and required clearances.
 - 2. Indicate dimensions, weights, loads, and points of load to building structure.
 - 3. Include diagrams for power, signal, and control wiring.
- C. Samples for Verification: For each type of exposed finish required, prepared on Samples of sizes indicated below:
 - 1. Metal Finish: Manufacturer's standard-size unit, not less than 3 inches square.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For each type of lift to include in operation and maintenance manuals.
 1. Include the following:
 - a. Parts list with sources indicated.
 - b. Recommended parts inventory list.
- B. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted use of lifts.
- C. Continuing Maintenance Proposal: Submit a continuing maintenance proposal from Installer to Owner, in the form of a standard one -year maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.
 1. Maintenance Proximity: Not more than two hours' normal travel time from Installer's place of
 - business to Project site.
- B. Provide the following upon request:
 - 1. Qualification Data: For manufacturer Installer.
 - 2. Product Certificates: For each type of lift.
 - a. Include statement that runway, ramp , dimensions as shown on Drawings, and electrical service as shown and specified are adequate for lift being provided.

1.6 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of lifts that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Seven years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Accessibility Standard: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design" and the Texas Accessibility Standards (TAS).

1.

B. Regulatory Requirements: Comply with ASME A18.1, "Safety Standard for Platform Lifts and Stairway Chairlifts."

2.2 VERTICAL PLATFORM LIFT

- A. Vertical Platform Lift, General: Preengineered lift system.
 - Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Ascension, Division of AGM Container Controls, Inc., Protege
 - b. Garaventa Lift, Genesis Opal (Basis-of-Design).
 - c. Savaria, Multilift Unenclosed.
- B. Number of Stops: Two.
- C. Platform Size: 36 by 54-7/8 inches, clear dimensions .
- D. Mast: 86 -3/8 inches minimum lifting height
- E. Rated Speed: 10 fpm.
- F. Power Supply: Electric.
 - 1. Electrical Characteristics:
 - a. Horsepower: 2.
 - b. Voltage: 120-V ac, single phase, 60 Hz. on a dedicated 20-amp circuit
- G. Emergency Operation: Provide manual operation to raise or lower unit to a landing in case of malfunction or power loss.
- H. Self-Supporting Unit: Support vertical loads of unit only at base, with lateral support only at landing levels.
- I. Platform: Aluminum floor plate with manufacturer's standard surface texture.
- J. Platform Enclosure and Door: Extruded-aluminum frame with flush aluminum-sheet panels.
- K. Platform configuration: straight through, front and rear openings
- L. Ramp: Fixed ramp matching platform to provide transition from floor to lift platform at bottom landing.
 - 1. Ramp Size: End ramps a minimum of 32 inches wide; length as required for slope.
 - 2. Ramp Slope: slope as recommended by manufacture and shall comply with accessibility
 - requirements.
 Ramp Finish: Finish ramps to match lift platform.
- M. Platform Controls: 24 VDC control circuit with the following:
 - 1. Direction Control: Continuous pressure rocker switch.
 - 2. Key switch.
- N. Call Station
 - 1. Mounting: Lower and upper landing, wall mounted.

2.3 MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Aluminum: Alloy and temper recommended by aluminum producer and finisher for type of use, corrosion resistance, and finish indicated; manufacturer's standard strengths and thicknesses for type of use.

2.4 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.5 FINISHES

- A. Steel Factory Finish:
 - 1. Baked-Enamel or Powder-Coat Finish: Clean, pretreat, and apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat with a minimum dry film thickness of 1 mil for topcoat.
 - 2. Color and Gloss: As selected by Architect from manufacturer's full range.
- B. Aluminum Finishes:

- 1. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
 - a. Color and Gloss: As indicated by manufacturer's designations.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, critical dimensions, and other conditions affecting performance of the Work.
- B. Minimum Headroom Clearance: Verify that installed lift will have a minimum headroom of 80 inches above any point on platform floor at any point of travel.
- C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Comply with ASME A18.1 and manufacturer's written instructions for installation of lifts unless otherwise indicated.
- B. Coordinate runway doors with platform travel and positioning, for accurate alignment and minimum clearance between platforms, runway doors, sills, and door frames.
- C. Position sills accurately and fill space under sills solidly with nonshrink, nonmetallic grout.
- Adjust stops for accurate stopping and leveling at each landing, within required tolerances.
 Leveling Tolerance: 1/4 inch up or down, regardless of load and direction of travel.
- E. Lubricate operating parts of lift, including drive mechanism, guide rails, hinges, safety devices, and hardware.
- F. Test safety devices and verify smoothness of required protective enclosures and other surfaces.

3.3 FIELD QUALITY CONTROL

- A. Acceptance Testing: On completion of lift installation and before permitting use of lifts, perform acceptance tests as required and recommended by ASME A18.1 and authorities having jurisdiction.
- B. Operating Test: In addition to acceptance testing, load lifts to rated capacity and operate continuously for 30 minutes between lowest and highest landings served. Readjust stops, signal equipment, and other devices for accurate stopping and operation of system.
- C. Advise Owner, Architect, and authorities having jurisdiction in advance of dates and times tests are to be performed on lifts.

3.4 MAINTENANCE SERVICE

A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by skilled employees of lift Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper lift operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain lifts. Include a review of emergency systems and emergency procedures to be followed at time of operational failure and other building emergencies.
- B. Check operation of lifts with Owner's personnel present and before date of Substantial Completion. Determine that operating systems and devices are functioning properly.
- C. Check operation of lifts with Owner's personnel present not more than one month before end of warranty period. Determine that operating systems and devices are functioning properly.

SECTION 210413 - COMMON SUBMITTAL REQUIREMENTS FOR FIRE SUPPRESSION

PART1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Supplementary administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals specific to the work of this Division.
- B. Related Requirements:
 - 1. Division 01 submittal requirements.

1.3 DEFINITIONS

- A. Contractor: Refers to an entity in direct Contract with the Owner to furnish and/or perform any portion of the Work of the Contract, including but not limited to a Construction Manager.
 - 1. Contractor shall review and approve Product Submittals prior to fowarding them to the Architect.
- B. Product Submittals: In general, Product Submittals show characteristics of the proposed construction in one of the following forms:
 - 1. Shop Drawings.
 - 2. Product Data.
 - 3. Samples.
- C. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- D. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."
- E. Submittal Review Sheet: Specific form required to accompany each submittal. Obtain Submittal Review Sheet from the SmithGroup Project Manager.

1.4 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Requirements specified for submittals are intended to provide efficient handling, while permitting review responsibilities to be carried out.
- B. Avoidable Resubmittals: The first two reviews of each specified submittal will be processed without cost to the Contractor. After the second review, the Owner may charge the Contractor for the cost of such additional processing, unless the processing results from approved Change Orders causing revisions to previously approved submittals.
- C. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 - 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 - 4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architectreserve the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- D. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

- 1. Initial Review: Allow 10 business days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required.
- 2. When a large volume of submittal materials is scheduled, additional review time may be required. Similarly, a particular submittal may require review completion in less than the agreed normal time. Due to variations in submittal volume and processing needs, agreed review time is not intended to apply to extreme conditions.
- 3. Resubmittal Review: Allow 10 business days for review of each resubmittal.
- 4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 15 business days for initial review of each submittal.
- E. Maintain at the Project Site ready access to the latest reviewed Shop Drawings and Product Data, and one set of samples.

1.5 DELEGATED-DESIGN SERVICES

- A. Definitions:
 - 1. Delegated Design: A portion or component of the Work identified by the Contract Documents to be designed by the Contractor, or an entity assigned by the Contractor, to satisfy performance and design criteria specified in the Contract Documents for that portion or component.
 - 2. Registered Design Professional: Design professional, assigned by the Contractor, who is responsible for providing the delegated design work, and for certifying that the work is in compliance with the specified performance requirements and design criteria. Design professional shall be legally qualified to practice in jurisdiction where Project is located and shall be experienced in providing delegated design services of the kind indicated. Delegated design services are defined as those performed for installation of the system, assembly or product that are similar in material, design, and extent to those indicated for this Project.
- B. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- C. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Combine with Submittal Review Sheet before submitting to Architect .
- B. Project Closeout and Maintenance Material Submittals: See requirements in Division 01.
- C. Be responsible for quantities, weights, and dimensions to be confirmed and correlated at the site; for information that pertains solely to the fabrication processes and to the means, methods, techniques, sequences, and procedures of construction; and for coordination of the work of every trade, supplier, and subcontractor.
- D. Be responsible for each submittal to be in conformance with information given and the design intent expressed in the Contract Documents.
- E. Provide with each submittal specific written notice of any variation from the requirements of the Contract Documents by causing a specific notation to be made on the Submittal Review Sheet and Submittal Transmittal.

3.2 ARCHITECT'S AND GENERAL CONTRACTOR'S ACTION

A. General: Architect will not review submittals that do not include the Submittal Review Sheet.

- B. Action Submittals: Architect's staff and consultants will review the submittal, and mark the Submittal Review Sheet with an action code. The code meanings are described below.
- C. Additional codes may be provided within comments or as an electronic submittal review stamp and shall be used in help indicating return of partial submittals.
- D. The Final Review Code on the Submittal Review Sheet prevails and governs the action of the overall submittal.
- E. Review Code meanings are as follows:
 - 1. Action Codes Permitting Use:
 - a. When an action code permitting use is assigned to a submittal, it does not authorize work that does not comply with the requirements of the Contract Documents. Acceptance of the Work will depend on compliance.
 - b. Code AP Approved: The Work covered by the submittal item may proceed, provided it complies with Contract Document requirements.
 - c. Code AN Approved as Noted: The Work covered by the submittal item may proceed, provided it complies with the Architect's notations and Contract Document requirements.
 - d. Code AN-R Approved as Noted Resubmit: Do not deliver or install the related work until the resubmittal has received Code AP or AN. However, fabrication and other off-site work covered by the submittal item may proceed, at the Contractor's risk, provided it complies with the Architect's notations and Contract Document requirements.
 - 2. Action Code Prohibiting Use:
 - a. Action Code REJ Not Approved: The Work covered by the submittal item, including purchasing, fabrication, delivery, and other activity, shall not proceed. Revise the submittal item or prepare a new item in accordance with the Architect's notations. Resubmit the corrected or new item without delay; do not permit submittal items marked "Not Approved" to be used. Work incorporating such items will be rejected.
 - 3. Action Code for Items Not Required:
 - a. Action Code X Not Requested by Contract Documents: The submittal item is not called for by the Contract Documents and is being returned unreviewed by the Architect except to the extent necessary to determine its status.
- F. Informational Submittals: For Architect's information only. Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
 - 1. Action Code for Information Only:
 - a. Action Code INF Information Only Received: The submittal item is not called for a return with a reviewed action code by the Contract Documents and is being returned un-reviewed by the Architect except to the extent necessary to determine its status.
- G. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- H. Incomplete submittals are not acceptable, will be considered non-responsive, and will be returned without review.
- I. Architect will return without review or discard submittals received from sources other than the Contractor.
- J. Submittals not required by the Contract Documents may be returned by the Architect without action.
 1. Do not submit Material Safety Data Sheets. They will be returned without review.

3.3 SUBMITTAL TRANSMITTAL REQUIREMENTS

- A. Submittal Transmittal shall be a PDF file in electronic format. It is recommended, to expedite the submittal review, the electronic form be emailed for review to the Architect as early as possible.
 - 1. Submittal Numbering: See below.
 - 2. Contact Information: Full Name, Phone Number and Email Address.
- B. Submittal Definition
 - 1. Each submittal consists of items from only ONE Specifications section.
 - 2. Complete Submittal: If ALL the items required by the Specifications section are listed on one Submittal Form (including continuation sheet), it is a complete submittal.
 - 3. Partial Submittals: If it is necessary to divide the required items of a given Specifications section into two or more submittals to meet schedule or handling requirements, the separate submittals are partial submittals. All partial submittals have the same submittal number, and are differentiated by sequential P-numbers (see below).

- 4. All items in each submittal, whether complete or partial, will be processed together: Individual items will not be 'broken out' for special handling. Arrange submittals accordingly.
- C. Submittal Numbering
 - 1. Number submittals as described below to assist tracking.
 - 2. Number each submittal in the format nnnnn-nn.
 - a. The 6-digit number is the number of the section that requires the submittal. For example, 044200.
 - b. The 2-digit number is based on the numerical sequence of submittals from that section. In other words, for each section, the first submittal is 01, the second is 02, and so on. The 2-digit number does not change for partial or re-submittals, so that the submittal can be tracked.
 - c. P-Number for Partial Submittals: Number each partial submittal in the pee space, beginning with P1, and increasing by one for each partial submittal of that submittal. If the submittal is a complete submittal, leave the P space blank.
 - d. R-Number for Re-submittals: Number each re-submittal in the arr space, beginning with R1, and increasing by one for each re-submittal of that submittal. Do not include an R-Number for the initial submittal.
 - e. Examples:
 - 1) Initial Complete Submittal: 044200-01. First Re-Submittal: 044200-01-R1.
 - 2) Initial Partial Submittal: 044200-01-P1. Second Partial Submittal: 0044200-01-P2. First Re-submittal of Second Partial Submittal: 044200-R1-P2.

3.4 SUBMITTAL REVIEW SHEET REQUIREMENTS

- A. Provide Submittal Review Sheet in PDF format. Submit as the page after the Submittal Transmittal.
- B. When attached, the Submittal Review Sheet shall not obscure information contained in the submittal.
- C. Do not edit any of the information contained within the Submittal Review Sheet except as follows:
- 1. Submittal Number: See Submittal Numbering in Submittal Transmittal Requirements paragraph.
- D. The Contractor shall submit the PDF file in a manner that will allow editing of the Submittal Review Sheet fields by SmithGroup and its consultants.

SECTION 210518 - ESCUTCHEONS FOR FIRE-SUPPRESSION PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Escutcheons.
 - 2. Floor plates.

PART 2 - PRODUCTS

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.
- B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.
 - 1. Escutcheons for New Piping:
 - a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
 - b. Insulated Piping: One-piece, stamped-steel type or split-plate, stamped-steel type with concealed hinge .
 - c. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, stamped-steel type or split-plate, stamped-steel type with concealed hinge .
 - d. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, stamped-steel type or split-plate, stamped-steel type with concealed hinge .
 - e. Bare Piping in Unfinished Service Spaces: One-piece, stamped-steel type or split-plate, stamped-steel type with concealed hinge .
 - f. Bare Piping in Equipment Rooms: One-piece, stamped-steel type or split-plate, stamped-steel type with concealed hinge .
 - 2. Escutcheons for Existing Piping:
 - a. Insulated Piping: Split-plate, stamped-steel concealed type or with exposed rivet hinge.
 - b. Bare Piping at Wall and Floor Penetrations in Finished Spaces: Split-plate, stamped-steel type with concealed hinge.
 - c. Bare Piping at Ceiling Penetrations in Finished Spaces: Split-plate, stamped-steel type with concealed hinge.
 - d. Bare Piping in Unfinished Service Spaces: Split-plate, stamped-steel type with concealed hinge.
 - e. Bare Piping in Equipment Rooms: Split-plate, stamped-steel type with concealed hinge.
- C. Install floor plates for piping penetrations of equipment-room floors.
- D. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.
 - 1. New Piping: One-piece, floor-plate type.
 - 2. Existing Piping: Split-casting, floor-plate type.

3.2 FIELD QUALITY CONTROL

A. Replace broken and damaged escutcheons and floor plates using new materials.

SECTION 220413 - COMMON SUBMITTAL REQUIREMENTS FOR PLUMBING

PART1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Supplementary administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals specific to the work of this Division.
- B. Related Requirements:
 - 1. Division 01 submittal requirements.

1.3 DEFINITIONS

- A. Contractor: Refers to an entity in direct Contract with the Owner to furnish and/or perform any portion of the Work of the Contract, including but not limited to a Construction Manager.
 - 1. Contractor shall review and approve Product Submittals prior to fowarding them to the Architect.
- B. Product Submittals: In general, Product Submittals show characteristics of the proposed construction in one of the following forms:
 - 1. Shop Drawings.
 - 2. Product Data.
 - 3. Samples.
- C. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- D. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."
- E. Submittal Review Sheet: Specific form required to accompany each submittal. Obtain Submittal Review Sheet from the SmithGroup Project Manager.

1.4 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Requirements specified for submittals are intended to provide efficient handling, while permitting review responsibilities to be carried out.
- B. Avoidable Resubmittals: The first two reviews of each specified submittal will be processed without cost to the Contractor. After the second review, the Owner may charge the Contractor for the cost of such additional processing, unless the processing results from approved Change Orders causing revisions to previously approved submittals.
- C. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 - 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 - 4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. reserve the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- D. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

- 1. Initial Review: Allow business days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required.
- 2. When a large volume of submittal materials is scheduled, additional review time may be required. Similarly, a particular submittal may require review completion in less than the agreed normal time. Due to variations in submittal volume and processing needs, agreed review time is not intended to apply to extreme conditions.
- 3. Resubmittal Review: Allow business days for review of each resubmittal.
- 4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow business days for initial review of each submittal.
- E. Maintain at the Project Site ready access to the latest reviewed Shop Drawings and Product Data, and one set of samples.

1.5 DELEGATED-DESIGN SERVICES

- A. Definitions:
 - 1. Delegated Design: A portion or component of the Work identified by the Contract Documents to be designed by the Contractor, or an entity assigned by the Contractor, to satisfy performance and design criteria specified in the Contract Documents for that portion or component.
 - 2. Registered Design Professional: Design professional, assigned by the Contractor, who is responsible for providing the delegated design work, and for certifying that the work is in compliance with the specified performance requirements and design criteria. Design professional shall be legally qualified to practice in jurisdiction where Project is located and shall be experienced in providing delegated design services of the kind indicated. Delegated design services are defined as those performed for installation of the system, assembly or product that are similar in material, design, and extent to those indicated for this Project.
- B. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- C. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Combine with Submittal Review Sheet before submitting to Architect .
- B. Project Closeout and Maintenance Material Submittals: See requirements in Division 01.
- C. Be responsible for quantities, weights, and dimensions to be confirmed and correlated at the site; for information that pertains solely to the fabrication processes and to the means, methods, techniques, sequences, and procedures of construction; and for coordination of the work of every trade, supplier, and subcontractor.
- D. Be responsible for each submittal to be in conformance with information given and the design intent expressed in the Contract Documents.
- E. Provide with each submittal specific written notice of any variation from the requirements of the Contract Documents by causing a specific notation to be made on the Submittal Review Sheet and Submittal Transmittal.

3.2 ARCHITECT'S AND GENERAL CONTRACTOR'S ACTION

A. General: Architect will not review submittals that do not include the Submittal Review Sheet.

- B. Action Submittals: Architect's staff and consultants will review the submittal, and mark the Submittal Review Sheet with an action code. The code meanings are described below.
- C. Additional codes may be provided within comments or as an electronic submittal review stamp and shall be used in help indicating return of partial submittals.
- D. The Final Review Code on the Submittal Review Sheet prevails and governs the action of the overall submittal.
- E. Review Code meanings are as follows:
 - 1. Action Codes Permitting Use:
 - a. When an action code permitting use is assigned to a submittal, it does not authorize work that does not comply with the requirements of the Contract Documents. Acceptance of the Work will depend on compliance.
 - b. Code AP Approved: The Work covered by the submittal item may proceed, provided it complies with Contract Document requirements.
 - c. Code AN Approved as Noted: The Work covered by the submittal item may proceed, provided it complies with the Architect's notations and Contract Document requirements.
 - d. Code AN-R Approved as Noted Resubmit: Do not deliver or install the related work until the resubmittal has received Code AP or AN. However, fabrication and other off-site work covered by the submittal item may proceed, at the Contractor's risk, provided it complies with the Architect's notations and Contract Document requirements.
 - 2. Action Code Prohibiting Use:
 - a. Action Code REJ Not Approved: The Work covered by the submittal item, including purchasing, fabrication, delivery, and other activity, shall not proceed. Revise the submittal item or prepare a new item in accordance with the Architect's notations. Resubmit the corrected or new item without delay; do not permit submittal items marked "Not Approved" to be used. Work incorporating such items will be rejected.
 - 3. Action Code for Items Not Required:
 - a. Action Code X Not Requested by Contract Documents: The submittal item is not called for by the Contract Documents and is being returned unreviewed by the Architect except to the extent necessary to determine its status.
- F. Informational Submittals: For Architect's information only. Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
 - 1. Action Code for Information Only:
 - a. Action Code INF Information Only Received: The submittal item is not called for a return with a reviewed action code by the Contract Documents and is being returned un-reviewed by the Architect except to the extent necessary to determine its status.
- G. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- H. Incomplete submittals are not acceptable, will be considered non-responsive, and will be returned without review.
- I. Architect will submittals received from sources other than the Contractor.
- J. Submittals not required by the Contract Documents may be returned by the Architect without action.
 1. Do not submit Material Safety Data Sheets. They will be returned without review.

3.3 SUBMITTAL TRANSMITTAL REQUIREMENTS

- A. Submittal Transmittal shall be a PDF file in electronic format. It is recommended, to expedite the submittal review, the electronic form be emailed for review to the Architect as early as possible.
 - 1. Submittal Numbering: See below.
 - 2. Contact Information: Full Name, Phone Number and Email Address.
- B. Submittal Definition
 - 1. Each submittal consists of items from only ONE Specifications section.
 - 2. Complete Submittal: If ALL the items required by the Specifications section are listed on one Submittal Form (including continuation sheet), it is a complete submittal.
 - 3. Partial Submittals: If it is necessary to divide the required items of a given Specifications section into two or more submittals to meet schedule or handling requirements, the separate submittals are partial submittals. All partial submittals have the same submittal number, and are differentiated by sequential P-numbers (see below).

- 4. All items in each submittal, whether complete or partial, will be processed together: Individual items will not be 'broken out' for special handling. Arrange submittals accordingly.
- C. Submittal Numbering
 - 1. Number submittals as described below to assist tracking.
 - 2. Number each submittal in the format nnnnn-nn.
 - a. The 6-digit number is the number of the section that requires the submittal. For example, 044200.
 - b. The 2-digit number is based on the numerical sequence of submittals from that section. In other words, for each section, the first submittal is 01, the second is 02, and so on. The 2-digit number does not change for partial or re-submittals, so that the submittal can be tracked.
 - c. P-Number for Partial Submittals: Number each partial submittal in the pee space, beginning with P1, and increasing by one for each partial submittal of that submittal. If the submittal is a complete submittal, leave the P space blank.
 - d. R-Number for Re-submittals: Number each re-submittal in the arr space, beginning with R1, and increasing by one for each re-submittal of that submittal. Do not include an R-Number for the initial submittal.
 - e. Examples:
 - 1) Initial Complete Submittal: 044200-01. First Re-Submittal: 044200-01-R1.
 - 2) Initial Partial Submittal: 044200-01-P1. Second Partial Submittal: 0044200-01-P2. First Re-submittal of Second Partial Submittal: 044200-R1-P2.

3.4 SUBMITTAL REVIEW SHEET REQUIREMENTS

- A. Provide Submittal Review Sheet in PDF format. Submit as the page after the Submittal Transmittal.
- B. When attached, the Submittal Review Sheet shall not obscure information contained in the submittal.
- C. Do not edit any of the information contained within the Submittal Review Sheet except as follows:
- 1. Submittal Number: See Submittal Numbering in Submittal Transmittal Requirements paragraph.
- D. The Contractor shall submit the PDF file in a manner that will allow editing of the Submittal Review Sheet fields by SmithGroup and its consultants.

SECTION 220517 - SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Sleeves.
 - 2. Grout.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 SLEEVES

A. Galvanized-Steel-Sheet Sleeves: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

2.2 GROUT

- A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- B. Characteristics: Nonshrink; recommended for interior and exterior applications.
- C. Design Mix: 5000-psi, 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

- A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.
- B. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.
 - 1. Permanent sleeves are not required for holes in slabs formed by molded-PE or -PP sleeves.
 - 2. Cut sleeves to length for mounting flush with both surfaces.
 - a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.
 - 3. Using grout, seal the space outside of sleeves in slabs and walls without sleeve-seal system.
- C. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Section 078413 "Penetration Firestopping."

3.2 SLEEVE AND SLEEVE-SEAL SCHEDULE

- A. Use sleeves and sleeve seals for the following piping-penetration applications:
 - 1. Concrete Slabs-on-Grade:

a.

- Piping Smaller Than NPS 6: Galvanized-steel-pipe sleeves with sleeve-seal system .
 - 1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.
- 2. Concrete Slabs above Grade:
 - a. Piping Smaller Than NPS 6: Galvanized-steel-pipe sleeves .
- 3. Interior Partitions:
 - a. Piping Smaller Than NPS 6: Galvanized-steel-pipe sleeves .

SECTION 220518 - ESCUTCHEONS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:1. Escutcheons.

1.3 DEFINITIONS

A. Existing Piping to Remain: Existing piping that is not to be removed and that is not otherwise indicated to be removed and salvaged, or removed and reinstalled.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide products by one of the following:
 - 1. BrassCraft Manufacturing Co.; a Masco company.
 - 2. Dearborn Brass.

2.2 ESCUTCHEONS

- A. One-Piece, Stainless-Steel Type: With polished stainless-steel finish.
- B. One-Piece, Cast-Brass Type: With polished, chrome-plated finish and setscrew fastener.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.
- B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of insulated piping and with OD that completely covers opening.
 - 1. Escutcheons for New Piping:
 - a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep pattern.
 - b. Chrome-Plated Piping: One-piece cast brass with polished, chrome-plated finish.
 - c. Insulated Piping: One-piece cast brass with polished, chrome-plated finish.
 - d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece cast brass with polished, chrome-plated finish.
 - e. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece cast brass with polished, chrome-plated finish.
 - f. Bare Piping in Unfinished Service Spaces: One-piece cast brass with polished, chrome-plated finish.
 - g. Bare Piping in Equipment Rooms: One-piece cast brass with polished, chrome-plated finish.
- C. Install floor plates for piping penetrations of equipment-room floors.
- D. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.
 - 1. New Piping : One-piece, floor plate.
 - 2. Existing Piping: Split floor plate.

3.2 FIELD QUALITY CONTROL

A. Using new materials, replace broken and damaged escutcheons and floor plates.

SECTION 220523.12 - BALL VALVES FOR PLUMBING PIPING

PART1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Bronze ball valves.
 - 2. Steel ball valves.

1.3 DEFINITIONS

A. CWP: Cold working pressure.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of valve.1. Certification that products comply with NSF 61and NSF 372.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Prepare valves for shipping as follows:
 - 1. Protect internal parts against rust and corrosion.
 - 2. Protect threads, flange faces, and soldered ends.
 - 3. Set ball valves open to minimize exposure of functional surfaces.
- B. Use the following precautions during storage:
 - 1. Maintain valve end protection.
 - 2. Store valves indoors and maintain at higher-than-ambient-dew-point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.
- C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use operating handles or stems as lifting or rigging points.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

- A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.
- B. ASME Compliance:
 - 1. ASME B1.20.1 for threads for threaded end valves.
 - 2. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
 - 3. ASME B16.18 for solder-joint connections.
- C. NSF Compliance: NSF 61 Annex G and NSF 372 for valve materials for potable-water service.
- D. Bronze valves shall be made with dezincification-resistant materials. Brass valves made with copper alloy containing more than 15 percent zinc are not permitted.
- E. Valve Pressure-Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.
- F. Valve Sizes: Same as upstream piping unless otherwise indicated.
- G. Valve Actuator Types:
 - 1. Handlever: For quarter-turn valves smaller than NPS 4.
- H. Valves in Insulated Piping:
 - 1. Include 2-inch stem extensions.
 - 2. Extended operating handles of nonthermal-conductive material and protective sleeves that allow operation of valves without breaking vapor seals or disturbing insulation.
 - 3. Memory stops that are fully adjustable after insulation is applied.
- BALL VALVES FOR PLUMBING PIPING

2.2 BRONZE BALL VALVES

- A. Bronze Ball Valves, Two-Piece with Full Port and Stainless-Steel Trim:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following: a. Hammond Valve.
 - b. Milwaukee Valve Company.
 - 2. WATTSDescription:
 - a. Standard: MSS SP-110 or MSS-145.
 - b. CWP Rating: 600 psig.
 - c. Body Design: Two piece.
 - d. Body Material: Bronze.
 - e. Ends: Threaded or soldered.
 - f. Seats: PTFE.
 - g. Stem: Stainless steel.
 - h. Ball: Stainless steel, vented.
 - i. Port: Full.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.
- B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.
- C. Examine threads on valve and mating pipe for form and cleanliness.
- D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.
- E. Do not attempt to repair defective valves; replace with new valves.

3.2 VALVE INSTALLATION

- A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
- B. Locate valves for easy access and provide separate support where necessary.
- C. Install valves in horizontal piping with stem at or above center of pipe.
- D. Install valves in position to allow full stem movement.
- E. Install valve tags. Comply with requirements in Section 220553 "Identification for Plumbing Piping and Equipment" for valve tags and schedules.

3.3 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

- A. If valves with specified CWP ratings are unavailable, the same types of valves with higher CWP ratings may be substituted.
- B. Select valves with the following end connections:
 - 1. For Copper Tubing, NPS 2 and Smaller: Threaded ends except where solder-joint valve-end option or press-end option is indicated in valve schedules below.
 - 2. For Copper Tubing, NPS 2-1/2 to NPS 4: Flanged ends except where threaded valve-end option is indicated in valve schedules below.

3.4 LOW-PRESSURE, COMPRESSED-AIR VALVE SCHEDULE (150 PSIG OR LESS)

- A. Pipe NPS 2 and Smaller:
 - 1. Bronze Valves: May be provided with solder-joint ends instead of threaded ends.
 - 2. Bronze ball valves, two-piece with full port and stainless steel trim.
- B. Pipe NPS 2-1/2 and Larger:
 - 1. Steel and Iron Valves, NPS 2-1/2 to NPS 4: May be provided with threaded ends instead of flanged ends.

3.5 HIGH-PRESSURE, COMPRESSED-AIR VALVE SCHEDULE (150 TO 200 PSIG

- A. Pipe NPS 2 and Smaller:
 - 1. Bronze and Brass Valves: May be provided with solder-joint ends instead of threaded ends.
 - 2. Bronze ball valves, two-piece with full port and stainless steel trim.
 - 3. Bronze ball valves, three-piece with full port and stainless steel trim.
- B. Pipe NPS 2-1/2 and Larger:
 - 1. Steel and Iron Valves, NPS 2-1/2 to NPS 4: May be provided with threaded ends instead of flanged ends.
 - 2. Steel ball valves, Class 150 with full port.

3.6 DOMESTIC HOT- AND COLD-WATER VALVE SCHEDULE

- A. Pipe NPS 2 and Smaller:
 - 1. Bronze ball valves, two-piece with full port and stainless steel trim. Provide with threaded -joint ends.
 - 2. Bronze ball valves, three-piece with full port and stainless steel trim.
- B. Pipe NPS 2-1/2 and Larger:
 - 1. Steel and Iron Valves, NPS 2-1/2 to NPS 4: May be provided with threaded ends instead of flanged ends.
 - 2. Steel ball valves, Class 150 with full port.

SECTION 220529 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Metal pipe hangers and supports.
 - 2. Trapeze pipe hangers.
 - 3. Fastener systems.

B. Related Requirements:

- 1. Section 055000 "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.
- 2. Section 220516 "Expansion Fittings and Loops for Plumbing Piping" for pipe guides and anchors.
- 3. for vibration isolation devices.

1.3 DEFINITIONS

A. MSS: Manufacturers Standardization Society of The Valve and Fittings Industry Inc.

1.4 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design trapeze pipe hangers and equipment supports, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Structural Performance: Hangers and supports for plumbing piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.
 - 1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
 - 2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 METAL PIPE HANGERS AND SUPPORTS

- A. Carbon-Steel Pipe Hangers and Supports:
 - 1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
 - 2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
 - 3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
 - 4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
 - 5. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel .
- B. Copper Pipe Hangers:
 - 1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.
 - 2. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel .

2.2 TRAPEZE PIPE HANGERS

A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.3 FASTENER SYSTEMS

A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

B. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

2.4 MISCELLANEOUS MATERIALS

- A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.
- B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.
 - 1. Properties: Nonstaining, noncorrosive, and nongaseous.
 - 2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT INSTALLATION

- A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.
- B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.
 - 1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
 - Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.
- C. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.
- D. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
- E. Install lateral bracing with pipe hangers and supports to prevent swaying.
- F. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- G. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.
- H. Insulated Piping:
 - 1. Attach clamps and spacers to piping.
 - a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
 - b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
 - c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.
 - 2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
 - a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
 - 3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
 - a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
 - 4. Shield Dimensions for Pipe: Not less than the following:
 - a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
 - b. NPS 4: 12 inches long and 0.06 inchthick.
 - c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
 - d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
 - e. NPS 16 to NPS 24: 24 inches long and 0.105 inch thick.
 - 5. Pipes NPS 8 and Larger: Include wood or reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.
 - 6. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.2 METAL FABRICATIONS

- A. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
- B. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.3 ADJUSTING

- A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.
- B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.4 PAINTING

A. Touchup: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.5 HANGER AND SUPPORT SCHEDULE

- A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.
- B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.
- C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.
- D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.
- E. Use copper-plated pipe hangers and attachments for copper piping and tubing.
- F. Use instead of building attachments where required in concrete construction.

SECTION 220553 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Equipment labels.
 - 2. Pipe labels.
 - 3. Valve tags.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Valve Schedules: For each piping system to include in maintenance manuals.

PART 2 - PRODUCTS

2.1 PIPE LABELS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 1. Brady Corporation.
 - 2. Brimar Industries, Inc.
 - 3. Carlton Industries, LP.
 - 4. Craftmark Identification Systems.
 - 5. Marking Services Inc.
 - 6. Seton Identification Products.
- B. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.
- C. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.
- D. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.
- E. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings; also include pipe size and an arrow indicating flow direction.
 - 1. Flow-Direction Arrows: Integral with piping-system service lettering to accommodate both directions or as separate unit on each pipe label to indicate flow direction.
 - 2. Lettering Size: Size letters according to ASME A13.1 for piping.

2.2 VALVE TAGS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 1. Brady Corporation.
 - 2. Brimar Industries, Inc.
 - 3. Carlton Industries, LP.
 - 4. Craftmark Identification Systems.
 - 5. Marking Services Inc.
 - 6. Seton Identification Products.
- B. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.
 - 1. Tag Material: Brass, 0.032-inch , 0.032-inchminimum thickness, and having predrilled or stamped holes for attachment hardware.
 - 2. Fasteners: BrassS-hook.
- C. Valve Schedules: For each piping system, on 8-1/2-by-11-inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.
 - 1. Valve-tag schedule shall be included in operation and maintenance data.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 GENERAL INSTALLATION REQUIREMENTS

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- B. Coordinate installation of identifying devices with locations of access panels and doors.
- C. Install identifying devices before installing acoustical ceilings and similar concealment.

3.3 PIPE LABEL INSTALLATION

- A. Piping Color Coding: Painting of piping is specified in Section 099123 "Interior Painting."
- B. Pipe Label Locations: Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:
 - 1. Near each valve and control device.
 - 2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
 - 3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
 - 4. At access doors, manholes, and similar access points that permit view of concealed piping.
 - 5. Near major equipment items and other points of origination and termination.
 - 6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
 - 7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.
- C. Directional Flow Arrows: Arrows shall be used to indicate direction of flow in pipes, including pipes where flow is allowed in both directions.
- D. Pipe Label Color Schedule:

1.

2.

- Low-Pressure Compressed Air Piping:
 - a. Background: Safety blue.
 - b. Letter Colors: White.
- High-Pressure Compressed Air Piping:
 - a. Background: Safety blue.
 - b. Letter Colors: White.
- 3. Domestic Water Piping
 - a. Background: Safety green.
 - b. Letter Colors: White.
- 4. Sanitary Waste Piping:
 - a. Background Color: Safety black.
 - b. Letter Color: White.

3.4 VALVE-TAG INSTALLATION

- A. Install tags on valves and control devices in piping systems, except check valves, valves within factory-fabricated equipment units, shutoff valves, faucets, convenience and lawn-watering hose connections, and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.
- B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:
 - 1. Valve-Tag Size and Shape:
 - a. Cold Water: 1-1/2 inches, round.
 - b. Hot Water: 1-1/2 inches, round.
 - c. Low-Pressure Compressed Air: 1-1/2 inches, round .
 - d. High-Pressure Compressed Air: 1-1/2 inches, round .
 - 2. Valve-Tag Colors:
 - a. Cold Water: Natural.
 - b. Hot Water: Natural.

- c. Low-Pressure Compressed Air: Natural.d. High-Pressure Compressed Air: Natural.Letter Colors:
- 3.
 - Cold Water: White. a.
 - Hot Water: White. b.
 - Low-Pressure Compressed Air: White. c.
 - d. High-Pressure Compressed Air: White.

SECTION 220719 - PLUMBING PIPING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes insulating the following plumbing piping services:
 - 1. Domestic cold-water piping.
 - 2. Domestic hot-water piping.
 - 3. Domestic recirculating hot-water piping.
 - 4. Supplies and drains for handicap-accessible lavatories and sinks.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory- and field-applied, if any).

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.
- B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84 by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.
 - 1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
 - 2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.
- C. Comply with the following applicable standards and other requirements specified for miscellaneous components:
 - 1. Supply and Drain Protective Shielding Guards: ICC A117.1.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.6 COORDINATION

- A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."
- B. Coordinate clearance requirements with piping Installer for piping insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.
- C. Coordinate installation and testing of heat tracing.

1.7 SCHEDULING

- A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.
- B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

- A. Comply with requirements in "Piping Insulation Schedule, General," "Indoor Piping Insulation Schedule," "Outdoor, Aboveground Piping Insulation Schedule," and "Outdoor, Underground Piping Insulation Schedule" articles for where insulating materials shall be applied.
- B. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.
- D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.
- E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
- F. Cellular Glass: Inorganic, incombustible, foamed or cellulated glass with annealed, rigid, hermetically sealed cells. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
 - 1. Block Insulation: ASTM C 552, Type I.
 - 2. Special-Shaped Insulation: ASTM C 552, Type III.
 - 3. Preformed Pipe Insulation without Jacket: Comply with ASTM C 552, Type II, Class 1.
 - 4. Preformed Pipe Insulation with Factory-Applied ASJ: Comply with ASTM C 552, Type II, Class 2.
 - 5. Factory fabricate shapes according to ASTM C 450 and ASTM C 585.
- G. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type I. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

2.2 ADHESIVES

- A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.
- B. Cellular-Glass Adhesive: Two-component, thermosetting urethane adhesive containing no flammable solvents, with a service temperature range of minus 100 to plus 200 deg F.
 - 1. Products: Subject to compliance with requirements, provide the following:
 - a. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 81-84.
 - 2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- C. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
 - 1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-127.
 - b. Eagle Bridges Marathon Industries; 225.
 - c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-60/85-70.
 - d. Mon-Eco Industries, Inc.; 22-25.
 - 2. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- D. ASJ Adhesive, and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.
 - 1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-82.

- b. Eagle Bridges Marathon Industries; 225.
- c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-20.
- d. Mon-Eco Industries, Inc.; 22-25.
- 2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- 3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- E. PVC Jacket Adhesive: Compatible with PVC jacket.
 - 1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Dow Corning Corporation; 739, Dow Silicone.
 - b. Johns Manville; Zeston Perma-Weld, CEEL-TITE Solvent Welding Adhesive.
 - c. P.I.C. Plastics, Inc.; Welding Adhesive.
 - 2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.3 SEALANTS

- A. Joint Sealants:
 - 1. Joint Sealants for Cellular-Glass and Phenolic Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.
 - b. Eagle Bridges Marathon Industries; 405.
 - c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-45.
 - d. Mon-Eco Industries, Inc.; 44-05.
 - e. Pittsburgh Corning Corporation; Pittseal 444.
 - 2. Materials shall be compatible with insulation materials, jackets, and substrates.
 - 3. Permanently flexible, elastomeric sealant.
 - 4. Service Temperature Range: Minus 100 to plus 300 deg F.
 - 5. Color: White or gray.
 - 6. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 7. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- B. ASJ Flashing Sealants, and Vinyl, PVDC, and PVC Jacket Flashing Sealants:
 - 1. Products: Subject to compliance with requirements, provide the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.
 - 2. Materials shall be compatible with insulation materials, jackets, and substrates.
 - 3. Fire- and water-resistant, flexible, elastomeric sealant.
 - 4. Service Temperature Range: Minus 40 to plus 250 deg F.
 - 5. Color: White.
 - 6. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 7. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.4 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

- 1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
- 2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.
- 3. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.

2.5 FIELD-APPLIED JACKETS

- A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.
- B. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.
 - 1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Johns Manville; Zeston.
 - b. P.I.C. Plastics, Inc.; FG Series.
 - c. Proto Corporation; LoSmoke.
 - d. Speedline Corporation; SmokeSafe.
 - Adhesive: As recommended by jacket material manufacturer.
 - Adhesive: As
 Color: White.
 - 4. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.
 - a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.
- C. Metal Jacket:
 - 1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; Metal Jacketing Systems.
 - b. ITW Insulation Systems; Aluminum and Stainless Steel Jacketing.
 - c. RPR Products, Inc.; Insul-Mate.
 - d.

a.

- 2. Aluminum Jacket: Comply with ASTM B 209, Alloy 3003, 3005, 3105, or 5005, Temper H-14.
 - a. Sheet and roll stock ready for shop or field sizing.
 - b. Finish and thickness are indicated in field-applied jacket schedules.
 - c. Moisture Barrier for Indoor Applications: 1-mil- thick, heat-bonded polyethylene and kraft paper.
 - d. Moisture Barrier for Outdoor Applications: 3-mil- thick, heat-bonded polyethylene and kraft paper.
 - e. Factory-Fabricated Fitting Covers:
 - 1) Same material, finish, and thickness as jacket.
 - 2) Preformed 2-piece or gore, 45- and 90-degree, short- and long-radius elbows.
 - 3) Tee covers.
 - 4) Flange and union covers.
 - 5) End caps.
 - 6) Beveled collars.
 - 7) Valve covers.
 - 8) Field fabricate fitting covers only if factory-fabricated fitting covers are not available. Stainless-Steel Jacket: ASTM A 167 or ASTM A 240/A 240M.
 - a. Sheet and roll stock ready for shop or field sizing.
 - b. Material, finish, and thickness are indicated in field-applied jacket schedules.
 - c. Moisture Barrier for Indoor Applications: 1-mil- thick, heat-bonded polyethylene and kraft paper.
 - d. Moisture Barrier for Outdoor Applications: 3-mil- thick, heat-bonded polyethylene and kraft paper.
 - e. Factory-Fabricated Fitting Covers:
 - 1) Same material, finish, and thickness as jacket.
 - 2) Preformed 2-piece or gore, 45- and 90-degree, short- and long-radius elbows.
 - 3) Tee covers.
 - 4) Flange and union covers.

3.

- 5) End caps.
- 6) Beveled collars.
- 7) Valve covers.
- 8) Field fabricate fitting covers only if factory-fabricated fitting covers are not available.
- D. Underground Direct-Buried Jacket: 125-mil- thick vapor barrier and waterproofing membrane consisting of a rubberized bituminous resin reinforced with a woven-glass fiber or polyester scrim and laminated aluminum foil.
 - 1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Pittsburgh Corning Corporation; Pittwrap.
 - b. Polyguard Products, Inc.; Insulrap No Torch 125.

2.6 TAPES

- A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.
 - 1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. ABI, Ideal Tape Division; 428 AWF ASJ.
 - b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0836.
 - c. Compac Corporation; 104 and 105.
 - d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.
 - 2. Width: 3 inches.
 - 3. Thickness: 11.5 mils.
 - 4. Adhesion: 90 ounces force/inch in width.
 - 5. Elongation: 2 percent.
 - 6. Tensile Strength: 40 lbf/inch in width.
 - 7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.
- B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.
 - 1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. ABI, Ideal Tape Division; 491 AWF FSK.
 - b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0827.
 - c. Compac Corporation; 110 and 111.
 - d. Venture Tape; 1525 CW NT, 1528 CW, and 1528 CW/SQ.
 - 2. Width: 3 inches.
 - 3. Thickness: 6.5 mils.
 - 4. Adhesion: 90 ounces force/inch in width.
 - 5. Elongation: 2 percent.
 - 6. Tensile Strength: 40 lbf/inch in width.
 - 7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

2.7 PROTECTIVE SHIELDING GUARDS

- A. Protective Shielding Pipe Covers,
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Engineered Brass Company.
 - b. Insul-Tect Products Co.; a subsidiary of MVG Molded Products.
 - c. McGuire Manufacturing.
 - d. Plumberex.
 - e. Truebro; a brand of IPS Corporation.
 - f. Zurn Industries, LLC; Tubular Brass Plumbing Products Operation.
 - 2. Description: Manufactured plastic wraps for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with Americans with Disabilities Act (ADA) requirements.
- B. Protective Shielding Piping Enclosures,
 - Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- a. Truebro; a brand of IPS Corporation.
- b. Zurn Industries, LLC; Tubular Brass Plumbing Products Operation.
- 2. Description: Manufactured plastic enclosure for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with ADA requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.
 - 1. Verify that systems to be insulated have been tested and are free of defects.
 - 2. Verify that surfaces to be insulated are clean and dry.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.
- B. Surface Preparation: Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:
 - 1. Stainless Steel: Coat 300 series stainless steel with an epoxy primer 5 mils thick and an epoxy finish 5 mils thick if operating in a temperature range between 140 and 300 deg F. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
 - Carbon Steel: Coat carbon steel operating at a service temperature between 32 and 300 deg F with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
- C. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.
- D. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.3 GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.
- B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.
- C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E. Install multiple layers of insulation with longitudinal and end seams staggered.
- F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- G. Keep insulation materials dry during application and finishing.
- H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- I. Install insulation with least number of joints practical.
- J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
 - 1. Install insulation continuously through hangers and around anchor attachments.
 - 2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
 - 3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
 - 4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

- K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- L. Install insulation with factory-applied jackets as follows:
 - 1. Draw jacket tight and smooth.
 - 2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
 - 3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c.
 - a. For below-ambient services, apply vapor-barrier mastic over staples.
 - 4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
 - 5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.
- M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.
- P. For above-ambient services, do not install insulation to the following:
 - 1. Vibration-control devices.
 - 2. Testing agency labels and stamps.
 - 3. Nameplates and data plates.
 - 4. Cleanouts.

3.4 PENETRATIONS

- A. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
- B. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.
 - 1. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping and fire-resistive joint sealers.
- C. Insulation Installation at Floor Penetrations:
 - 1. Pipe: Install insulation continuously through floor penetrations.
 - 2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.5 GENERAL PIPE INSULATION INSTALLATION

- A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.
- B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:
 - 1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
 - 2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
 - 3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
 - 4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.

- 5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.
- 6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
- 7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
- For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
- 9. Stencil or label the outside insulation jacket of each union with the word "union." Match size and color of pipe labels.
- C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.
- D. Install removable insulation covers at locations indicated. Installation shall conform to the following:
 - 1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
 - 2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
 - 3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.
 - 4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.
 - 5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.6 INSTALLATION OF CELLULAR-GLASS INSULATION

- A. Insulation Installation on Straight Pipes and Tubes:
 - 1. Secure each layer of insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
 - 2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
 - 3. For insulation with factory-applied jackets on above-ambient services, secure laps with outward clinched staples at 6 inches o.c.
 - 4. For insulation with factory-applied jackets on below-ambient services, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.
- B. Insulation Installation on Pipe Flanges:
 - 1. Install preformed pipe insulation to outer diameter of pipe flange.
 - 2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.

- 3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of cellular-glass block insulation of same thickness as pipe insulation.
- 4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.
- C. Insulation Installation on Pipe Fittings and Elbows:
 - 1. Install preformed sections of same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
 - 2. When preformed sections of insulation are not available, install mitered sections of cellular-glass insulation. Secure insulation materials with wire or bands.
- D. Insulation Installation on Valves and Pipe Specialties:
 - 1. Install preformed sections of cellular-glass insulation to valve body.
 - 2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
 - 3. Install insulation to flanges as specified for flange insulation application.

3.7 FINISHES

- A. Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."
 - 1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.
 - a. Finish Coat Material: Interior, flat, latex-emulsion size.
- B. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.
- C. Do not field paint aluminum or stainless-steel jackets.

3.8 PIPING INSULATION SCHEDULE, GENERAL

- A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.
- B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:
 - 1. Drainage piping located in crawl spaces.
 - 2. Underground piping.
 - 3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.9 INDOOR PIPING INSULATION SCHEDULE

A. Domestic Cold Water:

2.

- 1. NPS 1 and Smaller: Insulation shall be the following:
 - a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
 - NPS 1-1/4 and Larger: Insulation shall be the following:
 - a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 1/2 inch thick.
- B. Domestic Hot and Recirculated Hot Water:
 - 1. NPS 1-1/4 and Smaller: Insulation shall be the following:
 - a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
 - 2. NPS 1-1/2 and Larger: Insulation shall be the following:
 - a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 1/2 inch thick.
- C. Exposed Sanitary Drains, Domestic Water, Domestic Hot Water, and Stops for Plumbing Fixtures for People with Disabilities:
 - 1. All Pipe Sizes: Insulation shall be the following:
 - a. Polyolefin: 1/2 inch thick.

SECTION 221116 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Aboveground domestic water pipes, tubes, and fittings inside buildings.

1.3 ACTION SUBMITTALS

A. Product Data: For transition fittings and dielectric fittings.

1.4 INFORMATIONAL SUBMITTALS

- A. System purging and disinfecting activities report.
- B. Field quality-control reports.

1.5 FIELD CONDITIONS

- A. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water service according to requirements indicated:
 - 1. Notify Architect no fewer than two days in advance of proposed interruption of water service.
 - 2. Do not interrupt water service without Architect's Owner's written permission.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

- A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.
- B. Potable-water piping and components shall comply with NSF 14 and NSF 61 Annex G. Plastic piping components shall be marked with "NSF-pw."

2.2 COPPER TUBE AND FITTINGS

- A. Hard Copper Tube: ASTM B 88, Type L water tube, drawn temper.
- B. Soft Copper Tube: ASTM B 88, Type K water tube, annealed temper.
- C. Cast-Copper, Solder-Joint Fittings: ASME B16.18, pressure fittings.
- D. Wrought-Copper, Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.
- E. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.
- F. Copper Unions:
 - 1. MSS SP-123.
 - 2. Cast-copper-alloy, hexagonal-stock body.
 - 3. Ball-and-socket, metal-to-metal seating surfaces.
 - 4. Solder-joint or threaded ends.

2.3 PIPING JOINING MATERIALS

- A. Pipe-Flange Gasket Materials:
 - 1. AWWA C110/A21.10, rubber, flat face, 1/8 inch thick or ASME B16.21, nonmetallic and asbestos free unless otherwise indicated.
 - 2. Full-face or ring type unless otherwise indicated.
- B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.
- C. Solder Filler Metals: ASTM B 32, lead-free alloys.
- D. Flux: ASTM B 813, water flushable.
- E. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.

2.4 DIELECTRIC FITTINGS

- A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.
- B. Dielectric Unions:

1.

- Manufacturers: Subject to compliance with requirements, provide products by the following :
 - a. Jomar Valve.
 - b. Matco-Norca.
 - c. Watts; a Watts Water Technologies company.
 - d. Wilkins.
- 2. Standard: ASSE 1079.
- 3. Pressure Rating: 125 psig minimum at 180 deg F .
- 4. End Connections: Solder-joint copper alloy and threaded ferrous.
- C. Dielectric Nipples:

1.

- Manufacturers: Subject to compliance with requirements, provide products by the following :
 - a. Grinnell Mechanical Products.
 - b. Matco-Norca.
 - c. Precision Plumbing Products, Inc.
- 2. Standard: IAPMO PS 66.
- 3. Electroplated steel nipple complying with ASTM F 1545.
- 4. Pressure Rating and Temperature: 300 psig at 225 deg F
- 5. End Connections: Male threaded or grooved.
- 6. Lining: Inert and noncorrosive, propylene.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.
- B. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve inside the building at each domestic water-service entrance. Comply with requirements for pressure gages in Section 220519 "Meters and Gages for Plumbing Piping" and with requirements for drain valves and strainers in Section 221119 "Domestic Water Piping Specialties."
- C. Install domestic water piping level without pitch and plumb.
- D. Rough-in domestic water piping for water-meter installation according to utility company's requirements.
- E. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.
- F. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- G. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.
- H. Install piping to permit valve servicing.
- I. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than the system pressure rating used in applications below unless otherwise indicated.
- J. Install piping free of sags and bends.
- K. Install fittings for changes in direction and branch connections.
- L. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."
- M. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.2 JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

C. Joints for Dissimilar-Material Piping: Make joints using adapters compatible with materials of both piping systems.

3.3 HANGER AND SUPPORT INSTALLATION

- A. Comply with requirements for pipe hanger, support products, and installation in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."
 - 1. Vertical Piping: MSS Type 8 or 42, clamps.
 - 2. Individual, Straight, Horizontal Piping Runs:
 - a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
 - b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
 - c. Longer Than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.
 - 3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
 - 4. Base of Vertical Piping: MSS Type 52, spring hangers.
- B. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch.
- C. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 3/4 and Smaller: 60 inches with 3/8-inch rod.
 - 2. NPS 1 and NPS 1-1/4: 72 inches with 3/8-inch rod.
 - 3. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
 - 4. NPS 2-1/2: 108 inches with 1/2-inch rod.
- D. Install supports for vertical copper tubing every 10 feet.
- E. Support piping and tubing not listed in this article according to MSS SP-69 and manufacturer's written instructions.

3.4 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. When installing piping adjacent to equipment and machines, allow space for service and maintenance.

3.5 IDENTIFICATION

1.

2.

- A. Identify system components. Comply with requirements for identification materials and installation in Section 220553 "Identification for Plumbing Piping and Equipment."
- B. Label pressure piping with system operating pressure.

3.6 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 - Piping Inspections:
 - a. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
 - During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:
 - 1) Roughing-in Inspection: Arrange for inspection of piping before concealing or closing in after roughing in and before setting fixtures.
 - 2) Final Inspection: Arrange for authorities having jurisdiction to observe tests specified in "Piping Tests" Subparagraph below and to ensure compliance with requirements.
 - c. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
 - d. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction. Piping Tests:
 - a. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
 - b. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
 - c. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.

- d. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow it to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
- e. Repair leaks and defects with new materials, and retest piping or portion thereof until satisfactory results are obtained.
- f. Prepare reports for tests and for corrective action required.
- B. Domestic water piping will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

3.7 ADJUSTING

- A. Perform the following adjustments before operation:
 - 1. Close drain valves, hydrants, and hose bibbs.
 - 2. Remove plugs used during testing of piping and for temporary sealing of piping during installation.
 - 3. Remove and clean strainer screens. Close drain valves and replace drain plugs.
 - 4. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and are clean and ready for use.
 - 5. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.8 CLEANING

- A. Clean and disinfect potable domestic water piping as follows:
 - 1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
 - Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:
 - a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
 - b. Fill and isolate system according to either of the following:
 - 1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
 - Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.
 - c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
 - d. Repeat procedures if biological examination shows contamination.
 - e. Submit water samples in sterile bottles to authorities having jurisdiction.
 - 3. Secondary disinfection is required for projects constructed in phases before building is turned over to the owner, to prevent Legionella and other pathogens growth in standing domestic water system.
- B. Clean non-potable domestic water piping as follows:
 - 1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
 - 2. Use purging procedures prescribed by authorities having jurisdiction or; if methods are not prescribed, follow procedures described below:
 - a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
 - b. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.
- C. Prepare and submit reports of purging and disinfecting activities. Include copies of water-sample approvals from authorities having jurisdiction.
- D. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

SECTION 221119 - DOMESTIC WATER PIPING SPECIALTIES

PART1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Balancing valves.
 - 2. Temperature-actuated, water mixing valves.
 - 3. Outlet boxes.
 - 4. Water-hammer arresters.
 - 5. Trap-seal primer systems.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For domestic water piping specialties to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PIPING SPECIALTIES

A. Potable-water piping and components shall comply with NSF 61 Annex G and NSF 14.Mark "NSF-pw" on plastic piping components.

2.2 PERFORMANCE REQUIREMENTS

A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig unless otherwise indicated.

2.3 BACKFLOW PREVENTERS

- A. Dual-Check-Valve Backflow Preventers:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following :
 - a. FEBCO.
 - b. Watts; a Watts Water Technologies company.
 - c. Zurn Industries, LLC.
 - 2. Standard: ASSE 1024.
 - 3. Operation: Continuous-pressure applications.
 - 4. Body: Bronze with union inlet.

2.4 Constant Flow Control Balancing Valves:

- A. Base:
 - 1. Flow Design Inc. Autoflow.
- B. Optional:

2.5 Griswold Controls COMBO.

2.6 Preso.

- A. Balancing valves, constant flow control:
 - 1. Factory calibrated, direct acting, automatic pressure compensating.
 - Control flow rates within 5 percent of flow rating over operating pressure differential range.
 a. Set flow rating according to plans:
 - 3. Pressure differential range:
 - a. 4-57 PSID.
 - 4. Threaded brass or copper sweat body with stainless steel internal parts.
 - 5. Provide a metal identification tag with chain for each installed valve.

- a. Identify zone or location, valve model number, flow rate, direction of flow, and differential pressure range.
- 6. Provide with integral unions to allow field exchange of internal components without removing valve body from pipeline.
- 7. Provide manual valve upstream and downstream of each valve.

2.7 TEMPERATURE-ACTUATED, WATER MIXING VALVES

- A. Individual-Fixture, Water Tempering Valves:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following
 - a. Leonard Valve Company.
 - b. Powers.
 - c. Watts; a Watts Water Technologies company.
 - 2. Standard: ASSE 1016, thermostatically controlled, water tempering valve.
 - 3. Pressure Rating: 125 psig minimum unless otherwise indicated.
 - 4. Body: Bronze body with corrosion-resistant interior components.
 - 5. Temperature Control: Adjustable.
 - 6. Inlets and Outlet: Threaded.
 - 7. Finish: Rough or chrome-plated bronze.

2.8 OUTLET BOXES

1.

- A. Clothes Washer Outlet Boxes :
 - Manufacturers: Subject to compliance with requirements, provide products by the following :
 - a. Guy Gray Manufacturing Co., Inc.
 - b. IPS Corporation.
 - c. Oatey.
 - d. Watts; a Watts Water Technologies company.
 - 2. Mounting: Recessed.
 - 3. Material and Finish: Enameled-steel or epoxy-painted-steel box and faceplate.
 - 4. Faucet: Combination valved fitting or separate hot- and cold-water valved fittings complying with ASME A112.18.1. Include garden-hose thread complying with ASME B1.20.7 on outlets.
 - 5. Supply Shutoff Fittings: NPS 1/2 gate, globe, or ball valves and NPS 1/2 copper, water tubing.
 - 6. Drain: NPS 2 standpipe and P-trap for direct waste connection to drainage piping.
 - 7. Inlet Hoses: Two 60-inch- long, rubber household clothes washer inlet hoses with female, garden-hose-thread couplings. Include rubber washers.
 - 8. Drain Hose: One 48-inch- long, rubber household clothes washer drain hose with hooked end.
- B. Icemaker Outlet Boxes :
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following :
 - a. IPS Corporation.
 - b. Oatey.
 - 2. Mounting: Recessed.
 - 3. Material and Finish: Enameled-steel, epoxy-painted-steel, or plastic box and faceplate.
 - 4. Faucet: Valved fitting complying with ASME A112.18.1. Include NPS 1/2 or smaller copper tube outlet.
 - 5. Supply Shutoff Fitting: NPS 1/2 gate, globe, or ball valve and NPS 1/2 copper, water tubing.

WATER-HAMMER ARRESTERS

A. Water-Hammer Arresters :

2.9

- 1. Manufacturers: Subject to compliance with requirements, provide products by the following :
 - a. MIFAB, Inc.
 - b. Precision Plumbing Products, Inc.
 - c. Sioux Chief Manufacturing Company, Inc.
- 2. Water Hammer Arresters
 - a. Engineered, and certified in accordance with Plumbing and Drainage Institute Standard WH-201.
 - b. Cold rolled and spin closed seamless chamber end.
 - c. Pressurized air cushion.
 - d. Type L copper tube.
 - e. Polypro piston with two EPDM O-rings lubricated with Dow-Corning, 111 FDA approved silicone compound.
 - f. Seamless cold formed reduction.

- g. Certified ANSI/ASSE 1010 Standard.
- h. Sioux Chief model 650 Series or 660 Series.
- i. Install on all hot and cold water lines.
 - 1) At each fixture, or:
 - 2) Between the last two fixtures on multiple fixture branch lines up to 20 FT in length, or:
 - 3) Between the last two fixtures and at the approximate midpoint on multiple fixture branch lines over 20 FT in length.
 - 4) At other equipment with solenoid or quick closing shut-off valves.
 - 5) Size water hammer arrestors as scheduled, if pipe diameter not scheduled size per manufacturer recommendation or per PDI Standard WH-201.

2.10 TRAP-SEAL PRIMER SYSTEMS

- A. Trap-Seal Primer Systems:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following : a. Precision Plumbing Products, Inc.
 - 2. Standard: ASSE 1044.
 - 3. Piping: NPS 3/4, ASTM B 88, Type L; copper, water tubing.
 - 4. Cabinet: Surface-mounted steel box with stainless-steel cover.
 - Electric Controls: 24-hour timer, solenoid valve, and manual switch for 120-V ac power.
 a. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a gualified testing agency, and marked for intended location and application.
 - 6. Vacuum Breaker: ASSE 1001.
 - 7. Number Outlets: Four.
 - 8. Size Outlets: NPS 1/2.

PART 3 - EXECUTION

3.1 CONNECTIONS

- A. Comply with requirements for ground equipment in Section 260526 "Grounding and Bonding for Electrical Systems."
- B. Fire-retardant-treated-wood blocking is specified in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" for electrical connections.

3.2 LABELING AND IDENTIFYING

- A. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on or near each of the following:
 - 1. Trap-seal primer systems.
- B. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit. Nameplates and signs are specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.3 ADJUSTING

- A. Set field-adjustable flow set points of balancing valves.
- B. Set field-adjustable temperature set points of temperature-actuated, water mixing valves.

SECTION 221316 - SANITARY WASTE AND VENT PIPING

PART1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Pipe, tube, and fittings.
 - 2. Specialty pipe fittings.

B. Related Requirements:

- 1. Section 221313 "Facility Sanitary Sewers" for sanitary sewerage piping and structures outside the building.
- 2. Section 221329 "Sanitary Sewerage Pumps" for effluent and sewage pumps.
- 3. Section 226600 "Chemical-Waste Systems for Laboratory and Healthcare Facilities" for chemical-waste and vent piping systems.

1.3 PERFORMANCE REQUIREMENTS

- A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:
 - 1. Soil, Waste, and Vent Piping: 10-foot head of water.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.5 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- B. Comply with NSF/ANSI 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic drain, waste, and vent piping and "NSF-sewer" for plastic sewer piping.

1.6 PROJECT CONDITIONS

- A. Interruption of Existing Sanitary Waste Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
 - 1. Notify Architect Owner no fewer than two days in advance of proposed interruption of sanitary waste service.
 - 2. Do not proceed with interruption of sanitary waste service without Architect's Owner's written permission.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.2 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS

- A. Pipe and Fittings: ASTM A 74, Service class(es).
- B. Gaskets: ASTM C 564, rubber.
- C. Bear the collective trademark of the Cast Iron Soil Pipe Institute and be listed NSF International.

2.3 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS

- A. Pipe and Fittings: ASTM A 888 or CISPI 301.
- B. Bear the collective trademark of the Cast Iron Soil Pipe Institute and be listed NSF International.
- C. Heavy-Duty, Hubless-Piping Couplings:

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following: a. ANACO-Husky.
 - b. Clamp-All Corp.
 - c. MIFAB, Inc.
 - d. Tyler Pipe.
- 2. Standards: ASTM C 1540.
- 3. Description: Stainless-steel shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.
- D. Cast-Iron, Hubless-Piping Couplings:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following: a. MG Piping Products Company.
 - b. Ideal Tridon.
 - 2. Standard: ASTM C 1277.
 - 3. Description: Two-piece ASTM A 48/A 48M, cast-iron housing; stainless-steel bolts and nuts; and ASTM C 564, rubber sleeve with integral, center pipe stop.

PART 3 - EXECUTION

3.1 EARTH MOVING

A. Comply with requirements for excavating, trenching, and backfilling specified in Section 312000 "Earth Moving."

3.2 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.
- B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
- C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- E. Install piping to permit valve servicing.
- F. Install piping at indicated slopes.
- G. Install piping free of sags and bends.
- H. Install fittings for changes in direction and branch connections.
- I. Install piping to allow application of insulation.
- J. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if two fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.
- K. Install soil and waste drainage and vent piping at the following minimum slopes unless otherwise indicated:
 1. Building Sanitary Drain: 2 percent downward in direction of flow for piping NPS 2.5 and smaller; 1
 - Building Sanitary Drain: 2 percent downward in direction of how for piping NPS 2.
 percent downward in direction of flow for piping NPS 3 and larger.
 - Horizontal Sanitary Drainage Piping: 2 percent downward in direction of flow.
 - 3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.
- L. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
- M. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."
- N. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

O. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.3 JOINT CONSTRUCTION

- A. Join hub-and-spigot, cast-iron soil piping with gasket joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.
- B. Join hubless, cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling joints.
- C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- D. Flanged Joints: Align bolt holes. Select appropriate gasket material, size, type, and thickness. Install gasket concentrically positioned. Use suitable lubricants on bolt threads. Torque bolts in cross pattern.

3.4 SPECIALTY PIPE FITTING INSTALLATION

- A. Transition Couplings:
 - 1. Install transition couplings at joints of piping with small differences in OD's.

3.5 HANGER AND SUPPORT INSTALLATION

- A. Comply with requirements for seismic-restraint devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."
- B. Comply with requirements for pipe hanger and support devices and installation specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."
 - 1. Install carbon-steel pipe hangers for horizontal piping in noncorrosive environments.
 - 2. Vertical Piping: MSS Type 8 or Type 42, clamps.
 - 3. Install individual, straight, horizontal piping runs:
 - a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
 - 4. Base of Vertical Piping: MSS Type 52, spring hangers.
- C. Support horizontal piping and tubing within 12 inches of each fitting, valve, and coupling.
- D. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch minimum rods.
- E. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.
 - 2. NPS 3: 60 inches with 1/2-inch rod.
 - 3. Spacing for 10-foot lengths may be increased to 10 feet. Spacing for fittings is limited to 60 inches.
- F. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.6 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect drainage and vent piping to the following:
 - 1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code.
 - 2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
 - 3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code.
 - 4. Install test tees (wall cleanouts) in conductors near floor and floor cleanouts with cover flush with floor.
 - 5. Equipment: Connect drainage piping as indicated. Provide shutoff valve if indicated and union for each connection. Use flanges instead of unions for connections NPS 2-1/2 and larger.
- C. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.

- D. Make connections according to the following unless otherwise indicated:
 - 1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
 - 2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.

3.7 IDENTIFICATION

A. Identify exposed sanitary waste and vent piping. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.8 FIELD QUALITY CONTROL

- A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.
 - 1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
 - 2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
- B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
- C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
- D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:
 - 1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
 - 2. Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
 - 3. Roughing-in Plumbing Test Procedure: Test drainage and vent piping except outside leaders on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water. From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.
 - 4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg. Use U-tube or manometer inserted in trap of water closet to measure this pressure. Air pressure must remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.
 - 5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
 - 6. Prepare reports for tests and required corrective action.

3.9 CLEANING AND PROTECTION

- A. Clean interior of piping. Remove dirt and debris as work progresses.
- B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
- C. Place plugs in ends of uncompleted piping at end of day and when work stops.

3.10 PIPING SCHEDULE

- A. Aboveground, soil and waste piping NPS 4 and smaller shall be the following:
 - 1. Hubless, cast-iron soil pipe and fittings; heavy-duty hubless-piping couplings; and coupled joints.
- B. Aboveground, vent piping NPS 4 and smaller shall be the following:
 1. Hubless, cast-iron soil pipe and fittings; heavy-duty hubless-piping couplings; and coupled joints.
- C. Underground, soil, waste, and vent piping NPS 4 and smaller shall be the following:
 - 1. Service class, cast-iron soil piping; gaskets; and gasketed joints.
- D. Underground, soil and waste piping NPS 5 and larger shall be the following:
 - 1. Service class, cast-iron soil piping; gaskets; and gasketed joints.

SECTION 221319 - SANITARY WASTE PIPING SPECIALTIES

PART1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Cleanouts.
 - 2. Miscellaneous sanitary drainage piping specialties.
- B. Related Requirements:
 - 1. Section 078413 "Penetration Firestopping" for through-penetration firestop assemblies.
 - 2. Section 224300 "Healthcare Plumbing Fixtures" for plaster sink interceptors.

1.3 DEFINITIONS

- A. ABS: Acrylonitrile butadiene styrene.
- B. PVC: Polyvinyl chloride.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 CLEANOUTS

1.

1.

- A. Cast-Iron Exposed Cleanouts:
 - Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Jay R. Smith Mfg Co; a division of Morris Group International.
 - b. MIFAB, Inc.
 - c. Wade.
 - d. WATTS
 - 2. Standard: ASME A112.36.2M.
 - 3. Size: Same as connected drainage piping
 - 4. Body Material: Hubless, cast-iron soil pipe test tee as required to match connected piping.
 - 5. Closure: Countersunk or raised-head, brass plug.
 - 6. Closure Plug Size: Same as or not more than one size smaller than cleanout size.
- B. Cast-Iron Exposed Floor Cleanouts:
 - Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Jay R. Smith Mfg Co; a division of Morris Group International.
 - b. Josam Company.
 - c. MIFAB, Inc.
 - d. WATTS.
 - e. Zurn Industries, LLC.
 - 2. Standard: ASME A112.36.2M for threaded, adjustable housing cleanout.
 - 3. Size: Same as connected branch.
 - 4. Type: Threaded, adjustable housing.
 - 5. Body or Ferrule: Cast iron.
 - 6. Outlet Connection: Threaded.
 - 7. Closure: Cast-iron plug.
 - 8. Adjustable Housing Material: Cast iron with threads.
 - 9. Frame and Cover Material and Finish: Nickel-bronze, copper alloy.
 - 10. Frame and Cover Shape: Round.
 - 11. Top-Loading Classification: Heavy Duty.
 - 12. Riser: ASTM A74, Service Class, cast-iron drainage pipe fitting and riser to cleanout.
- C. Cast-Iron Wall Cleanouts:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Jay R. Smith Mfg Co; a division of Morris Group International.

- b. Josam Company.
- c. MIFAB, Inc.
- d. WATTŚ.
- e. Zurn Industries, LLC.
- 2. Standard: ASME A112.36.2M. Include wall access.
- 3. Size: Same as connected drainage piping.
- 4. Body: Hubless, cast-iron soil pipe test tee as required to match connected piping.
- 5. Closure Plug:
 - a. Brass.
 - b. Countersunk or raised head.
 - c. Drilled and threaded for cover attachment screw.
 - d. Size: Same as or not more than one size smaller than cleanout size.
- 6. Wall Access, Cover Plate: Round, flat, chrome-plated brass or stainless steel cover plate with screw.
- 7. Wall Access, Frame and Cover: Round, nickel-bronze, copper-alloy, or stainless steel wall-installation frame and cover.

2.2 MISCELLANEOUS SANITARY DRAINAGE PIPING SPECIALTIES

- A. Deep-Seal Traps:
 - 1. Description: Cast-iron or bronze casting, with inlet and outlet matching connected piping and cleanout trap-seal primer valve connection.
 - 2. Size: Same as connected waste piping.
 - a. NPS 2: 4-inch- minimum water seal.
 - b. NPS 2-1/2 and Larger: 5-inch- minimum water seal.
- B. Floor-Drain, Trap-Seal Primer Fittings:
 - 1. Description: Cast iron, with threaded inlet and threaded or spigot outlet, and trap-seal primer valve connection.
 - 2. Size: Same as floor drain outlet with NPS 1/2 side inlet.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:
 - 1. Size same as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
 - 2. Locate at each change in direction of piping greater than 45 degrees.
 - 3. Locate at minimum intervals of 50 feet for piping NPS 4 and smaller and 100 feet for larger piping.
 - 4. Locate at base of each vertical soil and waste stack.
- B. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.
- C. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.
- D. Install sleeve and sleeve seals with each riser and stack passing through floors with waterproof membrane.

3.2 PIPING CONNECTIONS

- A. Comply with requirements in Section 221316 "Sanitary Waste and Vent Piping" for piping installation requirements. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to equipment, to allow service and maintenance.

3.3 LABELING AND IDENTIFYING

- A. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit.
 - 1. Nameplates and signs are specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.4 PROTECTION

- A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.
- B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

SECTION 221319.13 - SANITARY DRAINS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:1. Floor drains.

1.3 DEFINITIONS

- A. ABS: Acrylonitrile-butadiene styrene.
- B. FRP: Fiberglass-reinforced plastic.
- C. HDPE: High-density polyethylene.
- D. PE: Polyethylene.
- E. PP: Polypropylene.
- F. PVC: Polyvinyl chloride.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.

2.1 FLOOR DRAINS

- A. Cast-Iron Floor Drains:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Jay R. Smith Mfg. Co.
 - b. MIFAB, Inc.
 - c. Wade; a subsidiary of McWane Inc.
 - d. WATTS.
 - Standard: ASME A112.6.3.
 - 3. Pattern: Floor drain.
 - 4. Body Material: Gray iron.
 - 5. Seepage Flange: Not required.
 - 6. Anchor Flange: Not required.
 - 7. Clamping Device: Not required.
 - 8. Outlet: Bottom.
 - 9. Coating on Interior and Exposed Exterior Surfaces: Not required.
 - 10. Sediment Bucket: Not required.
 - 11. Top or Strainer Material: Stainless steel.
 - 12. Top of Body and Strainer Finish: Stainless steel.
 - 13. Top Shape: Square.
 - 14. Dimensions of Top or Strainer: 6 inches.
 - 15. Top Loading Classification: Heavy Duty.
 - 16. Funnel: Not required.
 - 17. Inlet Fitting: Gray iron, with threaded inlet and threaded or spigot outlet, and trap-seal primer valve connection.
 - 18. Trap Material: Not required.
 - 19. Trap Pattern: Deep-seal P-trap.
 - 20. Trap Features: Trap-seal primer valve drain connection.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.

- 1. Position floor drains for easy access and maintenance.
- 2. Set floor drains below elevation of surrounding finished floor to allow floor drainage.
- 3. Set with grates depressed according to the following drainage area radii:
 - a. Radius, 30 Inches or Less: Equivalent to 1 percent slope, but not less than 1/4-inch total depression.
 - b. Radius, 30 to 60 Inches: Equivalent to 1 percent slope.
 - c. Radius, 60 Inches or Larger: Equivalent to 1 percent slope, but not greater than 1-inch total depression.
- 4. Install floor-drain flashing collar or flange, so no leakage occurs between drain and adjoining flooring.
 - a. Maintain integrity of waterproof membranes where penetrated.
- 5. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.
- B. Install open drain fittings with top of hub 2 inches above floor.

3.2 CONNECTIONS

- A. Comply with requirements in Section 221316 "Sanitary Waste and Vent Piping" for piping installation requirements. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Comply with requirements in Section 221319 "Sanitary Waste Piping Specialties" for backwater valves, air admittance devices and miscellaneous sanitary drainage piping specialties.
- C. Install piping adjacent to equipment to allow service and maintenance.

3.3 LABELING AND IDENTIFYING

A. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit. Nameplates and signs are specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.4 PROTECTION

- A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.
- B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

SECTION 224213.13 - COMMERCIAL WATER CLOSETS

PART1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Water closets.
 - 2. Flushometer valves.
 - 3. Toilet seats.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for water closets.
 - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. Shop Drawings: Include diagrams for power, signal, and control wiring.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Flushometer-Valve Repair Kits: Equal to 10 percent of amount of each type installed, but no fewer than one of each type.

PART 2 - PRODUCTS

2.1 WALL-MOUNTED WATER CLOSETS

- A. Water Closets : Wall mounted, top spud, accessible.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following: a. American Standard America.
 - a. American Standard A b. Kohler Co.
 - 2. Bowl:
 - a. Standards: ASME A112.19.2/CSA B45.1 and ASME A112.19.5.
 - b. Material: Vitreous china.
 - c. Type: Siphon jet.
 - d. Style: Flushometer valve.
 - e. Height: Standard.
 - f. Rim Contour: Elongated.
 - g. Water Consumption: 1.6 gal. per flush.
 - h. Spud Size and Location: NPS 1-1/2; top.
 - 3. Flushometer Valve: See flushometer valve paragraph below.
 - 4. Toilet Seat: See toilet seat paragraph below..
 - 5. Support:
 - a. Standard: ASME A112.6.1M.
 - b. Description: Waste-fitting assembly as required to match drainage piping material and arrangement with faceplates, couplings gaskets, and feet; bolts and hardware matching fixture.

2.2 FLUSHOMETER VALVES

- A. Solenoid-Actuator, Diaphragm Flushometer Valves:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following]:
 - a. Sloan Valve Company.
 - b. Zurn Industries, LLC; Commercial Brass and Fixtures.
 - 2. Standard: ASSE 1037.
 - 3. Minimum Pressure Rating: 125 psig.

- 4. Features: Include integral check stop and backflow-prevention device.
- 5. Material: Brass body with corrosion-resistant components.
- 6. Exposed Flushometer-Valve Finish: Chrome plated.
- 7. Panel Finish: Chrome plated or stainless steel.
- 8. Actuator: Solenoid complying with UL 1951, and listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- 9. Trip Mechanism: Hard-wired electronic sensor complying with UL 1951, and listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- 10. Consumption: 1.6 gal. per flush.
- 11. Minimum Inlet: NPS 1.
- 12. Minimum Outlet: NPS 1-1/4.

2.3 TOILET SEATS

A. Toilet Seats :

1.

- Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Bemis Manufacturing Company.
 - b. Church Seats.
 - c. Olsonite Seat Co.
- 2. Standard: IAPMO/ANSI Z124.5.
- 3. Material: Plastic.
- 4. Type: Commercial (Standard).
- 5. Shape: Elongated rim, open front.
- 6. Hinge: Self-sustaining, check.
- 7. Hinge Material: Noncorroding metal.
- 8. Seat Cover: Not required.
- 9. Color: White.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before water-closet installation.
- B. Examine walls and floors for suitable conditions where water closets will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Water-Closet Installation:
 - 1. Install level and plumb according to roughing-in drawings.
 - 2. Install floor-mounted water closets on bowl-to-drain connecting fitting attachments to piping or building substrate.
 - 3. Install accessible, wall-mounted water closets at mounting height for handicapped/elderly, according to ICC/ANSI A117.1.
- B. Support Installation:
 - 1. Install supports, affixed to building substrate, for floor-mounted, back-outlet water closets.
 - 2. Use carrier supports with waste-fitting assembly and seal.
 - 3. Install wall-mounted, back-outlet water-closet supports with waste-fitting assembly and waste-fitting seals; and affix to building substrate.
 - 4. Install fixture backing materials to prevent fixture from pulling away from wall.
- C. Flushometer-Valve Installation:
 - 1. Install flushometer-valve, water-supply fitting on each supply to each water closet.
 - 2. Attach supply piping to supports or substrate within pipe spaces behind fixtures.
 - 3. Install lever-handle flushometer valves for accessible water closets with handle mounted on open side of water closet.
 - 4. Install actuators in locations that are easy for people with disabilities to reach.
 - 5. Install fresh batteries in battery-powered, electronic-sensor mechanisms.
- D. Install toilet seats on water closets.
- E. Wall Flange and Escutcheon Installation:

- 1. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations and within cabinets and millwork.
- 2. Install deep-pattern escutcheons if required to conceal protruding fittings.
- 3. Comply with escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."
- F. Joint Sealing:
 - 1. Seal joints between water closets and walls and floors using sanitary-type, one-part,
 - mildew-resistant silicone sealant.
 - 2. Match sealant color to water-closet color.
 - 3. Comply with sealant requirements specified in Section 079200 "Joint Sealants."

3.3 CONNECTIONS

- A. Connect water closets with water supplies and soil, waste, and vent piping. Use size fittings required to match water closets.
- B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."
- C. Comply with soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."
- D. Where installing piping adjacent to water closets, allow space for service and maintenance.

3.4 ADJUSTING

- A. Operate and adjust water closets and controls. Replace damaged and malfunctioning water closets, fittings, and controls.
- B. Adjust water pressure at flushometer valves to produce proper flow.
- C. Install fresh batteries in battery-powered, electronic-sensor mechanisms.

3.5 CLEANING AND PROTECTION

- A. Clean water closets and fittings with manufacturers' recommended cleaning methods and materials.
- B. Install protective covering for installed water closets and fittings.
- C. Do not allow use of water closets for temporary facilities unless approved in writing by Owner.

SECTION 224216.13 - COMMERCIAL LAVATORIES

PART1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Vitreous-china, counter-mounted lavatories.
 - 2. Manually operated lavatory faucets.
 - 3. Supply fittings.
 - 4. Waste fittings.
 - 5. Lavatory supports.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for lavatories.
 - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For lavatories and faucets to include in operation and maintenance manuals.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Faucet Washers and O-Rings: Equal to 10 percent of amount of each type and size installed.
 - 2. Faucet Cartridges and O-Rings: Equal to 5 percent of amount of each type and size installed.

PART 2 - PRODUCTS

1.

2.1 VITREOUS-CHINA, COUNTER-MOUNTED LAVATORIES

- A. Lavatory Vitreous China, Undercounter Mounted :
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following: a. American Standard.
 - b. Kohler Co.
 - 2. Fixture:
 - a. Standard: ASME A112.19.2/CSA B45.1.
 - b. Type: For undercounter mounting.
 - c. Color: White. Coordinate with architect.
 - d. Mounting Material: Sealant and undercounter mounting kit.

2.2 AUTOMATICALLY OPERATED LAVATORY FAUCETS

- A. NSF Standard: Comply with NSF 61 and NSF 372 for faucet materials that will be in contact with potable water.
- B. Lavatory Faucets Automatic Type: Battery Powered Electronic Sensor Operated,
 - Manufacturers: Subject to compliance with requirements, provide products by one of the following: a. American Standard.
 - b. Kohler Co.
 - c. Sloan Valve Company.
 - 2. Standards: ASME A112.18.1/CSA B125.1 and UL 1951.
 - 3. General: Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture hole punchings; coordinate outlet with spout and fixture receptor.
 - 4. Body Material: Commercial, solid-brass, or die-cast housing with brazed copper and brass waterway.

- 5. Finish: Polished chrome plate
- 6. Maximum Flow Rate: 0.5 gpm
- 7. Drain: Not part of faucet.

2.3 SUPPLY FITTINGS

- A. Products shall comply with the SDWA (Safe Drinking Act) "No Lead" restrictions of ANSI NSF 61and NSF 372 for supply-fitting materials that will be in contact with potable water.
- B. Standard: ASME A112.18.1/CSA B125.1.
- C. Supply Piping: Chrome-plated-brass pipe or chrome-plated copper tube matching water-supply piping size. Include chrome-plated-brass or stainless steel wall flange.
- D. Supply Stops: Chrome-plated-brass, one-quarter-turn, ball-type or compression valve with brass stems and shall contain no plastics.
- E. 1/2" IPS inlet connection and outlet 3/8" compression.
- F. Operation: Loose key

2.4 WASTE FITTINGS

- A. Standard: ASME A112.18.2/CSA B125.2.
- B. Drain: Grid type with offset and straight tailpiece.
 - 1. Size: NPS 1-1/4
 - 2. Material:
 - a. Chrome plated cast brass strainer (with or without overflow) and brass lock nut.
 - b. 17-gauge seamless brass tube drain tailpiece.
 - c. CSA certified or other recognized third party testing authority.
 - d. Marked with manufacturers name.
- C. Trap:
 - 1. Size: NPS 1-1/2 by NPS 1-1/4.
 - 2. Material:
 - a. Chrome plated heavy cast brass with cleanout.
 - b. 17-gauge seamless brass adjustable wall bend.
 - c. Include cast brass, slip joints nuts and no reducing washers.
 - d. CSA certified or other recognized third party testing authority.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before lavatory installation.
- B. Examine counters and walls for suitable conditions where lavatories will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install lavatories level and plumb in accordance with roughing-in drawings.
- B. Install accessible wall-mounted lavatories at handicapped/elderly mounting height for people with disabilities or the elderly, in accordance with ICC A117.1.
- C. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings. Comply with escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."
- D. Seal joints between lavatories, counters, and walls using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in Section 079200 "Joint Sealants."
- E. Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of accessible lavatories. Comply with requirements in Section 220719 "Plumbing Piping Insulation."

3.3 PIPING CONNECTIONS

A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

- B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."
- C. Comply with soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."

3.4 ELECTRICAL CONNECTIONS

- A. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
- B. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."
- C. Install electrical devices furnished by manufacturer, but not factory mounted in accordance with NFPA 70 and NECA 1.
- D. Install nameplate for each electrical connection, indicating electrical equipment designation and circuit number feeding connection.
 - 1. Nameplate shall be laminated acrylic or melamine plastic signs, as specified in Section 260553 "Identification for Electrical Systems."
 - 2. Nameplate shall be laminated acrylic or melamine plastic signs with a black background and engraved white letters at least 1/2 inch high.

3.5 ADJUSTING

- A. Operate and adjust lavatories and controls. Replace damaged and malfunctioning lavatories, fittings, and controls.
- B. Install new batteries in battery-powered, electronic-sensor mechanisms.

3.6 CLEANING AND PROTECTION

- A. After completing installation of lavatories, inspect and repair damaged finishes.
- B. Clean lavatories, faucets, and other fittings with manufacturers' recommended cleaning methods and materials.
- C. Provide protective covering for installed lavatories and fittings.
- D. Do not allow use of lavatories for temporary facilities unless approved in writing by Owner.

SECTION 230413 - COMMON SUBMITTAL REQUIREMENTS FOR HVAC

PART1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Supplementary administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals specific to the work of this Division.
- B. Related Requirements:
 - 1. Division 01 submittal requirements.

1.3 DEFINITIONS

- A. Contractor: Refers to an entity in direct Contract with the Owner to furnish and/or perform any portion of the Work of the Contract, including but not limited to a Construction Manager.
 - 1. Contractor shall review and approve Product Submittals prior to fowarding them to the Architect.
- B. Product Submittals: In general, Product Submittals show characteristics of the proposed construction in one of the following forms:
 - 1. Shop Drawings.
 - 2. Product Data.
 - 3. Samples.
- C. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- D. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."
- E. Submittal Review Sheet: Specific form required to accompany each submittal. Obtain Submittal Review Sheet from the SmithGroup Project Manager.

1.4 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Requirements specified for submittals are intended to provide efficient handling, while permitting review responsibilities to be carried out.
- B. Avoidable Resubmittals: The first two reviews of each specified submittal will be processed without cost to the Contractor. After the second review, the Owner may charge the Contractor for the cost of such additional processing, unless the processing results from approved Change Orders causing revisions to previously approved submittals.
- C. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 - 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 - 4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architectreserve the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- D. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

- 1. Initial Review: Allow 10 business days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required.
- 2. When a large volume of submittal materials is scheduled, additional review time may be required. Similarly, a particular submittal may require review completion in less than the agreed normal time. Due to variations in submittal volume and processing needs, agreed review time is not intended to apply to extreme conditions.
- 3. Resubmittal Review: Allow 10 business days for review of each resubmittal.
- 4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 15 business days for initial review of each submittal.
- E. Maintain at the Project Site ready access to the latest reviewed Shop Drawings and Product Data, and one set of samples.

1.5 DELEGATED-DESIGN SERVICES

- A. Definitions:
 - 1. Delegated Design: A portion or component of the Work identified by the Contract Documents to be designed by the Contractor, or an entity assigned by the Contractor, to satisfy performance and design criteria specified in the Contract Documents for that portion or component.
 - 2. Registered Design Professional: Design professional, assigned by the Contractor, who is responsible for providing the delegated design work, and for certifying that the work is in compliance with the specified performance requirements and design criteria. Design professional shall be legally qualified to practice in jurisdiction where Project is located and shall be experienced in providing delegated design services of the kind indicated. Delegated design services are defined as those performed for installation of the system, assembly or product that are similar in material, design, and extent to those indicated for this Project.
- B. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- C. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Combine with Submittal Review Sheet before submitting to Architect .
- B. Project Closeout and Maintenance Material Submittals: See requirements in Division 01.
- C. Be responsible for quantities, weights, and dimensions to be confirmed and correlated at the site; for information that pertains solely to the fabrication processes and to the means, methods, techniques, sequences, and procedures of construction; and for coordination of the work of every trade, supplier, and subcontractor.
- D. Be responsible for each submittal to be in conformance with information given and the design intent expressed in the Contract Documents.
- E. Provide with each submittal specific written notice of any variation from the requirements of the Contract Documents by causing a specific notation to be made on the Submittal Review Sheet and Submittal Transmittal.

3.2 ARCHITECT'S AND GENERAL CONTRACTOR'S ACTION

A. General: Architect will not review submittals that do not include the Submittal Review Sheet.

- B. Action Submittals: Architect's staff and consultants will review the submittal, and mark the Submittal Review Sheet with an action code. The code meanings are described below.
- C. Additional codes may be provided within comments or as an electronic submittal review stamp and shall be used in help indicating return of partial submittals.
- D. The Final Review Code on the Submittal Review Sheet prevails and governs the action of the overall submittal.
- E. Review Code meanings are as follows:
 - 1. Action Codes Permitting Use:
 - a. When an action code permitting use is assigned to a submittal, it does not authorize work that does not comply with the requirements of the Contract Documents. Acceptance of the Work will depend on compliance.
 - b. Code AP Approved: The Work covered by the submittal item may proceed, provided it complies with Contract Document requirements.
 - c. Code AN Approved as Noted: The Work covered by the submittal item may proceed, provided it complies with the Architect's notations and Contract Document requirements.
 - d. Code AN-R Approved as Noted Resubmit: Do not deliver or install the related work until the resubmittal has received Code AP or AN. However, fabrication and other off-site work covered by the submittal item may proceed, at the Contractor's risk, provided it complies with the Architect's notations and Contract Document requirements.
 - 2. Action Code Prohibiting Use:
 - a. Action Code REJ Not Approved: The Work covered by the submittal item, including purchasing, fabrication, delivery, and other activity, shall not proceed. Revise the submittal item or prepare a new item in accordance with the Architect's notations. Resubmit the corrected or new item without delay; do not permit submittal items marked "Not Approved" to be used. Work incorporating such items will be rejected.
 - 3. Action Code for Items Not Required:
 - a. Action Code X Not Requested by Contract Documents: The submittal item is not called for by the Contract Documents and is being returned unreviewed by the Architect except to the extent necessary to determine its status.
- F. Informational Submittals: For Architect's information only. Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
 - 1. Action Code for Information Only:
 - a. Action Code INF Information Only Received: The submittal item is not called for a return with a reviewed action code by the Contract Documents and is being returned un-reviewed by the Architect except to the extent necessary to determine its status.
- G. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- H. Incomplete submittals are not acceptable, will be considered non-responsive, and will be returned without review.
- I. Architect will return without review or discard submittals received from sources other than the Contractor.
- J. Submittals not required by the Contract Documents may be returned by the Architect without action.
 1. Do not submit Material Safety Data Sheets. They will be returned without review.

3.3 SUBMITTAL TRANSMITTAL REQUIREMENTS

- A. Submittal Transmittal shall be a PDF file in electronic format. It is recommended, to expedite the submittal review, the electronic form be emailed for review to the Architect as early as possible.
 - 1. Submittal Numbering: See below.
 - 2. Contact Information: Full Name, Phone Number and Email Address.
- B. Submittal Definition
 - 1. Each submittal consists of items from only ONE Specifications section.
 - 2. Complete Submittal: If ALL the items required by the Specifications section are listed on one Submittal Form (including continuation sheet), it is a complete submittal.
 - 3. Partial Submittals: If it is necessary to divide the required items of a given Specifications section into two or more submittals to meet schedule or handling requirements, the separate submittals are partial submittals. All partial submittals have the same submittal number, and are differentiated by sequential P-numbers (see below).

- 4. All items in each submittal, whether complete or partial, will be processed together: Individual items will not be 'broken out' for special handling. Arrange submittals accordingly.
- C. Submittal Numbering
 - 1. Number submittals as described below to assist tracking.
 - 2. Number each submittal in the format nnnnn-nn.
 - a. The 6-digit number is the number of the section that requires the submittal. For example, 044200.
 - b. The 2-digit number is based on the numerical sequence of submittals from that section. In other words, for each section, the first submittal is 01, the second is 02, and so on. The 2-digit number does not change for partial or re-submittals, so that the submittal can be tracked.
 - c. P-Number for Partial Submittals: Number each partial submittal in the pee space, beginning with P1, and increasing by one for each partial submittal of that submittal. If the submittal is a complete submittal, leave the P space blank.
 - d. R-Number for Re-submittals: Number each re-submittal in the arr space, beginning with R1, and increasing by one for each re-submittal of that submittal. Do not include an R-Number for the initial submittal.
 - e. Examples:
 - 1) Initial Complete Submittal: 044200-01. First Re-Submittal: 044200-01-R1.
 - 2) Initial Partial Submittal: 044200-01-P1. Second Partial Submittal: 0044200-01-P2. First Re-submittal of Second Partial Submittal: 044200-R1-P2.

3.4 SUBMITTAL REVIEW SHEET REQUIREMENTS

- A. Provide Submittal Review Sheet in PDF format. Submit as the page after the Submittal Transmittal.
- B. When attached, the Submittal Review Sheet shall not obscure information contained in the submittal.
- C. Do not edit any of the information contained within the Submittal Review Sheet except as follows:
- 1. Submittal Number: See Submittal Numbering in Submittal Transmittal Requirements paragraph.
- D. The Contractor shall submit the PDF file in a manner that will allow editing of the Submittal Review Sheet fields by SmithGroup and its consultants.

SECTION 230529 - HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Fastener systems.
 - 2. Equipment supports.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Delegated-Design Submittal: For trapeze hangers indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 1. Detail fabrication and assembly of trapeze hangers.

1.4 QUALITY ASSURANCE

A. Structural-Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design trapeze pipe hangers and equipment supports.
- B. Structural Performance: Hangers and supports for HVAC piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.
 - 1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
 - 2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
 - 3. Design seismic-restraint hangers and supports for piping and equipment and obtain approval from authorities having jurisdiction.
 - 4. Fasteners used for hangers and supports in seismic applications shall be tested and approved for seismic applications.

2.2 METAL PIPE HANGERS AND SUPPORTS

- A. Copper Pipe and Tube Hangers:
 - 1. Description: MSS SP-58, Types 1 through 58, copper-plated steel, factory-fabricated components.
 - 2. Hanger Rods: Continuous-thread rod, nuts, and washer made of copper-plated steel.

2.3 THERMAL-HANGER SHIELD INSERTS

- A. Insulation-Insert Material for Cold Piping: ASTM C552, Type II cellular glass with 100-psi or ASTM C591, Type VI, Grade 1 polyisocyanurate with 125-psi minimum compressive strength and vapor barrier.
- B. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.
- C. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.4 FASTENER SYSTEMS

A. Mechanical-Expansion Anchors: Insert-wedge-type anchors for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

B. Threaded Fasteners: Threaded-type anchors for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

2.5 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.

2.6 MATERIALS

- A. Aluminum: ASTM B221.
- B. Carbon Steel: ASTM A1011/A1011M.
- C. Structural Steel: ASTM A36/A36M, carbon-steel plates, shapes, and bars; galvanized.
- D. Stainless Steel: ASTM A240/A240M.
- E. Threaded Rods: Continuously threaded. Zinc-plated or galvanized steel for indoor applications and stainless steel for outdoor applications. Mating nuts and washers of similar materials as rods.
- F. Grout: ASTM C1107/C1107M, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.
 - 1. Properties: Nonstaining, noncorrosive, and nongaseous.
 - 2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping materials and installation for penetrations through fire-rated walls, ceilings, and assemblies.
- B. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.

3.2 HANGER AND SUPPORT INSTALLATION

- A. Metal Pipe-Hanger Installation: Comply with MSS SP-58. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.
- B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-58. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.
- C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled strut systems.
- D. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.
- E. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.
- F. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
- G. Install lateral bracing with pipe hangers and supports to prevent swaying.
- H. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.
- I. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- J. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.
- K. Insulated Piping:

1.

- Attach clamps and spacers to piping.
 - a. Use thermal-hanger shield insert with clamp sized to match OD of insert.
 - b. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.

- 2. Install MSS SP-58, Type 40, protective shields on cold piping. Shields shall span an arc of 180 degrees.
- 3. Shield Dimensions for Pipe: Not less than the following:
 - a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
 - b. NPS 4: 12 inches long and 0.06 inch thick.
 - c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
 - d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
 - e. NPS 16 to NPS 24: 24 inches long and 0.105 inch thick.
- 4. Pipes NPS 4 and Larger: Includereinforced calcium-silicate-insulation inserts of length at least as long as protective shield.
- 5. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.3 EQUIPMENT SUPPORTS

- A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.
- B. Grouting: Place grout under supports for equipment and make bearing surface smooth.
- C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.4 METAL FABRICATIONS

- A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.
- B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
- C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.5 ADJUSTING

- A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.
- B. Trim excess length of continuous-thread hanger and support rods to 2 inches.

3.6 PAINTING

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 - 1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.
- B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A780/A780M.

3.7 HANGER AND SUPPORT SCHEDULE

- A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.
- B. Comply with MSS SP-58 for pipe-hanger selections and applications that are not specified in piping system Sections.
- C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.
- D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.
- E. Use carbon-steel pipe hangers and supports, metal trapeze pipe hangers and metal framing systems and attachments for general service applications.
- F. Use stainless steel pipe hangers and stainless steel, corrosion-resistant attachments for hostile environment applications.

- G. Use copper-plated pipe hangers and copper or stainless steel attachments for copper piping and tubing.
- H. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30.
 - Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes NPS 3/4 to NPS 36, requiring clamp flexibility and up to 4 inches of insulation.
 - 3. Pipe Hangers (MSS Type 5): For suspension of pipes NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
 - 4. Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated, stationary pipes NPS 3/4 to NPS 8.
 - 5. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
 - 6. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
 - 7. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
 - 8. Split Pipe Ring with or without Turnbuckle Hangers (MSS Type 11): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 8.
 - 9. Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 3.
 - 10. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
 - 11. Single-Pipe Rolls (MSS Type 41): For suspension of pipes NPS 1 to NPS 30, from two rods if longitudinal movement caused by expansion and contraction might occur.
 - 12. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes NPS 2-1/2 to NPS 24, from single rod if horizontal movement caused by expansion and contraction might occur.
 - 13. Complete Pipe Rolls (MSS Type 44): For support of pipes NPS 2 to NPS 42 if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is unnecessary.
 - 14. Pipe Roll and Plate Units (MSS Type 45): For support of pipes NPS 2 to NPS 24 if small horizontal movement caused by expansion and contraction might occur and vertical adjustment is unnecessary.
 - 15. Adjustable Pipe Roll and Base Units (MSS Type 46): For support of pipes NPS 2 to NPS 30 if vertical and lateral adjustment during installation might be required in addition to expansion and contraction.
- I. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
 - 2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
 - 3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
 - 4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
 - 5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.
- J. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
 - 2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.
 - 3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
 - 4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
 - 5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
 - 6. C-Clamps (MSS Type 23): For structural shapes.
 - 7. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
 - 8. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.

- 9. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
- 10. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
- 11. Malleable-Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
- 12. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:
 - a. Light (MSS Type 31): 750 lb.
 - b. Medium (MSS Type 32): 1500 lb.
 - c. Heavy (MSS Type 33): 3000 lb.
- 13. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
- 14. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
- 15. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.
- K. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
 - 2. Thermal-Hanger Shield Inserts: For supporting insulated pipe.
- L. Use mechanical-expansion anchors instead of building attachments where required in concrete construction.

SECTION 230553 - IDENTIFICATION FOR HVAC, PIPING AND EQUIPMENT

PART1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Equipment labels.
 - 2. Warning signs and labels.
 - 3. Warning tags.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

- A. Plastic Labels for Equipment:
 - 1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
 - 2. Letter Color: White.
 - 3. Background Color: Black.
 - 4. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
 - 5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
 - 6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-guarters the size of principal lettering.
 - 7. Fasteners: Stainless-steel rivets or self-tapping screws.
 - 8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- B. Label Content: Include equipment's Drawing designation or unique equipment number.
- C. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number, and identify Drawing numbers where equipment is indicated (plans, details, and schedules) and the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 WARNING SIGNS AND LABELS

- A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
- B. Letter Color: Red.
- C. Background Color: White.
- D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
- E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
- F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.
- G. Fasteners: Stainless-steel rivets or self-tapping screws.
- H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- I. Label Content: Include caution and warning information plus emergency notification instructions.

2.3 WARNING TAGS

- A. Description: Preprinted or partially preprinted accident-prevention tags of plasticized card stock with matte finish suitable for writing.
 - 1. Size: 3 by 5-1/4 inches minimum.

- 2. Fasteners: Brass grommet and wire.
- 3. Nomenclature: Large-size primary caption such as "DANGER," "CAUTION," or "DO NOT OPERATE."
- 4. Color: Safety-yellow background with black lettering.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 GENERAL INSTALLATION REQUIREMENTS

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- B. Coordinate installation of identifying devices with locations of access panels and doors.
- C. Install identifying devices before installing acoustical ceilings and similar concealment.

3.3 EQUIPMENT LABEL INSTALLATION

- A. Install or permanently fasten labels on each major item of mechanical equipment.
- B. Locate equipment labels where accessible and visible.

3.4 DUCT LABEL INSTALLATION

- A. Install self-adhesive duct labels with permanent adhesive on air ducts in the following color codes:
 1. Blue: For cold-air supply ducts.
 - Yellow: For hot-air supply ducts.
 - 3. Green: For exhaust-, outside-, relief-, return-, and mixed-air ducts.
- B. Locate labels near points where ducts enter into and exit from concealed spaces and at maximum intervals of 50 feet in each space where ducts are exposed or concealed by removable ceiling system.

3.5 WARNING-TAG INSTALLATION

A. Write required message on, and attach warning tags to, equipment and other items where required.

SECTION 230593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

1.

- A. Section Includes:
 - Balancing Air Systems:
 - a. Constant-volume air systems.
 - b. Dual-duct systems.
 - c. Variable-air-volume systems.
 - 2. Testing, adjusting, and balancing existing systems and equipment.
 - 3. Duct leakage tests.
 - 4. Control system verification.

1.3 DEFINITIONS

- A. AABC: Associated Air Balance Council.
- B. BAS: Building automation systems.
- C. NEBB: National Environmental Balancing Bureau.
- D. TAB: Testing, adjusting, and balancing.
- E. TABB: Testing, Adjusting, and Balancing Bureau.
- F. TAB Specialist: An independent entity meeting qualifications to perform TAB work.
- G. TDH: Total dynamic head.

1.4 PREINSTALLATION MEETINGS

- A. TAB Conference: If requested by the Owner, conduct a TAB conference at Project site after approval of the TAB strategies and procedures plan to develop a mutual understanding of the details. Provide a minimum of 14 days' advance notice of scheduled meeting time and location.
 - 1. Minimum Ágenda Items:
 - a. The Contract Documents examination report.
 - b. The TAB plan.
 - c. Needs for coordination and cooperation of trades and subcontractors.
 - d. Proposed procedures for documentation and communication flow.

1.5 ACTION SUBMITTALS

- A. Sustainable Design Submittals:
 - 1. Air-Balance Report: Documentation indicating that Work complies with ASHRAE 62.1, Section 7.2.2 "Air Balancing."

1.6 FIELD CONDITIONS

- A. Full Owner Occupancy: Owner will occupy the site and existing building during entire TAB period. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.
- B. Partial Owner Occupancy: Owner may occupy completed areas of building before Substantial Completion. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 TAB SPECIALISTS

- **3.2** TAB Specialist to be under the owner's contract. The information within this section provided for required coordination with General Contractor, Mechanical Contractor and TAB Specialist. **EXAMINATION**
 - A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems designs that may preclude proper TAB of systems and equipment.

- B. Examine installed systems for balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are applicable for intended purpose and are accessible.
- C. Examine the approved submittals for HVAC systems and equipment.
- D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems output, and statements of philosophies and assumptions about HVAC system and equipment controls.
- E. Examine ceiling plenums and underfloor air plenums used for supply, return, or relief air to verify that they are properly separated from adjacent areas. Verify that penetrations in plenum walls are sealed and fire-stopped if required.
- F. Examine equipment performance data including fan and pump curves.
 - 1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
 - Calculate system-effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from the conditions used to rate equipment performance. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," or in SMACNA's "HVAC Systems - Duct Design." Compare results with the design data and installed conditions.
- G. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.
- H. Examine test reports specified in individual system and equipment Sections.
- I. Examine HVAC equipment and verify that bearings are greased, belts are aligned and tight, filters are clean, and equipment with functioning controls is ready for operation.
- J. Examine terminal units, such as variable-air-volume boxes, and verify that they are accessible and their controls are connected and functioning.
- K. Examine strainers. Verify that startup screens have been replaced by permanent screens with indicated perforations.
- L. Examine control valves for proper installation for their intended function of throttling, diverting, or mixing fluid flows.
- M. Examine heat-transfer coils for correct piping connections and for clean and straight fins.
- N. Examine system pumps to ensure absence of entrained air in the suction piping.
- O. Examine operating safety interlocks and controls on HVAC equipment.
- P. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.3 PREPARATION

- A. Prepare a TAB plan that includes the following:
 - 1. Equipment and systems to be tested.
 - 2. Strategies and step-by-step procedures for balancing the systems.
 - 3. Instrumentation to be used.
 - 4. Sample forms with specific identification for all equipment.
- B. Perform system-readiness checks of HVAC systems and equipment to verify system readiness for TAB work. Include, at a minimum, the following:
 - 1. Airside:
 - a. Verify that leakage and pressure tests on air distribution systems have been satisfactorily completed.
 - b. Duct systems are complete with terminals installed.
 - c. Volume, smoke, and fire dampers are open and functional.
 - d. Clean filters are installed.
 - e. Fans are operating, free of vibration, and rotating in correct direction.
 - f. Variable-frequency controllers' startup is complete and safeties are verified.
 - g. Automatic temperature-control systems are operational.
 - h. Ceilings are installed.
 - i. Windows and doors are installed.
 - j. Suitable access to balancing devices and equipment is provided.

3.4 GENERAL PROCEDURES FOR TESTING AND BALANCING

- A. Perform testing and balancing procedures on each system according to the procedures contained in NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" and in this Section.
- B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.
 - 1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
 - 2. After testing and balancing, install test ports and duct access doors that comply with requirements in Section 233300 "Air Duct Accessories."
 - Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish according to Section 230713 "Duct Insulation," Section 230716 "HVAC Equipment Insulation," and Section 230719 "HVAC Piping Insulation."
- C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.
- D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.5 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

- A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Cross-check the summation of required outlet volumes with required fan volumes.
- B. Prepare schematic diagrams of systems' "as-built" duct layouts.
- C. For variable-air-volume systems, develop a plan to simulate diversity.
- D. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.
- E. Check airflow patterns from the outdoor-air louvers and dampers and the return- and exhaust-air dampers through the supply-fan discharge and mixing dampers.
- F. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
- G. Verify that motor starters are equipped with properly sized thermal protection.
- H. Check dampers for proper position to achieve desired airflow path.
- I. Check for airflow blockages.
- J. Check condensate drains for proper connections and functioning.
- K. Check for proper sealing of air-handling-unit components.
- L. Verify that air duct system is sealed as specified in Section 233113 "Metal Ducts."

3.6 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

- A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.
 - 1. Measure total airflow.
 - a. Set outside-air, return-air, and relief-air dampers for proper position that simulates minimum outdoor-air conditions.
 - b. Where duct conditions allow, measure airflow by main Pitot-tube traverse. If necessary, perform multiple Pitot-tube traverses, close to the fan and prior to any outlets, to obtain total airflow.
 - c. Where duct conditions are not suitable for Pitot-tube traverse measurements, a coil traverse may be acceptable.
 - 2. Measure fan static pressures as follows:
 - a. Measure static pressure directly at the fan outlet or through the flexible connection.
 - b. Measure static pressure directly at the fan inlet or through the flexible connection.
 - c. Measure static pressure across each component that makes up the air-handling system.
 - d. Report artificial loading of filters at the time static pressures are measured.
 - 3. Review Record Documents to determine variations in design static pressures versus actual static pressures. Calculate actual system-effect factors. Recommend adjustments to accommodate actual conditions.

- 4. Obtain approval from Owner for adjustment of fan speed higher or lower than indicated speed. Comply with requirements in HVAC Sections for air-handling units for adjustment of fans, belts, and pulley sizes to achieve indicated air-handling-unit performance.
- 5. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload occurs. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.
- B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows.
 - 1. Measure airflow of submain and branch ducts.
 - 2. Adjust submain and branch duct volume dampers for specified airflow.
 - 3. Re-measure each submain and branch duct after all have been adjusted.
- C. Adjust air inlets and outlets for each space to indicated airflows.
 - 1. Set airflow patterns of adjustable outlets for proper distribution without drafts.
 - 2. Measure inlets and outlets airflow.
 - 3. Adjust each inlet and outlet for specified airflow.
 - 4. Re-measure each inlet and outlet after they have been adjusted.
- D. Verify final system conditions.
 - 1. Re-measure and confirm that minimum outdoor, return, and relief airflows are within design. Readjust to design if necessary.
 - 2. Re-measure and confirm that total airflow is within design.
 - 3. Re-measure all final fan operating data, rpms, volts, amps, and static profile.
 - 4. Mark all final settings.
 - 5. Test system in economizer mode. Verify proper operation and adjust if necessary.
 - 6. Measure and record all operating data.
 - 7. Record final fan-performance data.

3.7 PROCEDURES FOR DUAL-DUCT SYSTEMS

- A. Adjust the dual-duct systems as follows:
 - 1. Verify that the system static pressure sensor is located two-thirds of the distance down the duct from the fan discharge. On systems with separate hot-deck and cold-deck fans, verify the location of the sensor on each deck.
 - 2. Verify that the system is under static pressure control.
 - 3. Select the terminal unit that is most critical to the supply-fan airflow. Measure inlet static pressure, and adjust system static pressure control set point so the entering static pressure for the critical terminal unit is not less than the sum of the terminal-unit manufacturer's recommended minimum inlet static pressure plus the static pressure needed to overcome terminal-unit discharge system losses.
 - 4. Calibrate and balance each terminal unit's hot deck and cold deck for maximum and minimum design airflow as follows:
 - a. Adjust controls so that terminal is calling for full cooling. Some controllers require starting with minimum set point. Verify calibration procedure for specific project.
 - b. Measure airflow and adjust calibration factors as required for design cold-deck maximum airflow and hot-deck minimum airflow. Record calibration factors.
 - c. When maximum airflow is correct, balance the air outlets downstream from terminal units.
 - d. Adjust controls so that terminal is calling for full heating.
 - e. Measure airflow and adjust calibration factors as required for design cold-deck minimum airflow and hot-deck maximum airflow. Record calibration factors. If no minimum calibration is available, note any deviation from design airflow.
 - 5. After terminals have been calibrated and balanced, test and adjust system for total airflow. Adjust fans to deliver total design airflows within the maximum allowable fan speed listed by fan manufacturer.
 - a. Set outside-air, return-air, and relief-air dampers for proper position that simulates minimum outdoor-air conditions.
 - b. Set terminals for maximum airflow. If system design includes diversity (cooling coil or fan), adjust terminals for maximum and minimum airflow so that connected total matches cooling coil or fan selection and simulates actual load in the building. In systems with separate hot-deck and cold-deck fans, diversity consideration applies to each individual fan.
 - c. Where duct conditions allow, measure airflow by Pitot-tube traverse. If necessary, perform multiple Pitot-tube traverses to obtain total airflow.

- d. Where duct conditions are not suitable for Pitot-tube traverse measurements, a coil traverse may be acceptable.
- e. If a reliable Pitot-tube traverse or coil traverse is not possible, measure airflow at terminals and calculate the total airflow.
- 6. Measure the fan(s) static pressures as follows:
 - a. Measure static pressure directly at the fan outlet or through the flexible connection.
 - b. Measure static pressure directly at the fan inlet or through the flexible connection.
 - c. Measure static pressure across each component that makes up the air-handling system.
 - d. Report any artificial loading of filters at the time static pressures are measured.
- 7. Set final return and outside airflow to the fan(s) while operating at maximum return airflow and minimum outdoor airflow.
 - a. Balance the return-air ducts and inlets the same as described for constant-volume air systems.
 - b. Verify that all terminal units are meeting design airflow under system maximum flow.
- 8. Re-measure the inlet static pressure at the most critical terminal unit and adjust the system static pressure set point to the most energy-efficient set point to maintain the optimum system static pressure. Record set point and give to controls contractor.
- 9. Verify final system conditions as follows:
 - a. Re-measure and confirm that minimum outdoor, return, and relief airflows are within design. Readjust to match design if necessary.
 - b. Re-measure and confirm that total airflow is within design.
 - c. Re-measure final fan operating data, rpms, volts, amps and static profile.
 - d. Mark final settings.

f.

- e. Test system in economizer mode. Verify proper operation and adjust if necessary. Measure and record all operating data.
 - Verify tracking between supply and return fans.
- 10. Record final fan-performance data.

3.8 PROCEDURES FOR VARIABLE-AIR-VOLUME SYSTEMS

- A. Adjust the variable-air-volume systems as follows:
 - 1. Verify that the system static pressure sensor is located two-thirds of the distance down the duct from the fan discharge.
 - 2. Verify that the system is under static pressure control.
 - 3. Select the terminal unit that is most critical to the supply-fan airflow. Measure inlet static pressure, and adjust system static pressure control set point so the entering static pressure for the critical terminal unit is not less than the sum of the terminal-unit manufacturer's recommended minimum inlet static pressure plus the static pressure needed to overcome terminal-unit discharge system losses.
 - 4. Calibrate and balance each terminal unit for maximum and minimum design airflow as follows:
 - a. Adjust controls so that terminal is calling for maximum airflow. Some controllers require starting with minimum airflow. Verify calibration procedure for specific project.
 - b. Measure airflow and adjust calibration factor as required for design maximum airflow. Record calibration factor.
 - c. When maximum airflow is correct, balance the air outlets downstream from terminal units.
 - d. Adjust controls so that terminal is calling for minimum airflow.
 - e. Measure airflow and adjust calibration factor as required for design minimum airflow. Record calibration factor. If no minimum calibration is available, note any deviation from design airflow.
 - f. When in full cooling or full heating, ensure that there is no mixing of hot-deck and cold-deck airstreams unless so designed.
 - g. On constant volume terminals, in critical areas where room pressure is to be maintained, verify that the airflow remains constant over the full range of full cooling to full heating. Note any deviation from design airflow or room pressure.
 - 5. After terminals have been calibrated and balanced, test and adjust system for total airflow. Adjust fans to deliver total design airflows within the maximum allowable fan speed listed by fan manufacturer.
 - a. Set outside-air, return-air, and relief-air dampers for proper position that simulates minimum outdoor-air conditions.
 - b. Set terminals for maximum airflow. If system design includes diversity, adjust terminals for maximum and minimum airflow so that connected total matches fan selection and simulates actual load in the building.

- c. Where duct conditions allow, measure airflow by Pitot-tube traverse. If necessary, perform multiple Pitot-tube traverses to obtain total airflow.
- d. Where duct conditions are not suitable for Pitot-tube traverse measurements, a coil traverse may be acceptable.
- e. If a reliable Pitot-tube traverse or coil traverse is not possible, measure airflow at terminals and calculate the total airflow.
- 6. Measure fan static pressures as follows:
 - a. Measure static pressure directly at the fan outlet or through the flexible connection.
 - b. Measure static pressure directly at the fan inlet or through the flexible connection.
 - c. Measure static pressure across each component that makes up the air-handling system.
 - d. Report any artificial loading of filters at the time static pressures are measured.
- 7. Set final return and outside airflow to the fan while operating at maximum return airflow and minimum outdoor airflow.
 - a. Balance the return-air ducts and inlets the same as described for constant-volume air systems.
 - b. Verify that terminal units are meeting design airflow under system maximum flow.
- 8. Re-measure the inlet static pressure at the most critical terminal unit and adjust the system static pressure set point to the most energy-efficient set point to maintain the optimum system static pressure. Record set point and give to controls contractor.
- 9. Verify final system conditions as follows:
 - a. Re-measure and confirm that minimum outdoor, return, and relief airflows are within design. Readjust to match design if necessary.
 - b. Re-measure and confirm that total airflow is within design.
 - c. Re-measure final fan operating data, rpms, volts, amps, and static profile.
 - d. Mark final settings.
 - e. Test system in economizer mode. Verify proper operation and adjust if necessary. Measure and record all operating data.
 - f. Verify tracking between supply and return fans.

3.9 DUCT LEAKAGE TESTS

- A. Witness the duct pressure testing performed by Installer.
- B. Verify that proper test methods are used and that leakage rates are within specified tolerances.
- C. Report deficiencies observed.

3.10 CONTROLS VERIFICATION

- A. In conjunction with system balancing, perform the following:
 - 1. Verify temperature control system is operating within the design limitations.
 - 2. Confirm that the sequences of operation are in compliance with Contract Documents.
 - 3. Verify that controllers are calibrated and function as intended.
 - 4. Verify that controller set points are as indicated.
 - 5. Verify the operation of lockout or interlock systems.
 - 6. Verify the operation of valve and damper actuators.
 - 7. Verify that controlled devices are properly installed and connected to correct controller.
 - 8. Verify that controlled devices travel freely and are in position indicated by controller: open, closed, or modulating.
 - 9. Verify location and installation of sensors to ensure that they sense only intended temperature, humidity, or pressure.
- B. Reporting: Include a summary of verifications performed, remaining deficiencies, and variations from indicated conditions.

3.11 PROCEDURES FOR TESTING, ADJUSTING, AND BALANCING EXISTING SYSTEMS

- A. Perform a preconstruction inspection of existing equipment that is to remain and be reused.
 - 1. Measure and record the operating speed, airflow, and static pressure of each fan.
 - 2. Measure motor voltage and amperage. Compare the values to motor nameplate information.
 - 3. Check the refrigerant charge.
 - 4. Check the condition of filters.
 - 5. Check the condition of coils.
 - 6. Check the operation of the drain pan and condensate-drain trap.
 - 7. Check bearings and other lubricated parts for proper lubrication.

- 8. Report on the operating condition of the equipment and the results of the measurements taken. Report deficiencies.
- B. Before performing testing and balancing of existing systems, inspect existing equipment that is to remain and be reused to verify that existing equipment has been cleaned and refurbished. Verify the following:
 - 1. New filters are installed.
 - 2. Coils are clean and fins combed.
 - 3. Drain pans are clean.
 - 4. Fans are clean.
 - 5. Bearings and other parts are properly lubricated.
 - 6. Deficiencies noted in the preconstruction report are corrected.
- C. Perform testing and balancing of existing systems to the extent that existing systems are affected by the renovation work.
 - 1. Compare the indicated airflow of the renovated work to the measured fan airflows, and determine the new fan speed and the face velocity of filters and coils.
 - 2. Verify that the indicated airflows of the renovated work result in filter and coil face velocities and fan speeds that are within the acceptable limits defined by equipment manufacturer.
 - 3. If calculations increase or decrease the airflow rates and water flow rates by more than 5 percent, make equipment adjustments to achieve the calculated rates. If increase or decrease is 5 percent or less, equipment adjustments are not required.
 - 4. Balance each air outlet.

3.12 TOLERANCES

- A. Set HVAC system's airflow rates and water flow rates within the following tolerances:
 - 1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus or minus 10 percent.
 - 2. Air Outlets and Inlets: Plus or minus 10 percent.
- B. Maintaining pressure relationships as designed shall have priority over the tolerances specified above.

3.13 PROGRESS REPORTING

- A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for systems balancing devices. Recommend changes and additions to systems balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.
- B. Status Reports: Prepare weekly progress reports to describe completed procedures, procedures in progress, and scheduled procedures. Include a list of deficiencies and problems found in systems being tested and balanced. Prepare a separate report for each system and each building floor for systems serving multiple floors.

3.14 FINAL REPORT

- A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.
 - 1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
 - 2. Include a list of instruments used for procedures, along with proof of calibration.
 - 3. Certify validity and accuracy of field data.
- B. Final Report Contents: In addition to certified field-report data, include the following:
 - 1. Pump curves.
 - 2. Fan curves.
 - 3. Manufacturers' test data.
 - 4. Field test reports prepared by system and equipment installers.
 - 5. Other information relative to equipment performance; do not include Shop Drawings and Product Data.
- C. General Report Data: In addition to form titles and entries, include the following data:
 - 1. Title page.
 - 2. Name and address of the TAB specialist.
 - 3. Project name.
 - 4. Project location.

- 5. Architect's name and address.
- 6. Engineer's name and address.
- 7. Contractor's name and address.
- 8. Report date.
- 9. Signature of TAB supervisor who certifies the report.
- 10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
- 11. Summary of contents including the following:
 - a. Indicated versus final performance.
 - b. Notable characteristics of systems.
 - c. Description of system operation sequence if it varies from the Contract Documents.
- 12. Nomenclature sheets for each item of equipment.
- 13. Data for terminal units, including manufacturer's name, type, size, and fittings.
- 14. Notes to explain why certain final data in the body of reports vary from indicated values.
- 15. Test conditions for fans and pump performance forms including the following:
 - a. Settings for outdoor-, return-, and exhaust-air dampers.
 - b. Conditions of filters.
 - c. Cooling coil, wet- and dry-bulb conditions.
 - d. Face and bypass damper settings at coils.
 - e. Fan drive settings including settings and percentage of maximum pitch diameter.
 - f. Inlet vane settings for variable-air-volume systems.
 - g. Settings for supply-air, static-pressure controller.
 - h. Other system operating conditions that affect performance.
- D. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:
 - 1. Quantities of outdoor, supply, return, and exhaust airflows.
 - 2. Water and steam flow rates.
 - 3. Duct, outlet, and inlet sizes.
 - 4. Pipe and valve sizes and locations.
 - 5. Terminal units.
 - 6. Balancing stations.
 - 7. Position of balancing devices.
- E. Round, Flat-Oval, and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:
 - 1. Report Data:
 - a. System and air-handling-unit number.
 - b. Location and zone.
 - c. Traverse air temperature in deg F.
 - d. Duct static pressure in inches wg.
 - e. Duct size in inches.
 - f. Duct area in sq. ft..
 - g. Indicated airflow rate in cfm.
 - h. Indicated velocity in fpm.
 - i. Actual airflow rate in cfm.
 - j. Actual average velocity in fpm.
 - k. Barometric pressure in psig.
- F. Air-Terminal-Device Reports:
 - 1. Unit Data:
 - a. System and air-handling unit identification.
 - b. Location and zone.
 - c. Apparatus used for test.
 - d. Area served.
 - e. Make.
 - f. Number from system diagram.
 - g. Type and model number.
 - h. Size.
 - i. Effective area in sq. ft..
 - 2. Test Data (Indicated and Actual Values):
 - a. Airflow rate in cfm.

- b. Air velocity in fpm.
- c. Preliminary airflow rate as needed in cfm.
- d. Preliminary velocity as needed in fpm.
- e. Final airflow rate in cfm.
- f. Final velocity in fpm.
- g. Space temperature in deg F.
- G. Instrument Calibration Reports:
 - 1. Report Data:
 - a. Instrument type and make.
 - b. Serial number.
 - c. Application.
 - d. Dates of use.
 - e. Dates of calibration.

3.15 VERIFICATION OF TAB REPORT

- A. The TAB specialist's test and balance engineer shall conduct the inspection in the presence of commissioning authority.
- B. Owner shall randomly select measurements, documented in the final report, to be rechecked. Rechecking shall be limited to either 10 percent of the total measurements recorded or the extent of measurements that can be accomplished in a normal 8-hour business day.
- C. If rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."
- D. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.
- E. If TAB work fails, proceed as follows:
 - 1. TAB specialists shall recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection.
 - If the second final inspection also fails, Owner may contract the services of another TAB specialist to complete TAB work according to the Contract Documents and deduct the cost of the services from the original TAB specialist's final payment.
 - 3. If the second verification also fails, Owner may contact AABC Headquarters regarding the AABC National Performance Guaranty.
- F. Prepare test and inspection reports.

3.16 ADDITIONAL TESTS

- A. Within 90 days of completing TAB, perform additional TAB to verify that balanced conditions are being maintained throughout and to correct unusual conditions.
- B. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional TAB during near-peak summer and winter conditions.

END OF SECTION

SECTION 230713 - DUCT INSULATION

PART1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes insulating the following duct services:
 - 1. Indoor, concealed supply air.
 - 2. Indoor, exposed supply air.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory- and field-applied if any).
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - 1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
 - 2. Detail insulation application at elbows, fittings, dampers, specialties and flanges for each type of insulation.
 - 3. Detail application of field-applied jackets.
 - 4. Detail application at linkages of control devices.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.
- B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.
 - 1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
 - 2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.6 COORDINATION

- A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."
- B. Coordinate clearance requirements with duct Installer for duct insulation application. Before preparing ductwork Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.
- C. Coordinate installation and testing of heat tracing.

1.7 SCHEDULING

- A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.
- B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

- A. Comply with requirements in "Duct Insulation Schedule, General," "Indoor Duct and Plenum Insulation Schedule," and "Aboveground, Outdoor Duct and Plenum Insulation Schedule" articles for where insulating materials shall be applied.
- B. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.
- D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.
- E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
- F. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type III with factory-applied FSK jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
- G. Mineral-Fiber Board Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, Type IA or Type IB. For duct and plenum applications, provide insulation with factory-applied ASJ. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

2.2 ADHESIVES

- A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.
- B. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
 - 1. Fiberglass adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. ASJ Adhesive, and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.
 - 1. Adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.3 MASTICS AND COATINGS

- A. Materials shall be compatible with insulation materials, jackets, and substrates.
 1. VOC Content: 300 g/L or less.
- B. Vapor-Retarder Mastic: Water based; suitable for indoor use on below ambient services.
 - 1. Water-Vapor Permeance: Comply with ASTM C 755, Section 7.2.2, Table 2, for insulation type and service conditions.
 - 2. Service Temperature Range: Minus 20 to plus 180 deg F.
 - 3. Comply with MIL-PRF-19565C, Type II, for permeance requirements.
 - 4. Color: White.
- C. Breather Mastic: Water based; suitable for indoor and outdoor use on above ambient services.
 - 1. Water-Vapor Permeance: ASTM E 96, greater than 1.0 perm at manufacturer's recommended dry film thickness.
 - 2. Service Temperature Range: Minus 20 to plus 180 deg F.
 - 3. Color: White.
- 2.4 LAGGING ADHESIVES
 - A. Description: Comply with MIL-A-3316C, Class I, Grade A and shall be compatible with insulation materials, jackets, and substrates.
 - 1. Adhesives shall have a VOC content of 50 g/L or less.
 - 2. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over duct insulation.
 - 3. Service Temperature Range: 0 to plus 180 deg F.
 - 4. Color: White.

2.5 SEALANTS

- A. FSK and Metal Jacket Flashing Sealants:
 - 1. Materials shall be compatible with insulation materials, jackets, and substrates.
 - 2. Fire- and water-resistant, flexible, elastomeric sealant.
 - 3. Service Temperature Range: Minus 40 to plus 250 deg F.
 - 4. Color: Aluminum.
 - 5. Sealant shall have a VOC content of 420 g/L or less.
- B. ASJ Flashing Sealants:
 - 1. Materials shall be compatible with insulation materials, jackets, and substrates.
 - 2. Fire- and water-resistant, flexible, elastomeric sealant.
 - 3. Service Temperature Range: Minus 40 to plus 250 deg F.
 - 4. Color: White.
 - 5. Sealant shall have a VOC content of 420 g/L or less.

2.6 FACTORY-APPLIED JACKETS

- A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:
 - 1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
 - 2. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.

2.7 TAPES

- A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.
 - 1. Width: 3 inches.
 - 2. Thickness: 11.5 mils.
 - 3. Adhesion: 90 ounces force/inch in width.
 - 4. Elongation: 2 percent.
 - 5. Tensile Strength: 40 lbf/inch in width.
 - 6. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.
- B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.
 - 1. Width: 3 inches.
 - 2. Thickness: 6.5 mils.
 - 3. Adhesion: 90 ounces force/inch in width.
 - 4. Elongation: 2 percent.
 - 5. Tensile Strength: 40 lbf/inch in width.
 - 6. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.
- C. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.
 - 1. Width: 2 inches.
 - 2. Thickness: 3.7 mils.
 - 3. Adhesion: 100 ounces force/inchin width.
 - 4. Elongation: 5 percent.
 - 5. Tensile Strength: 34 lbf/inch in width.

2.8 SECUREMENTS

- A. Bands:
 - 1. Aluminum: ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 1/2 inch wide with wing seal or closed seal.
- B. Insulation Pins and Hangers:
 - 1. Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.135-inch- diameter shank, length to suit depth of insulation indicated.
 - 2. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.135-inch- diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch galvanized carbon-steel washer.

- 3. Metal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:
 - a. Baseplate: Perforated, galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
 - b. Spindle: Aluminum, fully annealed, 0.106-inch- diameter shank, length to suit depth of insulation indicated.
 - c. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.
- 4. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick, aluminum sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.
 - a. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in exposed locations.
- C. Staples: Outward-clinching insulation staples, nominal 3/4-inch- wide, stainless steel or Monel.
- D. Wire: 0.080-inch nickel-copper alloy.

2.9 CORNER ANGLES

A. Aluminum Corner Angles: 0.040 inch thick, minimum 1 by 1 inch, aluminum according to ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.
 - 1. Verify that systems to be insulated have been tested and are free of defects.
 - 2. Verify that surfaces to be insulated are clean and dry.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

3.3 GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of ducts and fittings.
- B. Install insulation materials, vapor barriers or retarders, jackets, and thicknesses required for each item of duct system as specified in insulation system schedules.
- C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E. Install multiple layers of insulation with longitudinal and end seams staggered.
- F. Keep insulation materials dry during application and finishing.
- G. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- H. Install insulation with least number of joints practical.
- I. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
 - 1. Install insulation continuously through hangers and around anchor attachments.
 - 2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
 - 3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.

- J. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- K. Install insulation with factory-applied jackets as follows:
 - 1. Draw jacket tight and smooth.
 - 2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
 - Overlap jacket longitudinal seams at least 1-1/2 inches. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c.
 a. For below ambient services, apply vapor-barrier mastic over staples.
 - 4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
 - 5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to duct flanges and fittings.
- L. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- M. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- N. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

3.4 PENETRATIONS

- A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.
 - 1. Seal penetrations with flashing sealant.
 - 2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
 - 3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.
 - 4. Seal jacket to roof flashing with flashing sealant.
- B. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.
 - 1. Seal penetrations with flashing sealant.
 - 2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
 - 3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
 - 4. Seal jacket to wall flashing with flashing sealant.
- C. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
- D. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Terminate insulation at fire damper sleeves for fire-rated wall and partition penetrations. Externally insulate damper sleeves to match adjacent insulation and overlap duct insulation at least 2 inches.
 - 1. Comply with requirements in Section 078413 "Penetration Firestopping."
- E. Insulation Installation at Floor Penetrations:
 - 1. Duct: For penetrations through fire-rated assemblies, terminate insulation at fire damper sleeves and externally insulate damper sleeve beyond floor to match adjacent duct insulation. Overlap damper sleeve and duct insulation at least 2 inches.
 - 2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.5 INSTALLATION OF MINERAL-FIBER INSULATION

- A. Blanket Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.
 - 1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.
 - 2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
 - 3. Install either capacitor-discharge-weld pins and speed washers or cupped-head,
 - capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:

- a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
- b. On duct sides with dimensions larger than 18 inches, place pins 16 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
- c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
- d. Do not overcompress insulation during installation.
- e. Impale insulation over pins and attach speed washers.
- f. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
- 4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from one edge and one end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory-or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.
 - a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
 - b. Install vapor stops for ductwork and plenums operating below 50 deg F at 18-foot intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to two times the insulation thickness, but not less than 3 inches.
- 5. Overlap unfaced blankets a minimum of 2 inches on longitudinal seams and end joints. At end joints, secure with steel bands spaced a maximum of 18 inches o.c.
- 6. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
- 7. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inchwide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.
- B. Board Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.
 - 1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.
 - 2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
 - 3. Install either capacitor-discharge-weld pins and speed washers or cupped-head,
 - capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
 - a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
 - b. On duct sides with dimensions larger than 18 inches, space pins 16 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
 - c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
 - d. Do not overcompress insulation during installation.
 - e. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
 - 4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from one edge and one end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory-or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.
 - a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
 - b. Install vapor stops for ductwork and plenums operating below 50 deg F at 18-foot intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to two times the insulation thickness, but not less than 3 inches.

- 5. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Groove and score insulation to fit as closely as possible to outside and inside radius of elbows. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
- 6. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inchwide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.

3.6 FINISHES

- A. Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."
 - 1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.
 - a. Finish Coat Material: Interior, flat, latex-emulsion size.
- B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.
- C. Do not field paint aluminum or stainless-steel jackets.

3.7 DUCT INSULATION SCHEDULE, GENERAL

- A. Plenums and Ducts Requiring Insulation:
 - 1. Indoor, concealed supply.
 - 2. Indoor, exposed supply.
 - 3. Indoor, concealed return.
 - 4. Indoor, exposed return.
 - 5. Indoor, concealed exhaust between isolation damper and penetration of building exterior.
 - 6. Indoor, exposed exhaust between isolation damper and penetration of building exterior.

B. Items Not Insulated:

- 1. Fibrous-glass ducts.
- 2. Metal ducts with duct liner of sufficient thickness to comply with energy code and ASHRAE/IESNA 90.1.
- 3. Factory-insulated flexible ducts.
- 4. Factory-insulated plenums and casings.
- 5. Flexible connectors.
- 6. Vibration-control devices.
- 7. Factory-insulated access panels and doors.

3.8 INDOOR DUCT AND PLENUM INSULATION SCHEDULE

- A. Concealed supply-air duct insulation shall be the following:
 - 1. Mineral-Fiber Blanket: 2 inches thick and 1.5-lb/cu. ft. nominal density. Regardless of the thickness of the insulation, the R value of the insulation shall be no less than R-8.
- B. Concealed return-air duct insulation shall be the following:
 - 1. Mineral-Fiber Blanket: 2 inches thick and 1.5-lb/cu. ft. nominal density. Regardless of the thickness of the insulation, the R value of the insulation shall be no less than R-8.
 - 2. None
- C. Exposed supply-air duct insulation shall be the following:
 - 1. Mineral-Fiber Board: 2 inches thick and 2-lb/cu. ft. nominal density. Regardless of the thickness of the insulation, the R value of the insulation shall be no less than R-8.
- D. Exposed return-air duct insulation shall be the following:
 - 1. |Mineral-Fiber Board: 2 inches thick and 2-lb/cu. ft. nominal density.Regardless of the thickness of the insulation, the R value of the insulation shall be no less than R-8.
- E. Exposed exhaust-air duct insulation shall be the following:
 - 1. None.

END OF SECTION

SECTION 230800 - COMMISSIONING OF HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes Cx process requirements for the following HVAC systems, assemblies, and equipment:
 1. Air distribution systems.
 - 2. Heating and cooling terminal and unitary equipment.
 - 3. Building Automation System (BAS) Commissioning.
 - 4. TAB verification.

1.3 DEFINITIONS

- A. BAS: Building automation system.
- B. Cx: Commissioning, as defined in Section 019113 "General Commissioning Requirements."
- C. CxA: Commissioning Authority, as defined in Section 019113 "General Commissioning Requirements."
- D. IgCC: International Green Construction Code.
- E. "Systems," "Assemblies," "Subsystems," "Equipment," and "Components": Where these terms are used together or separately, they mean "as-built" systems, assemblies, subsystems, equipment, and components.
- F. TAB: Testing, adjusting, and balancing.

1.4 ADDITIONAL RESPONSIBILITIES

- A. Refer to Section 01 91 13019113nsibilities common to all Divisions are specified in Section 01 91 13. The f019113re responsibilities or notable responsibilities specific to Division 23.
- B. Construction Phase
 - 1. Provide skilled technicians qualified to perform the work required.
 - 2. Provide factory-trained and authorized technicians where required by the Contract Documents.
 - 3. Prepare and submit required draft Start-Up Documentation and submit along with the manufacturer¢s application, installation and start-up information.
 - 4. Provide assistance to the CxA in preparation of the specific Functional Performance Test (FPT) procedures. Contractors, subcontractors and vendors shall review FPT procedures to ensure feasibility, safety and equipment protection and provide necessary written alarm limits to be used during the tests. Damage caused to equipment performed in accordance with the approved procedures will be the responsibility of the Contractor.
 - 5. Thoroughly complete and inspect installation of systems and equipment as detailed throughout Contract Documents, as required by reference or industry standards, and as specifically indicated elsewhere this Section.
 - 6. Start-Up, test/adjust/balance, and Turn-Over systems and equipment prior to functional performance testing by the CxA. Approved Start-Up Documentation shall be in accordance with Contract Documents, reference or industry standards, and specifically elsewhere in Part I of this Section.
 - 7. Record Start-Up on approved Start-Up Documentation forms and certify that the systems and equipment have been started and or tested in accordance with the requirements specified above and in Section 010900. Each task or item shall be indicated with the Party actually performing the task or procedure.
 - 8. TAB: As outlined in Section 230593. Specifically as it relates to Cx:
 - a. Attend Construction Phase Cx Kick-Off Meeting and Cx progress meetings beginning within 3 months of start of TAB work;
 - b. Submit TAB Plan as indicated above;
 - c. Meet with Cx team to review TAB procedures and documentation required;
 - d. Demonstrate TAB procedures for repetitive tasks (zone balancing, AHU adjusting) as called for by the CxA;
 - e. Participate in Action List dialogue;
 - f. Provide all documentation electronically.
 - g. On airflow tracking zones:

- 1) Balance all outlets downstream of VAV terminal. Record final settings.
- 2) Measure airflow at both minimum and maximum flow conditions and calibrate VAV flow signals at both extremes. Extremes of flow shall be established by putting the zone into full heating and full cooling and raising the fume hood sashes to the stop height and lowering them to the airfoil. Record all parameters and final flow coefficient. If only one flow coefficient is available and this does not permit setting the range to within specified tolerances, enter the flow coefficient as the average of the two required flow coefficients and report the deficiency in an Action Item.
- 3) Measure and record supply air flow at flow extremes with reheat valves both open and closed as required above.
- C. Acceptance Phase

1.

- Assist CxA in Functional Performance Testing. Assistance will typically include the following:
 - a. Manipulate systems and equipment to facilitate Functional Performance Testing
 - b. Provide any specialized instrumentation necessary for Functional Performance Testing;
 - c. Manipulate BAS and other control systems to facilitate Functional Performance Testing.
 - d. Provide a TAB technician to work at the direction of CxA for up to 16 hours beyond assistance specified above.
 - e. Provide a BAS technician to work at the direction of CxA for up to 16 hours beyond assistance specified above.
 - f. Maintain trends and monitor the facility throughout the Endurance Period.
- D. Warranty Phase
 - 1. Maintain record documentation of any configurations, setpoints, parameters, etc. that change throughout the Warranty Period.
 - 2. Provide representative for off-season testing as required by CxA.
 - 3. Respond to warranty issues as required by Division 01 and the General Conditions.

1.5 TEMPORARY OPERATION AND CONDITIONING PLAN

- A. Contractor shall be allowed to use permanent building equipment to provide temporary conditioning ONLY upon the approval of the Owner Approval for such will only be given upon acceptance of a detailed Temporary Operating and Conditioning Plan provided by the individually involved subcontractors and compiled by the CM. The Temporary Operating and Conditioning Plan shall consider/address the following at a minimum:
 - 1. Contractor shall address how equipment will be maintained in good, clean condition. Specifically address:
 - a. Temporary Filtering of Air: Air filters used for construction shall be as or more effective than those specified for permanent use. Contractor shall remove construction filters and replace with new filters prior to FPT. Filters shall be maintained and replaced at the specified final pressure drop. Contractor shall install a magnehelic gauge for visual indication of pressure drop as well as setting and adjusting the loaded filter DP switch for monitoring on the BAS.
 - b. Sealing/Filtering of Open Ducts: Address that all open ducts shall be either sealed or protected with filter media. Return or exhaust systems shall not be used during construction unless otherwise approved.
 - c. Lubrication and Maintenance: Contractor shall maintain the systems and equipment in accordance with the manufacturer¢s instructions. Contractor shall coordinate lubricants used with Owner's operators. Frequency of lubrication and inspection shall be as recommended by manufacturer's literature. Applicable maintenance lubrication schedules shall be included in the Plan. Draft maintenance logs shall be submitted with Plan and completed as maintenance is performed.
 - d. Operation Outside of Normal Ranges: Systems and equipment shall not be operated outside the range of specified conditions. The Temporary Conditioning Plan shall address how the Contractor will ensure that operation will not harm the equipment.
 - 2. Emergency Condition Identification and Response Protocols: The Temporary Conditioning Plan shall address protocols for responding to equipment malfunctions and or harmful operation. Automatic safeties and remote enunciation shall be in place to protect people and property. Temporary operation shall not be allowed until there is an automatic communication/enunciation medium such as a phone connection or an Internet connection. At a minimum, an alarm on the equipment used for temporary service shall be automatically sent to the Contractor's 24 hour monitoring service and to the Owner's help desk. The Contractor shall respond to and be responsible for securing conditions within the building.

- 3. Building Protection: Address how the system will be controlled to avoid humidity conditions that could either promote mold growth or cause corrosion.
- 4. Equipment Reconditioning: Address with specific means and methods how the equipment used for temporary conditioning will be reconditioned to like-new condition. Belts, seals, bearings, couplings, or other parts that wear more than 3% of their expected life shall be replaced.
- 5. Cleaning: Address how ducts, pipes, coils, converters, air handling equipment, terminal units, etc. shall be cleaned prior to Turn-Over.
- 6. Operations Log: Contractor responsible for operating the equipment shall maintain a log of all activities associated with operating and maintaining equipment. Log shall be submitted to Owner on a frequency specified by the Owner.
- 7. Operating System Alterations: The Temporary Conditioning Plan shall address specific protocol for doing work on the systems.
- 8. Damages: Any material, device, component, or equipment that is assessed as damaged or as having a substantially shortened life as a result of temporary conditioning operation shall be replaced by the Contractor at no cost to the Owner or to the project.
- 9. Segregation: Where only portions of a system are to be used, Contractor shall specifically indicate how the used portion will be isolated from the unused portion. The Temporary Conditioning Plan shall address how to ensure that the reduced operation condition will be maintained within acceptable ranges, and/or how capacity will be throttled to keep all operating parameters in recommended ranges.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 CxA

A. Commissioning Agent to be under the owner's contract. The information within this section provided for required coordination with General Contractor, Mechanical Contractor and CxA.

3.2 Cx PROCESS:

2.

4.

- A. Perform Cx process in accordance with Section 019113 "General Commissioning Requirements" for BAS HVAC and in accordance with the following:
 - 1. [Commissioning standards acceptable to the authority having jurisdiction].

3.3 CONSTRUCTION CHECKLISTS

- A. Additional systems required to be commissioned:
 - 1. Air duct systems, including the following:
 - a. Duct systems.
 - b. Air-duct accessories, including volume dampers, fire and smoke dampers, turning vanes, sound attenuators, and flexible connectors.
 - c. Duct-mounted access doors and panels.
 - d. Hangers and supports.
 - TAB Verification:
 - a. Airflow.
 - b. Space pressurization.
 - 3. Documentation:
 - a. Mechanical systems manuals.
 - b. Documentation of required commissioning.
 - Mechanical insulation, including the following:
 - a. Duct and plenum insulation.

3.4 Cx TESTING PREPARATION

- A. Certify that HVAC systems, subsystems, and equipment have been installed, calibrated, and started and that they are operating in accordance with the Contract Documents and approved submittals.
- B. Certify that HVAC instrumentation and control systems have been completed and calibrated, point-to-point checkout has been successfully completed, and systems are operating in accordance with their design sequence of operation, Contract Documents, and approved submittals. Certify that all sensors are operating within specified accuracy and all systems are set to and maintaining set points as required by the design documents.

- C. Certify that TAB procedures have been completed and that TAB reports have been submitted, discrepancies corrected, and corrective work approved.
- D. Set systems, subsystems, and equipment into operating mode to be tested in accordance with approved test procedures (e.g., normal shutdown, normal auto position, normal manual position, unoccupied cycle, emergency power, and alarm conditions).

3.5 Cx TEST CONDITIONS

- A. Perform tests using design conditions, whenever possible.
 - 1. Simulated conditions may, with approval of Architect, be imposed using an artificial load when it is impractical to test under design conditions. Before simulating conditions, calibrate testing instruments. Provide equipment to simulate loads. Set simulated conditions as directed by CxA, and document simulated conditions and methods of simulation. After tests, return configurations and settings to normal operating conditions.
 - 2. Cx test procedures may direct that set points be altered when simulating conditions is impractical.
 - 3. Cx test procedures may direct that sensor values be altered with a signal generator when design or simulating conditions and altering set points are impractical.
- B. If tests cannot be completed because of a deficiency outside the scope of the HVAC system, document the deficiency and report it to Architect. After deficiencies are resolved, reschedule tests.
- C. If seasonal testing is specified, complete appropriate initial performance tests and documentation, and schedule seasonal tests.

3.6 Cx TESTS COMMON TO HVAC SYSTEMS

- A. Measure capacities and effectiveness of systems, assemblies, subsystems, equipment, and components, including operational and control functions, to verify compliance with acceptance criteria.
- B. Test systems, assemblies, subsystems, equipment, and components for operating modes, interlocks, control responses, responses to abnormal or emergency conditions, and response in accordance with acceptance criteria.
- C. Coordinate schedule with, and perform Cx activities at the direction of, CxA.
- D. Comply with Construction Checklist requirements, including material verification, installation checks, startup, and performance test requirements specified in Division 23 Sections specifying HVAC systems and equipment.
- E. Provide technicians, instrumentation, tools, and equipment to perform and document the following:
 - 1. Cx Construction Checklist verification tests.
 - 2. Cx Construction Checklist verification test demonstrations.

3.7 CONSTRUCTION CHECKLIST EXAMPLES

- A. Vibration Isolation in HVAC Systems:
 - 1. Prerequisites: Acceptance of results of construction checklists for vibration control devices specified in Section 230548.13 "Vibration Controls for HVAC Piping and Equipment".
 - 2. Components to Be Tested:
 - a. Vibration isolation control devices in HVAC systems.
 - b. Support systems.
 - 3. Test Purpose: Evaluate effectiveness of vibration isolation control devices.
 - 4. Test Conditions, Constant Speed Equipment: Measure vibration of the facility structure at threelocations designated by Owner's witness while the isolated equipment operates.
 - 5. Test Conditions, Variable Speed Equipment: Measure vibration of the facility structure at threelocations designated by Owner's witness at the following operating conditions:
 - a. Maximum speed.
 - b. Minimum speed.
 - c. Critical speed.
 - 6. Acceptance Criteria: Structure-borne vibration not to exceed specified performance.

3.8 TAB VERIFICATION

- A. Prerequisites: Completion of "Examination" Article requirements and correction of deficiencies, as specified in Section 230593 "Testing, Adjusting, and Balancing for HVAC."
- B. Completion of "Preparation" Article requirements for preparation of a TAB plan that includes strategies and step-by-step procedures, and system-readiness checks and reports, as specified in Section 230593 "Testing, Adjusting, and Balancing for HVAC."

- C. Scope: HVAC air systems.
- D. Purpose: Differential flow relationships intended to maintain air and water pressurization differentials between the various areas of Project.
- E. Conditions of the Test:
 - 1. Cx Test Demonstration Sampling Rate: As specified in "Inspections" Article in Section 230593 "Testing, Adjusting, and Balancing for HVAC."
 - 2. Systems operating in full heating mode.
 - 3. Systems operating in full cooling mode.
- F. Acceptance Criteria:

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- 1. Under all conditions, rechecked measurements comply with "Inspections" Article in Section 230593 "Testing, Adjusting, and Balancing for HVAC."
- 2. Additionally, no rechecked measurement shall differ from measurements documented in the final report by more than the tolerances allowed.
- 3. Under all conditions, where the Contract Documents indicate a differential in airflow between supply and exhaust and/or return in a space, the differential relationship shall be maintained.

3.9 TERMINAL UNIT EQUIPMENT Cx TESTS

- A. VAV Terminal Air Units with Coils:
 - Prerequisites: Installation verification of the following:
 - a. Occupancy Input Device: Occupancy sensor.
 - b. Occupancy Output Device: DDC system binary output.
 - c. Room Temperature Input Device: Room thermostat.
 - d. Room Temperature Output Device: Electronic damper actuators and control-valve operators.
 - e. Display the following at the operator's workstation:
 - 1) Room/area served.
 - 2) Room occupied/unoccupied.
 - 3) Room temperature indication.
 - 4) Room temperature set point.
 - 5) Room temperature set point, occupied.
 - 6) Room temperature set point, unoccupied.
 - 7) Air-damper position as percentage open.
 - 2. Scope: VAV terminal air units and dual-duct terminal air units and associated controls.
 - 3. Purpose:
 - a. Occupancy-dependent room temperature set-point reset.
 - b. Room temperature control.
 - 4. Conditions of the Test:
 - a. Cx Test Demonstration Sampling Rate: 10 percent of each model/size unit.
 - b. Temperature Control Occupied: Start with the room unoccupied. Occupy the room and observe the change to occupied status. Observe temperature control until room temperature is stable at occupied set point, plus or minus 1.0 deg F.
 - c. Temperature Control Unoccupied: Start with the room occupied. Vacate the room and observe the change to unoccupied status. Observe temperature control until room temperature is stable at unoccupied set point, plus or minus 1.0 deg F.
 - 5. Acceptance Criteria:
 - a. Temperature Control Occupied:
 - 1) Control system status changes from "occupied" to "unoccupied" after the specified time.
 - 2) Room temperature is stable at occupied set point, plus or minus 1.0 deg F within 10 minutes of occupancy. Room temperature does not overshoot or undershoot set point by more than 2.0 deg F during transition.
 - b. Temperature Control Unoccupied:
 - 1) Control system status changes from "unoccupied" to "occupied" immediately.
 - Room temperature is stable at unoccupied set point, plus or minus 1.0 deg F within 30 minutes of occupancy.

3.10 BUILDING AUTOMATION SYSTEM (BAS) COMMISSIONING

- A. WORK INCLUDED
 - 1. BAS Start-Up and Functional Performance Testing.

- 2. Validation of proper and thorough installation of BAS and associated equipment.
- 3. Generic Start-Up Documentation for BAS.
- 4. Development of final Start-Up Documentation for BAS.
- 5. Functional Performance Testing of BAS.
- 6. Coordination of BAS-related training.
- 7. Documentation of BAS Operation and Maintenance Documentation.
- B. GENERAL DESCRIPTION
 - 1. This section defines responsibilities of the Building Automation System Contractor to commission the BAS.
 - 2. Commissioning (Cx) is the process of ensuring that (i) all building systems are installed and perform interactively according to the design intent; (ii) that systems are efficient and cost effective and meet the Owner's operational needs; (iii) that the installation is accurately documented; and (iv) that the Operators are adequately trained. Commissioning serves as a tool to minimize post-occupancy operational problems, and establishes testing and communication protocols to advance the building systems from installation to optimized, fully-dynamic operation.
 - 3. Commissioning Authority (CxA) shall work with the Contractor and the design engineers to direct and oversee the Cx process and perform Functional Performance Testing.
 - 4. The Commissioning Plan outlines the Cx process beyond the Construction Contract, including design phase activities and design team/owner responsibilities. The specification Sections dictate all requirements of the commissioning process relative to the construction contract. The Cx Plan is not part of the construction contract, although it is available for reference at the request of the Contractor.
- C. SCOPE

D.

- 1. The scope of Commissioning on this project shall include the entire BAS system.
- DEFINITIONS AND ABBREVIATIONS
 - 1. Refer to Section 019113 for a complete list of Definitions and Abbreviations.
 - 2. POT (Portable Operators Terminal): Portable operator workstation (typically a laptop computer) that has BAS software loaded and the capability to access, program, and edit the BAS.
 - 3. HHD (Hand-Held Device): Portable device (typically with limited functionality) that is used to access components of the BAS. May be a standard PDA or proprietary device/interface.
- E. CONTRACTOR RESPONSIBILITIES
 - 1. General responsibilities of the BAS Contractor (BAC) are specified in Section 01 91 13019113c responsibilities of the BAS Contractor.
 - 2. Assist CxA in verification and Functional Performance Testing. Assistance will typically include the following:
 - a. Establish trend logs of system operation as specified herein.
 - b. Manipulate systems and equipment to facilitate Functional Performance Testing. Typically, this will only be for initial samples of like systems.
 - c. Provide POTs or operator workstations in locations convenient to testing activities as specified below.
 - d. Provide CxA with appropriate passwords, keys, and access to control panels and workstations.
 - e. Where control systems do not allow a test mode or the overriding of physical input values for testing, program an interim virtual point for all inputs that can be used to represent the point and be overridden for testing.
 - 3. Provide a control technician to work at the direction of the CxA for software optimization assistance for a minimum of 40 hours during the Acceptance Phase of the project.
 - 4. Controls Parameter Matrix: Contractor shall provide a form summarizing all setpoints and alarm parameters and alarming strategies for the Owner to complete. Organize a meeting to discuss the desired initial setpoints and alarm parameters. Contractor shall enter the requested setpoints and alarm parameters at completion of start-up and record the applicable settings in the Start-Up Documentation.
 - 5. Final Systems Operation Training: The BAC shall train the Owner and Operators on operation and use of any new items for the BAS. Additional information is provided in Section 01 91019113al Tools: Special equipment, tools and instruments (only available from vendor, specific to a piece of equipment) required for testing equipment, according to these Contract Documents shall be included in the base bid price to the Contractor and turned over to the Owner upon project completion.

F. TAB & COMMISSIONING Portable operators terminal

- 1. Provide the CxA with all software, connection devices, licenses, passwords, etc. to facilitate connection to the BAS throughout the building. Provide a license to graphic software, and all operating software necessary for testing and configuration of all control elements at all levels. License may be a temporary license that will expire after the completion of the Warranty Period. Options include:
 - a. A laptop computer provided by BAS Contractor for dedicated use by the CxA throughout the Construction and Acceptance Phases. This would be turned over to the Owner at the end of the Acceptance Phase.
 - b. Browser access to the full graphic software: CxA will provide laptop, however BAS Contractor shall set up the laptop to successfully connect.
 - c. Licensed client software to be installed on CxA computer: BAS Contractor shall install the software and ensure it is functional.
 - d. Terminal Services session access to a graphic server with required CALs to allow use of all required software. BAS Contractor shall configure the CxA computer to connect to the terminal session.
- 2. Access to the BAS must be provided throughout the building as more fully defined as follows:
 - a. Full wireless connection to the graphic server throughout the building will be adequate.b. Network connection for full access to the graphic server within 50¢ of any point in the
 - building.
 c. Exception to 1 and 2 above: An acceptable alternative to full building access to the graphic server relating to terminal controls shall be providing to the CxA the devices and software
 - required to connect to local terminal controllers through a connection port in the space such as connection to a jack on the temperature sensor (basically what is required by TAB specified below). This does not apply to mechanical rooms as full graphic access is required in mechanical rooms.
- 3. Provide software required by TAB to calibrate all flow sensors. TAB will provide computer to be used as a portable operator¢s terminal. Any manufacturer specific hardware such as connection cables, converters, hand held devices, etc. shall be provided by the BAS Contractor.
- 4. Connections shall be provided local to the device being calibrated. For instance, for VAV boxes, connection of the operator¢s terminal shall be either at the sensor as well as at the box. Otherwise a wireless system shall be provided to facilitate this local functionality.

G. BAS Start-Up TESTING, ADJUSTING, CALIBRATION

- BAS work and/or systems shall be fully functioning prior to Demonstration and Acceptance Phase. Contractor shall start, test, adjust, and calibrate all work and/or systems under this contract, as described below:
 - a. Inspect the installation of all devices. Review the manufacturer¢s installation instructions and validate that the device is installed in accordance with them.
 - b. Verify proper electrical voltages and amperages, and verify that all circuits are free from faults.
 - c. Verify integrity/safety of all electrical connections.
 - d. Coordinate with TAB Contractor to obtain and with CxA to fine tune control settings that are determined from balancing procedures. Record the following control settings as obtained from TAB Contractor, and note any TAB deficiencies in the BAS Start-Up Documentation:
 - 1) Optimum duct static pressure setpoints for VAV air handling units.
 - 2) Minimum outside air damper settings for air handling units.
 - 3) Optimum differential pressure setpoints for variable speed pumping systems.
 - 4) Calibration parameters for flow control devices such as VAV boxes and flow measuring stations. BAS Contractor shall provide hand held device as a minimum to the TAB and CxA to facilitate calibration. Connection for any given device shall be local to the device (i.e., at the VAV box or at the thermostat). HHD or POT shall allow querying and editing of parameters required for proper calibration and Start-Up.
 - 5) Calibration parameters for fume hoods.
 - e. Test, calibrate, and set all digital and analog sensing and actuating devices. Calibrate each instrumentation device by making a comparison between the BAS display and the reading at the device, using an instrument traceable to the National Bureau of Standards, which shall be at least twice as accurate as the device to be calibrated (e.g., if field device is +/-0.5% accurate, test equipment shall be +/-0.25% accurate over same range). Record the measured value and displayed value for each device in the BAS Start-Up Documentation.

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- f. Check and set zero and span adjustments for all transducers and transmitters.
- g. For dampers and valves:
 - 1) Check for adequate installation including free travel throughout range and adequate seal.
 - 2) Where control loops are sequenced, check for proper control without overlap
- h. For actuators:
 - 1) Check to insure that device seals tightly when the appropriate signal is applied to the operator.
 - Check for appropriate fail position, and that the stroke and range is as required and coordinated with the programmed ranges when it is operating under normal conditions.
 - 3) For pneumatic operators, adjust the operator spring compression as required to achieve close off. If positioner or volume booster is installed on the operator, calibrate per manufacturer¢s procedure to achieve spring range indicated. Check split range positioners to verify proper operation. Record settings for each device.
 - 4) Check the stroke and range under actual loading conditions and validate that they correlate with programmed values.
 - 5) For sequenced electronic actuators, calibrate per manufacturer¢s instructions to required ranges.
- i. Check each digital control point by making a comparison between the control command at the CU and the status of the controlled device. Check each digital input point by making a comparison of the state of the sensing device and the OI display. Record the results for each device.
- j. For outputs to reset other manufacturers devices (such as VSDs) and feedback from them, calibrate ranges to establish proper parameters. Coordinate with representative of the respective manufacturer and obtain their approval of the installation.
- k. Verify proper sequences by using the approved Start-Up Documentation to record results. Verify proper sequence and operation of all specified functions.
- I. Verify that all safety devices trip at appropriate conditions. Adjust setpoints accordingly.
- m. Tune all control loops to obtain the fastest stable response without hunting, offset or overshoot. Record tuning parameters and response test results for each control loop in the BAS Start-Up Documentation. Except from a start-up, maximum allowable variance from setpoint for controlled variables under normal load fluctuations shall be as follows. Within 3 minutes of any step-change (for which the system has the capability to respond) in the control loop, the following tolerances shall be maintained (exceptions noted):
 - 1) Duct air temperature: ±1 deg F
 - 2) Zone temperature: ±3°F within 3 minutes and control within ±2 deg F
 - 3) Chilled water temperatures: ±1 deg F
 - 4) Hot water temperatures: ±2 deg F
 - 5) Duct air pressure: ± 0.25 i.w.g
 - 6) Water pressure: ±1 psig
 - 7) Duct relative humidity: ±3% when adding humidity
 - 8) Zone relative humidity: ±5% when adding humidity
 - 9) Terminal air flow control: ±5% of setpoint. This includes all VAV terminal control and exhausted BSCs, canopy hoods, ventilated cage racks, necropsy tables, and other scientific equipment with supply or exhaust ventilation.
 - 10) Fume hoods: ±10% on full sash travel (from min to max in 3 seconds) within 3 seconds. ±5% when sash is positioned in the controllable range. Refer to Section 15995 for fume hood acceptance requirements.
 - 11) Zone pressurization (on active control systems): ±0.03 i.w.c. with no door or window movements. No high containment space shall go more than 0.15 i.w.c. positive, nor go positive at all for more than 20 seconds.
- n. For communication interfaces and BAS control panels:
 - 1) Ensure devices are properly installed with adequate clearance for maintenance and with clear labels in accordance with the record drawings.
 - 2) Ensure that terminations are safe, secure and labeled in accordance with the record drawings.
 - 3) Check power supplies for proper voltage ranges and loading.
 - 4) Ensure that wiring and tubing are run in a neat and workman-like manner, either bound or enclosed in trough.

- 5) Check for adequate signal strength and acceptable bandwidth utilization on communication networks.
- 6) Check for stand-alone performance of controllers by disconnecting the controller from the LAN. Verify the event is annunciated at Operator Interfaces. Verify that the controlling LAN reconfigures as specified in the event of a LAN disconnection.
- 7) Ensure that all outputs and devices fail to their proper positions/states.
- 8) Ensure that buffered and/or volatile information is retained through power outage.
- 9) With all system and communications operating normally and all trends functioning, sample and record update/annunciation times for critical alarms fed from the panel to the Operator Interface.
- 10) Check for adequate grounding of all BAS panels and devices.
- 11) Run self diagnostic routines and ensure they are functional.
- 12) Check the memory allocation and loading to ensure adequate and excess capacity is available and that it will not affect control functionality.
- o. Coordinate desired initial alarm strategies with Owner's Operators. Set all required alarms and document the initial settings in the Start-Up Documentation.
- p. Coordinate all initial setpoints with Owner's Operators. Ensure those setpoints are active.
- q. For Operator Interfaces:
 - 1) Verify that all elements on the graphics are functional and are properly bound to physical devices and/or virtual points, and that hot links or page jumps are functional and logical.
 - 2) Output all specified BAS reports for review and approval.
 - 3) Verify that the alarm printing and logging is functional and per requirements.
 - 4) Verify that trend archiving to disk and provide a sample to the CxA for review.
 - 5) Verify alarm enunciation functionality. Time delay from actual occurrence to the time updated or enunciated on the screen. Ensure it is per the specified requirements.
 - 6) Verify that real time and historical trends are accessible and viewable in graph format.
 - 7) Verify that paging/dial out alarm annunciation is functional.
 - 8) Verify the functionality of remote OIs and that a robust connection can be established consistently.
 - 9) Verify that required third party software applications required with the bid are installed and are functional.
 - 10) Demonstrate open protocol and custom third party interfaces reliably communicate and check response time.
 - 11) Verify response times and screen update and refresh times are per the requirements.
 - 12) Verify that all custom programs are editable from the OI. Check upload, download, back up and restore capabilities of system configuration information as well as custom programs.
 - 13) Verify schedules are set up and working.
 - 14) Verify Owner stipulated security and permissions is set up and functional.
 - 15) In concert with the Building Power Outage test, validate that critical GUI installations are properly powered by UPS and emergency outlets to keep it functional during a power outage. Validate that the space has adequate lighting to manage the building in the event of an outage.
- r. Start-up and check out control air compressors and air drying and filtering systems in accordance with the appropriate section and with manufacturer¢s instructions.
 - 1) Validate adequate drying and pressures.
 - 2) Validate adequate redundancy
 - 3) Validate max run time and cycle time vs manufacturer¢s recommendations
 - 4) Validate that routing of the compressed air does not result in condensation at any point in the system when used with the specified drier.
 - 5) Check all PRVs both primary and back up to ensure adequate functionality and maintenance of downstream pressure.
- s. Verify proper interface with Fire Alarm System.
- t. Verify proper interface with control panels of equipment with self-contained controls that are being monitored by the BAS.
- 2. Submit Start-Up Documentation. This shall be completed, submitted, and approved prior to demonstration and Acceptance Phase.
- H. SENSOR CHECKOUT AND CALIBRATION

- General Checkout: Verify that all sensor locations are appropriate and are away from causes of erratic operation. Verify that sensors with shielded cable are grounded only at one end. For sensor pairs that are used to determine a temperature or pressure difference, make sure they are reading within 0.2°F of each other for temperature and within a tolerance equal to 2% of the reading of each other for pressure. Tolerances for critical applications may be tighter.
- 2. Calibration: Calibrate all sensors using one of the following procedures:
 - a. Sensors Without Transmitters--Standard Application. Make a reading with a calibrated test instrument within 6 inches of the site sensor at various points across the range. Verify that the sensor reading (via the permanent thermostat, gage or BAS) is within the tolerances specified for the sensor. If not, adjust offset and range, or replace sensor. Where sensors are subject to wide variations in the sensed variable, calibrate sensor within the highest and lowest 20% of the expected range.
 - b. Sensors With Transmitters--Standard Application. Disconnect sensor. Connect a signal generator in place of sensor. Connect ammeter in series between transmitter and BAS control panel. Using manufacturer¢s resistance-temperature data, simulate minimum desired temperature. Adjust transmitter potentiometer zero until 4 mA is read by the ammeter. Repeat for the maximum temperature matching 20 mA to the potentiometer span or maximum and verify at the OI. Record all values and recalibrate controller as necessary to conform to tolerances. Reconnect sensor. Make a reading with a calibrated test instrument within 6 inches of the site sensor. Verify that the sensor reading (via the permanent thermostat, gage or BAS) is within the tolerances specified. If not, replace sensor and repeat. For pressure sensors, perform a similar process with a suitable signal generator.
- 3. Sensor Tolerance: Sensors shall be within the tolerances specified for the device. Refer to Section 230900.
- I. LOOP TUNING
 - 1. For all control loops, Contractor shall tune the loops to ensure the fastest stable response without hunting, offset or overshoot with tolerances defined above. Contractor shall introduce upsets to the load when possible to affect response. Otherwise, setpoints can be changed to affect the response.
 - 2. Generally tune loops during periods of high gain.
 - 3. Document all parameters either by capturing text, short interval trends, or screen shots of trend graph documenting the final response.
- J. GRAPHIC COORDINATION
 - 1. The Contractor shall prepare all graphics (only one example graphic is required for typical systems like terminal units) with points embedded for review of CxA and Onwer. Owner shall use these graphics to provide direction to Contractor for the required final graphic. All final graphics must be complete and active before functional testing. Any deviation from the approved graphics will be considered a failure from the perspective of the functional test.

K. BAS DEMONSTRATION

- Demonstrate the operation of the BAS hardware, software, and all related components and systems to the satisfaction of the CxA and Owner. Schedule the demonstration with the Owner's representative 1 week in advance. Demonstration shall not be scheduled until all hardware and software submittals, and the Start-Up Test Report are approved.
- 2. The Contractor shall supply all personnel and equipment for the demonstration, including, but not limited to, instruments, ladders, etc. Contractor supplied personnel must be competent with and knowledgeable of all project-specific hardware, software, and the HVAC systems. All training documentation and submittals shall be at the job site.
- 3. Demonstration shall typically involve small representative samples of systems/equipment randomly selected by the Owner and CxA.
- 4. The system shall be demonstrated following the same procedures used in the Start-Up Test by using the approved Commissioning Checklists. Demonstration shall include, but not necessarily be limited to, the following:
 - a. Demonstrate that required software is installed on BAS workstations. Demonstrate that graphic screens, alarms, trends, and reports are installed as submitted and approved.
 - b. Demonstrate that points specified and shown can be interrogated and/or commanded (as applicable) from all workstations, as specified.
 - c. Demonstrate that remote dial-up communication abilities are in accordance with these Specifications.

- d. Demonstrate correct calibration of input/output devices using the same methods specified for the start-Up tests. A maximum of 10 percent of I/O points shall be selected at random by CxA and/or Owner for demonstration. Upon failure of any device to meet the specified end-to-end accuracy, an additional 10 percent of I/O points shall be selected at random by CxA for demonstration. This process shall be repeated until 100 percent of randomly selected I/O points have been demonstrated to meet specified end-to-end accuracy.
- e. Demonstrate that all BAS and other software programs exist at respective field panels. The BAS programming and point database shall be as submitted and approved.
- f. Demonstrate that all BAS programs accomplish the specified sequences of operation.
- g. Demonstrate that the panels automatically recover from power failures, as specified.
- h. Demonstrate that the stand-alone operation of panels meets the requirements of these Specifications. Demonstrate that the panels' response to LAN communication failures meets the requirements of these Specifications.
- i. Identify access to equipment selected by CxA. Demonstrate that access is sufficient to perform required maintenance.
- j. Demonstrate that required trend graphs and trend logs are set up per the requirements. Provide a sample of the data archive. Indicate the file names and locations.
- 5. BAS Demonstration shall be completed and approved prior to Functional Performance Testing. CxA shall determine if the system is ready for Functional Performance Testing and document any problems requiring Contractor attention.
 - a. If the systems are not ready for Functional Performance Testing, Contractor shall correct problems and provide notification to the Owner¢s representative that all problems have been corrected. The Acceptance Period shall be restarted at a mutually scheduled time for an additional one week period. This process shall be repeated until CxA issues notice that the BAS is ready for Functional Performance Testing.
- 6. Any tests successfully completed during the BAS Demonstration will be recorded as ÜPassed¢ for the Functional Performance Testing and will not have to be re-accomplished.
- L. FUNCTIONAL PERFORMANCE TESTING
 - 1. Requirements for assistance with Functional Performance Testing are specified in the Section 019113, Section 230800 and Section 260800. Provide assistance during Functional Performance Testing per the Section 019113 and related Specifications.
- M. BAS ACCEPTANCE PHASE AND OBSERVATION PERIOD
 - 1. BAS Acceptance Phase: BAS Acceptance Phase consists of the Functional Performance Testing process of the BAS by the CxA and shall begin after approval of the BAS Demonstration and prior to issuance of Substantial Completion. Acceptance Phase for the BAS shall not be scheduled until all HVAC systems are in operation, the Start-Up Documentation has been reviewed, all required cleaning and lubrication has been completed (i.e., filters changed, piping flushed, strainers cleaned, etc.), and TAB report has been submitted and approved. Acceptance Phase and its approval to begin will be performed on a system-by-system basis if mutually agreed upon by Contractor and Owner.
 - 2. BAS Observation Period: After Functional Performance Testing, the BAS shall be shown to operate properly for 2 weeks without malfunction, without alarm caused by control action or device failure, and with smooth and stable control of systems and equipment in conformance with these specifications. At the end of the two weeks, BAS Contractor shall forward the trend logs to the CxA for review.
 - 3. During the Acceptance Phase, the Contractor shall maintain a hard copy log of all alarms generated by the BAS. For each alarm received, Contractor shall diagnose the cause of the alarm, and shall list on the log for each alarm, the diagnosed cause of the alarm, and the corrective action taken. If in the Contractor¢s opinion, the cause of the alarm is not the responsibility of the Contractor, Contractor shall immediately notify the Owner's representative.
 - 4. During the Acceptance Phase, the Contractor shall maintain all controller network and workstation hardware and software in a state that will allow remote access by CxA to trend logs as specified below.
- N. BAS TREND REQUIREMENTS
 - 1. The BAS Contractor shall configure and analyze all trends required under this Section.
 - Trends are historical archives on computer disks that document the operation of the systems and equipment. Trends can be time-series (interval) recordings of system I/O parameters or change-of-value (COV) based trends that record when a system value changes by more than a specified threshold.

- 3. CxA will analyze trend logs of the system operating parameters to evaluate normal system functionality. The requirements of the trending are specified below. Contractor shall establish these trends, ensure they are being stored properly, and forward the data in electronic format to the CxA.
- 4. Data shall include a single row of field headings and the data thereafter shall be contiguous. Each record shall include a date and time field. Recorded parameters for a given piece of equipment or component shall be trended at the same time intervals and be presented in a maximum of two separate two dimensional formats with time being the vertical axis and field name being the horizontal axis.. Data shall be forwarded in one of the following formats.
 - a. Microsoft Access Database (.mdb)
 - b. Microsoft Excel Spreadsheet (.xls)
 - c. Comma Separated Value (.csv or .txt), preferably with quotes delimiting text fields and # delimiting date/time fields.
- 5. Sample times indicated as COV (±) mean that the changed parameter only needs to be recorded whenever the value changes by the amount listed. When output to the trend file, the latest recorded value shall be listed along with the time increment record. If the BAS does not have the capability to record based on COV, the parameter shall be recorded based on the time interval common to other point trends for the system.
- 6. Contractor shall provide the CxA with required passwords, phone numbers, etc. to allow the CxA access to the trend log data and allow downloading to a remote location. Contractor shall also provide step-by-step written instructions for accessing the data.
- 7. Trending Requirements: All I/O points on primary equipment shall be trended throughout the Cx process on 10 min. intervals for analog values and change-of-value for binary values. Trends shall include but are not necessarily limited to the following points:
 - a. Outside air temperature
 - b. Outside air relative humidity
 - c. Outside air enthalpy
 - d. Cooling tons
 - e. All sensed hydronic temperatures
 - f. All sensed air temperatures and relative humidity measurements on primary equipment
 - g. All damper outputs on primary equipment
 - h. All valve outputs on primary equipment
 - i. All sensed fan volumes (flow) on primary equipment
 - j. All inputs and outputs to Variable Speed Drives
 - k. Return (or exhaust) air temperature on each air handler
 - I. All safety indications
 - m. Status on all primary equipment
 - n. All air and water pressures on primary equipment or systems
 - o. Zone temperatures
 - p. Steam flow
 - q. Electricity consumption where monitored.
 - r. Natural gas flows
 - s. Converter steam valves and hot water temperatures
 - t. Steam supply pressures and temperatures.
 - u. All points on primary equipment and selected sampling of terminal points unless approved otherwise.
- O. TREND GRAPHS
 - 1. Trend graphs shall be used during Functional Performance Testing to facilitate and document testing. Contractor shall prepare controller and workstation software to display graphical format trends throughout the Acceptance Phase. Trend graphs shall demonstrate compliance with contract documents. Trended values and intervals shall be the same as those specified for the Functional Performance Tests.
 - 2. Lines shall be labeled and shall be distinguishable from each other by using either different line types or different line colors.
 - 3. Indicate engineering units of the y-axis values; e.g. degrees F., inches w.c., Btu/lb, percent wide open, etc.
 - 4. The y-axis scale shall be chosen so that all trended values are in a readable range. Do not mix trended values on one graph if their unit ranges are incompatible.
 - 5. Trend outside air temperature, humidity, and enthalpy during each period in which any other points are trended.

- 6. All points trended for one HVAC subsystem (e.g. air handling unit, chilled water system, etc.) shall be trended simultaneously and on a common trend period.
- 7. Each graph shall be clearly labeled with HVAC subsystem title, date, and times.
- 8. The format of all trend graphs must be provided as approved by the CxA.

P. WARRANTY PHASE - OPPOSITE SEASON TRENDING AND TESTING

- 1. Trending: Throughout the Warranty Phase, trend logs shall be maintained as required for the Acceptance Phase. BAS Contractor shall forward archived trend logs to the CxA for review upon CxA request. CxA will review these and notify BAS Contractor of any warranty work required.
- Opposite Season Testing: Within 6 months of completion of the Acceptance Phase, CxA shall schedule and conduct Opposite Season Functional Performance Testing. The BAS Contractor shall support this testing and remedy any deficiencies identified.

Q. SOFTWARE OPTIMIZATION ASSISTANCE

- 1. The Contractor shall provide the services of a BAS technician as specified above at the project site to be at the disposal of the CxA. The purpose of this requirement is to make changes, enhancements and additions to control unit and/or workstation software that have been identified by the CxA during the construction and commissioning of the project and that are beyond the specified Contract requirements. The cost for this service shall be included with the bid. Requests for assistance shall be for contiguous or non-contiguous 8-hour days, unless otherwise mutually agreed upon by Contractor, CxA, and Owner. The Owner's representative shall notify Contractor 2 days in advance of each day of requested assistance.
- 2. The BAS technician provided shall be thoroughly trained in the programming and operation of the controller and workstation software. If the BAS technician provided cannot perform every software task requested by the CxA in a timely fashion, Contractor shall provide additional qualified personnel at the project site as requested by the CxA to meet the total specified requirement on-site.

R. BAS OPERATOR TRAINING

- 1. Provide up to 6 complete sets of User Manuals (hard copy and one electronic copy) to be used for training.
- 2. BAS Contractor shall submit a Training Plan per the requirements of Div 01 to the CM who will forward it to the A/E and CxA for review.
- 3. On Site Training: Provide services of BAS Contractor's qualified technical personnel to instruct Owners personnel in operation and maintenance of the BAS. Instruction shall be in classroom setting at the project site for appropriate portions of the training. Training may be in non-contiguous days at the request of the Owner. The Owner's representative shall notify Contractor 1-week in advance of each day of requested training. The Contractor's designated training personnel shall meet with the A/E, CxA and Owner¢s representative for the purpose of discussing and fine-tuning the training agenda prior to the first training session. Training agenda shall be as follows:
 - a. Basic Operator Workstation Training:
 - 1) Brief walk-through of building, including identification of all controlled equipment and condensed demonstration of controller portable and built-in operator interface device display capabilities.
 - 2) Brief overview of the various parts of the BAS O&M manuals, including hardware and software programming and operating publications, catalog data, controls installation drawings, and BAS programming documentation.
 - 3) Demonstration of workstation login/logout procedures, password setup, and exception reporting.
 - 4) Demonstration of workstation menu penetration and broad overview of the various workstation features.
 - 5) Overview of systems installed.
 - 6) Present all site-specific naming conventions and points lists, open protocol information, configuration databases, back up sequences, upload/download procedures etc.
 - 7) Overview of scheduling procedures.
 - 8) Overview of alarm features, including how to acknowledge, respond to, and archive alarms, and how to access further information from them.
 - 9) Overview of trend features, including how to set up and view trends.
 - 10) Overview of workstation reporting features and introductory level report generation and scheduling.
 - b. BAS Technician Training:

- 1) General review of sequence of operation and control logic for the project site, including standalone and fail safe modes of operation
- 2) Uploading/downloading and backing up controller configuration and application programs
- 3) Review of installed components including all communication devices, controllers, I/O, etc., and how to install/replace, maintain, commission, and diagnose them
- 4) Introduction to controller programming and overview of the programming application interface
- 5) Defining trends, generating graphs in real time; archiving trends, accessing historical archive and generating reports from them
- 6) Introductory network administration
- 7) Introduction to creating and editing graphics
- 8) Review of setpoint optimization and fine-tuning concepts
- 9) OI use and maintenance
- 10) Web page creation as applicable
- c. System Administrator Training:
 - 1) Overview of system architecture including all routers, bridges, repeaters, gateways, communications protocols, servers, controllers etc.
 - 2) Overview of and recommendations for backing up and restoring the system configuration database
 - 3) Server maintenance
 - Security Management: Assigning passwords and rights for various users on the server, workstations and GUI software
- d. Final Systems Operation Training
 - 1) The BAS Contractor shall conduct Final Systems Operation Training in accordance with Section 019113.
 - 2) Final Systems Operation Training provides the Owner and Operators a training session on whole-building operation. It shall focus primarily on BAS control of building systems and operation and its impact on building performance. System interactions shall be presented and discussed (such as a combined air handler, chiller, boiler, and terminal unit system), along with a detailed presentation of the sequences of operation and their relationship to the BAS. This training shall be conducted by the BAC with assistance from the CxA, and shall be attended by the Owner, Operators, Contractor, Design Team, and by any other Cx Team members deemed necessary by the CxA or the Owner.
 - 3) The Record BAS Shop Drawings shall be provided as a handout for the training.
 - 4) Scheduling, attendees, and training methods shall be as specified in Section 019113.
- e. Fume Hood Controls Training
 - The vendor for the fume hood controls shall present a session to occupant representatives on how the fume hood controls work and how to use the hood monitor.
 - 2) The audience for this session shall be the occupants and their representatives. The setting should be in the field at a functioning fume hood.

END OF SECTION

SECTION 230900 - INSTRUMENTATION AND CONTROL FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes control equipment, including but not limited to HVAC systems and components, control components for equipment not supplied with factory-wired controls
- B. Direct-Digital Control (DDC) system description
 - 1. The Controls Contractor shall supply and install a complete Direct Digital Control (DDC) Building Automation System (BAS) as required to accomplish the Sequences of Control for heating, ventilating, air-conditioning and other building-level equipment and systems as described herein.
- C. Furnish all labor, materials, equipment and service necessary for a complete and operational DDC BAS pursuant with this specification and as shown on the associated contract drawings.
- D. Provide all labor, material, equipment and service not specifically referred to in this specification or on associated drawings that are required to fulfill the functional intent of this specification at no additional cost to the Owner.

1.3 DEFINITIONS

- A. B-AAC: Advanced Application Controllers
- B. B-ASC: Application Specific Controllers
- C. ATC: Automatic Temperature Control
- D. BAS: Building Automation System
- E. B-AWS: Advanced Workstation Software
- F. B-OWS: Operator Workstation Software
- G. B-BBC: Building Controllers
- H. BLCN: Building Level Communication Network
- I. BTN: BACnet Testing Laboratories
- J. DDC: Direct digital control.
- K. I/O: Input/output.
- L. MS/TP: Master slave/token passing.
- M. PC: Personal computer.
- N. PID: Proportional plus integral plus derivative.
- O. RTD: Resistance temperature detector.

1.4 DDC SYSTEM REQUIREMENTS

- A. DDC Systems installed under this specification shall strictly adhere to the following characteristics:
 - 1. Building Automation System (BAS) Direct Digital Controls (DDC) shall consist of native BACnet, microprocessor-based, peer-to-peer, networked, distributed devices utilizing the BACnet communication protocol in an open, interoperable system. The BAS also includes operator interface devices, programming and configuration software applications, DDC input/output devices, non-DDC automatic temperature controls, enclosures and interconnecting conduit and wire.
 - a. The BACnet operating stack must be embedded directly in every Device at the board level, and in all operator interface software packages.

- b. No Gateways, Communication Bridges, Protocol Translators or any other device that translates any proprietary or other communication protocol to the BACnet communication protocol shall be permitted as a part of the BAS installation pursuant with this specification section. Gateways may only be used as required for communication to existing systems or systems installed pursuant with other specification sections.
- c. DDC controllers that are not BACnet compliant shall not be acceptable under this specification and are strictly prohibited.
- 2. The BAS shall be modular in nature and comprised of a network of stand-alone DDC devices. The System shall be designed and implemented in such a way that it may be expanded in both capacity and functionality through the addition of DDC Devices, sensors, actuators, etc.
- 3. All BAS controllers shall be tested, certified, clearly stamped and listed by the BACnet Testing Laboratories (BTL).
- 4. Program database, data acquisition, and all control sequence logic shall reside in each DDC Device. The Building Level Communication Network (BLCN) shall not be dependent upon connection to a Server or Master Controller for performance of the Sequence of Control as outlined in this specification. Each individual Device shall, to the greatest possible extent, perform its programmed sequence without reliance on the BLCN.
- 5. All BAS DDC Devices at all levels shall be fully custom-programmable in the field using the standard Operators Workstation Software. No configurable, canned program application specific controllers will be permitted.
- 6. All BAS DDC Devices shall be capable of updating firmware using software via internet without replacing any hardware, microprocessors or chips.
- 7. The BAS shall be capable of sending system alarms and Event Notifications to pagers, and email services.
- 8. Actuation of control devices shall be electronic. Spring return fail-safe actuation shall be provided when loss of property and/or property damage is possible and where specified.
- 9. DDC Automatic Temperature Control (ATC) System shall prevent all controlled equipment from simultaneously restarting after a power outage. The order in which equipment (or groups of equipment) is started; along with the time delay between starts shall be user-selectable.
- 10. All binary output points shall be protected from short cycling via output configuration and/or programming. This feature shall allow minimum on time and off-time to be configurable.
- 11. The DDC System Manufacturer product line selected shall be the most current and complete offering from the manufacturer and shall currently be actively manufactured and supported at the time that this project is bid.
- 12. This project shall not be used as a test site. First release and test version hardware, software and firmware shall not be implemented on this project under any circumstances.
- 13. DDC System devices and spare components or equivalent shall be readily available for a minimum of five (5) years after the completion and final acceptance of this project.

1.5 BASIC SYSTEM ARCHITECTURE

- A. The DDC BAS as provided and installed under this specification shall be a complete system from a single manufacturer designed for use on intranets and the internet.
- B. The primary BAS components shall include but not be limited to:
 - 1. BACnet Advanced Operator Workstation Software (B-AWS)
 - 2. Remote BACnet Advanced Operator Workstation Software (Remote B-AWS)
 - 3. Portable Operator Workstation Software (Portable B-OWS)
 - 4. Building Controllers (B-BC)
 - 5. Advanced Application Controllers (B-AAC)
 - 6. Application Specific Controllers (B-ASC)
- C. Enterprise Level Communication Network (ELCN) shall consist of high-speed BACnet/IP Local Area Network (LAN) to host Operators Workstations (B-OWS), Building Controllers (B-BC), Building Level Communication Networks (BLCN) and Web-Enabled remote connectivity.
- D. Building Level Communication Network (BLCN) shall consist of a BACnet internetwork to host field level DDC Controllers.
- E. B-BCs shall automatically route BACnet communications to all configured available BACnet networks.
- F. B-AWS shall be fully IT-compatible devices that communicate directly on a TCP/IP Local Area Network (LAN).
 - 1. LAN shall be 10/100Mbps TCP/IP with the following minimum requirements:
 - a. Cable: 10 base-T, UTP-8 wire, category 5e or greater

- b. Minimum throughput: 10Mbps with the ability to increase to 100Mbps
- 2. Enterprise Level Communication Network (ELCN) shall provide communication between BBCs, B-OWS, remote B-OWS and Web Server using a B/IP LAN backbone.
- 3. B-BCs shall connect directly to the LAN and communicate using B/IP without a TCP/IP Gateway or network server.
- 4. Coordinate implementation of the BAS on the Owner¢s LAN without disruption.
- G. BAS Manufacturer must natively support the following BACnet data links as defined in the ANSI/ASHRAE Standard 135-2008, BACnet:
 - 1. Point-to-Point (PTP)
 - 2. Master Slave/Token Passing (MS/TP)
 - 3. Ethernet (ISO 8802-3)
 - 4. BACnet IP (B/IP)
- Field sensors and control devices shall connect to peer-to-peer, fully programmable B-BC, B-AAC & B-ASC as required to achieve the point monitoring and Sequence of Control as specified herein. All devices are to be monitored by a B-OWS. Final control devices are to be electronic.
- I. Each Mechanical System and/or major piece of Mechanical Equipment shall have one (1) dedicated DDC controller with sufficient I/O capacity such that it shall be connected to ALL field devices and sensors associated with that system and/or piece of equipment. Distributed control of one (1) single piece of major mechanical equipment shall not be performed by multiple controllers.
- J. All BAS controllers, sensors and devices shall be UL listed.
 1. All BAS controllers and interface devices must be UL 916 Listed.

1.6 SYSTEM PERFORMANCE

- A. Comply with the following performance requirements:
 - 1. Graphic Display: Display graphic with minimum 50 dynamic points with current data within 10 seconds.
 - 2. Graphic Refresh: Update graphic with minimum 20 dynamic points with current data within 8 seconds.
 - Object Command: Reaction time of less than five seconds between operator command of a binary object and device reaction. Analog objects shall start to adjust within 10 seconds of being commanded to change.
 - 4. Object Scan: Transmit change of state and change of analog values to control units or workstation within six seconds.
 - 5. B-BC, B-AAC, & B-ASC shall be able to execute control loops at a selectable frequency at least 1 time every second. The controller shall scan and update the process value and output generated by this calculation at this same frequency at a minimum.
 - 6. Alarm Response Time: Annunciate alarm at workstation within 45 seconds. Multiple workstations must receive alarms within five seconds of each other.
 - 7. Program Execution Frequency: Run capability of applications as often as five seconds, but selected consistent with mechanical process under control.
 - 8. Performance: Programmable controllers shall execute DDC PID control loops, and scan and update process values and outputs at least once per second.
 - 9. Reporting Accuracy and Stability of Control: Report values and maintain measured variables within tolerances as follows:
 - a. Water Temperature: Plus or minus 1 deg F.
 - b. Water Flow: Plus or minus 5 percent of full scale.
 - c. Water Pressure: Plus or minus 2 percent of full scale.
 - d. Space Temperature: Plus or minus 1 deg F.
 - e. Ducted Air Temperature: Plus or minus 1 deg F.
 - f. Outside Air Temperature: Plus or minus 2 deg F.
 - g. Dew Point Temperature: Plus or minus 3 deg F.
 - h. Temperature Differential: Plus or minus 0.25 deg F.
 - i. Relative Humidity: Plus or minus 5 percent.
 - j. Airflow (Pressurized Spaces): Plus or minus 3 percent of full scale.
 - k. Airflow (Measuring Stations): Plus or minus 5 percent of full scale.
 - I. Airflow (Terminal): Plus or minus 10 percent of full scale.
 - m. Air Pressure (Space): Plus or minus 0.01-inch wg.
 - n. Air Pressure (Ducts): Plus or minus 0.1-inch wg.
 - o. Carbon Monoxide: Plus or minus 5 percent of reading.

- p. Carbon Dioxide: Plus or minus 50 ppm.
- q. Nitrogen Dioxide: Plus or minus 50 ppm.
- r. Electrical: Plus or minus 5 percent of reading.
- 10. Overall combined system repeatability of sensors, controllers and readout devices for a particular application shall be plus or minus 2% of full scale of the operating range. Repeatability of overall combined system of sensor, controller and readout device in a control loop application will be plus or minus 5% of full scale of the operating range.
- 11. Long-term electronic drift shall not exceed 0.4% per year.
- 12. All components provided as part of this system shall operate under ambient environmental conditions of 20F to 104F dry bulb and 10% to 90% relative humidity, noncondensing as a minimum. Sensors and control elements shall operate under the ambient environmental temperature, pressure, humidity, and vibration conditions encountered for the installed location. B-OWS equipment (hardware only), such as CRTs and printers, shall, unless designated otherwise, operate properly under ambient environmental conditions of 45F to 90F and a relative humidity of 10% to 90%.
- 13. Networked components of the system shall be able to operate at 90% to 110% of nominal voltage rating and shall perform an orderly shutdown below 80%.

B. Energy Dashboard

 Provide interactive, educational dashboard using a web application to display real-time energy data and building performance metrics in a common area shown on the drawings. Incorporate Owner branding and coordinate content with the Owner and A/E of record. Provide user interface for content management that allows the Owner to update text and photos. Provide one 48 inches wall-mounted commercial-grade monitor and infrared multi-touch overlay with 3-year warranty. Provide 24/7 content scheduler.

1.7 SEQUENCE OF OPERATIONS

A. See the contract drawings for system sequence of operations for each system to be controlled.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Factory-Mounted Components: Where control devices specified in this Section are indicated to be factory mounted on equipment, arrange for shipping of control devices to equipment manufacturer.
- B. System Software: Update to latest version of software at Project completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Schneider
- B. Building controls system is existing, provide all required items to connect new equipment to the existing system as needed. Information provide in this section is for reference and not all items may be required.
- C. Building floor plan graphics and any relocated equipment shall be updated on the existing BMS.
- D. Control system shall consist of sensors, indicators, actuators, final control elements, interface equipment, other apparatus, and accessories to control mechanical systems.
- E. Control system shall consist of sensors, indicators, actuators, final control elements, interface equipment, other apparatus, accessories, and software connected to distributed controllers operating in multiuser, multitasking environment on token-passing network and programmed to control mechanical systems. An operator workstation permits interface with the network via dynamic color graphics with each mechanical system, building floor plan, and control device depicted by point-and-click graphics.
- F. Incorporate other monitored or controlled systems identified in paragraph 1.14.C above.

2.2 ELECTRONIC SENSORS

- A. Description: Vibration and corrosion resistant; for wall, immersion, or duct mounting as required.
- B. Platinum RTDs: Common Requirements:
 - 1. 100 or 1000 ohms at zero deg C and a temperature coefficient of 0.00385 ohm/ohm/deg C.
 - 2. Two-wire, PTFE-insulated, 22-gage stranded copper leads.
 - 3. Performance Characteristics:
 - a. Range: Minus 50 to 275 deg F.

- b. Interchangeable Accuracy: At 32 deg F within 0.5 deg F.
- c. Repeatability: Within 0.5 deg F.
- d. Self-Heating: Negligible.
- 4. Transmitter Requirements:
 - a. Transmitter required for each 100-ohm RTD.
 - b. Transmitter optional for 1000-ohm RTD, contingent on compliance with end-to-end control accuracy.
- C. Platinum RTD, Single-Point Air Temperature Duct Sensors:
 - 1. 100 or 1000 ohms.
 - 2. Temperature Range: Minus 50 to 275 deg F ((Minus 45 to 135 deg C).)
 - 3. Probe: Single-point sensor with a stainless-steel sheath.
 - 4. Length: As required by application to achieve tip at midpoint of air tunnel, up to 18 inches ((450 mm) long).
 - 5. Enclosure: Junction box with removable cover; NEMA 250, Type 1 for indoor applications and Type 4 for outdoor applications.
 - 6. Gasket for attachment to duct or equipment to seal penetration airtight.
 - 7. Conduit Connection: 1/2-inch ((16-mm) trade size.)
- D. Platinum RTD, Air Temperature Averaging Sensors:
 - 1. 100 or 1000 ohms.
 - 2. Temperature Range: Minus 50 to 275 deg F
 - 3. Multiple sensors to provide average temperature across entire length of sensor.
 - 4. Rigid probe of aluminum, brass, copper, or stainless-steel sheath.
 - 5. Flexible probe of aluminum, brass, copper, or stainless-steel sheath and formable to a 4-inch radius.
 - 6. Length: As required by application to cover entire cross section of air tunnel.
 - 7. Enclosure: Junction box with removable cover; NEMA 250, Type 1 for indoor applications and Type 4 for outdoor applications.
 - 8. Gasket for attachment to duct or equipment to seal penetration airtight.
 - Conduit Connection: 1/2-inchPlatinum RTD Space Air Temperature Sensors:
 - 1. 100 or 1000 ohms.

Ε.

- 2. Temperature Range: Minus 50 to 212 deg F
- 3. Sensor assembly shall include a temperature sensing element mounted under a bright white, non-yellowing, plastic cover.
- 4. Provide a mounting plate that is compatible with the surface shape that it is mounted to and electrical box used.
- 5. Concealed wiring connection.
- F. Thermal Resistors (Thermistors): Common Requirements:
 - 1. 10,000 ohms at 25 deg Ć and a temperature coefficient of 23.5 ohms/ohm/deg C.
 - 2. Two-wire, PTFE-insulated, 22-gage stranded copper leads.
 - 3. Performance Characteristics:
 - a. Range: Minus 50 to 275 deg F.
 - b. Interchangeable Accuracy: At 77 deg F within 0.5 deg F.
 - c. Repeatability: Within 0.5 deg F.
 - d. Drift: Within 0.5 deg F over 10 years.
 - e. Self-Heating: Negligible.
 - 4. Transmitter optional, contingent on compliance with end-to-end control accuracy.
- G. Thermistor, Single-Point Duct Air Temperature Sensors:
 - 1. Temperature Range: Minus 50 to 275 deg F
 - 2. Probe: Single-point sensor with a stainless-steel sheath.
 - 3. Length: As required by application to achieve tip at midpoint of air tunnel, up to 18 inches.
 - 4. Enclosure: Junction box with removable cover; NEMA 250, Type 1 for indoor applications and Type 4 for outdoor applications.
 - 5. Gasket for attachment to duct or equipment to seal penetration airtight.
 - 6. Conduit Connection: 1/2- inch trade size
- H. Space Air Temperature Sensors for Use with DDC Controllers Controlling Terminal Units:
 - 1. 100- or 1000-ohm platinum RTD.
 - 2. Thermistor:

- Pre-aged, burned in, and coated with glass; inserted in a metal sleeve; and entire unit a. encased in epoxy.
- Thermistor drift shall be less than plus or minus 0.5 deg F over 10 years. b.
- 3. Temperature Transmitter Requirements:
 - Mating transmitter required with each 100-ohm RTD. a.
 - Mating transmitters optional for 1000-ohm RTD and thermistor, contingent on compliance b. with end-to-end control accuracy.
- 4. Provide digital display of sensed temperature.
- Provide sensor with local control. 5.
 - Local override to turn HVAC on. a.
 - Local adjustment of temperature set point. b.
 - c. Both features shall be capable of manual override through control system operator.
- Room sensor accessories include the following: I.
 - Insulating Bases: For sensors located on exterior walls. 1.
 - Sensor Protective Guards: Locking; heavy-duty, transparent plastic; mounted on separate base. 2.
 - Adjusting Key: As required for calibration and cover screws. 3.

2.3 THERMOSTATS

- Schneider 1
- В. Electric, solid-state, microcomputer-based room thermostat with remote sensor.
 - 1 Automatic switching from heating to cooling.
 - Preferential rate control to minimize overshoot and deviation from set point. 2.
 - 3. Set up for four separate temperatures per day.
 - Instant override of set point for continuous or timed period from 1 hour to 31 days. 4.
 - Short-cycle protection. 5.
 - Programming based on every day of week. 6.
 - Selection features include degree F or degree C display, 12- or 24-hour clock, keyboard disable, 7. remote sensor, and fan on-auto.
 - Battery replacement without program loss. 8. 9.
 - Thermostat display features include the following:
 - a. Time of day.
 - Actual room temperature. b.
 - Programmed temperature. c.
 - Programmed time. d.
 - e. Duration of timed override.
 - Day of week. f.
 - System mode indications include "heating," "off," "fan auto," and "fan on." q.
- C. Low-Voltage, On-Off Thermostats: NEMA DC 3, 24-V, bimetal-operated, mercury-switch type, with adjustable or fixed anticipation heater, concealed set-point adjustment, 55 to 85 deg F set-point range, and 2 deg Fmaximum differential.
- D. Line-Voltage, On-Off Thermostats: Bimetal-actuated, open contact or bellows-actuated, enclosed, snap-switch or equivalent solid-state type, with heat anticipator; listed for electrical rating; with concealed set-point adjustment, 55 to 85 deg F set-point range, and 2 deg F maximum differential.
 - Electric Heating Thermostats: Equip with off position on dial wired to break ungrounded 1. conductors.
 - 2. Selector Switch: Integral, manual on-off-auto.
- Ε. Remote-Bulb Thermostats: On-off or modulating type, liquid filled to compensate for changes in ambient temperature; with copper capillary and bulb, unless otherwise indicated.
 - Bulbs in water lines with separate wells of same material as bulb. 1.
 - 2. Bulbs in air ducts with flanges and shields.
 - Averaging Elements: Copper tubing with either single- or multiple-unit elements, extended to cover 3. full width of duct or unit; adequately supported.
 - 4. Scale settings and differential settings are clearly visible and adjustable from front of instrument.
 - On-Off Thermostat: With precision snap switches and with electrical ratings required by 5. application.
 - 6. Modulating Thermostats: Construct so complete potentiometer coil and wiper assembly is removable for inspection or replacement without disturbing calibration of instrument.

2.4 ACTUATORS

- A. Electronic Actuators: Direct-coupled type designed for minimum 60,000 full-stroke cycles at rated torque.
 - 1. Valves: Size for torque required for valve close off at maximum pump differential pressure.
 - 2. Dampers: Size for running torque calculated as follows:
 - a. Parallel-Blade Damper with Edge Seals: 7 inch-lb/sq. ft. of damper.
 - b. Opposed-Blade Damper with Edge Seals: 5 inch-lb/sq. ft. of damper.
 - c. Parallel-Blade Damper without Edge Seals: 4 inch-lb/sq. ft of damper.
 - d. Opposed-Blade Damper without Edge Seals: 3 inch-lb/sq. ft. of damper.
 - e. Dampers with 2- to 3-Inch wg of Pressure Drop or Face Velocities of 1000 to 2500 fpm: Increase running torque by 1.5.
 - f. Dampers with 3- to 4-Inch wg of Pressure Drop or Face Velocities of 2500 to 3000 fpm: Increase running torque by 2.0.
 - 3. Coupling: V-bolt and V-shaped, toothed cradle.
 - 4. Overload Protection: Electronic overload or digital rotation-sensing circuitry.
 - 5. Fail-Safe Operation: Mechanical, spring-return mechanism. Provide external, manual gear release on nonspring-return actuators.
 - 6. Power Requirements (Two-Position Spring Return): 24 or 120]-V ac.
 - 7. Power Requirements (Modulating): Maximum 25 VA at 24-V ac or 8 W at 24-V dc.
 - 8. Proportional Signal: 0- to 10-V dc or 4 to 20 mA, and 2- to 10-V dc position feedback signal.
 - 9. Temperature Rating: 40 to 104 deg F.
 - 10. Temperature Rating (Smoke Dampers): Minus 22 to plus 250 deg F.
 - 11. Run Time: 12 seconds open, 5 seconds closed.
 - 12. The manufacturer shall provide 5-year limited warranty from the date of sale covering defects in material or workmanship.
 - 13. All actuators are to be delivered with a detailed written installation instruction.

2.5 DAMPERS

- A. Dampers: AMCA-rated, opposed-blade design; 0.108-inch-minimum thick, galvanized-steel or 0.125-inchminimum thick, extruded-aluminum frames with holes for duct mounting; damper blades shall not be less than 0.064-inch- thick galvanized steel with maximum blade width of 8 inches and length of 48 inches.
 - 1. Secure blades to 1/2-inch- diameter, zinc-plated axles using zinc-plated hardware, with oil-impregnated sintered bronze blade bearings, blade-linkage hardware of zinc-plated steel and brass, ends sealed against spring-stainless-steel blade bearings, and thrust bearings at each end of every blade.
 - 2. Operating Temperature Range: From minus 40 to plus 200 deg F.
 - 3. Edge Seals, Standard Pressure Applications: Closed-cell neoprene.
 - 4. Edge Seals, Low-Leakage Applications: Use inflatable blade edging or replaceable rubber blade seals and spring-loaded stainless-steel side seals, rated for leakage at less than 10 cfm per sq. ft. of damper area, at differential pressure of 4-inch wg when damper is held by torque of 50 in. x lbf; when tested according to AMCA 500D.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that conditioned power supply is available to control units and operator workstation.

3.2 GENERAL

- A. All control system components shall be installed in locations as required to properly sense the controlled medium.
- B. BAS Installation shall be performed by professionals in a workmanlike manner and in compliance with the Contract Documents, Division 26 Project Electrical System Specifications, the National Electric Code (NEC), and any/all applicable local codes and/or Authorities Having Jurisdiction (AHJ) and the following:
 - Complete BAS installation including all DDC Devices, Enclosures, wiring, equipment, control devices and sensors shall be installed in accordance with the manufacturers¢ recommended installation procedures and as specified.
 - 2. All control devices are to be provided and installed with all required gaskets, seals, flanges, connection enclosures, thermal compounds, insulation, piping, fittings and valves as required for design operation, isolation, equalization, purging and calibration.
 - 3. Strap-on control devices shall not be permitted except as explicitly called out.

- 4. All control devices mounted outdoors shall be protected by a weather-shield, integral outdoor enclosure, from ambient elements in such a manner as to not impede design functionality and/or sensing.
- 5. BAS installation shall be such that it provides sufficient clearance for system maintenance by maintaining sufficient access for equipment, device and/or component service, calibration, removal, repair or replacement.
- 6. BAS installation shall not interfere with required clearance for mechanical and/or electrical equipment maintenance.
- 7. Penetrations through and mounting holes in the building exterior associated with the BAS installation shall be sealed and made water-tight.
- 8. Dielectric isolation shall be provided where dissimilar metals are used in installation for connection and support.
- C. Installation, wiring and material shall be protected from damage or theft before, during, and after installation. Any damaged or stolen installation, wiring, or material shall be repaired or replaced.
- D. After completion of installation, calibrate and commission all components provided as part of the Control System and demonstrate proper sequence of operation in compliance with the specifications. BAS components not operating correctly shall be field corrected or replaced.

3.3 BAS APPLICATION SOFTWARE

- A. At time of acceptance all operating system, Third party and Control System Application software shall be at least the latest official release version available.
- B. Software programs are described to their general intent. It is recognized that Networked System manufacturer¢s software differ; however, the Application software provided shall incorporate the features described fully implemented and optimized to provide the sequences described, minimize energy consumption and prolong equipment life.
- C. When programming the system BACnet addressing rules will be strictly adhered to. All addressing strategies will have to be approved by Owner and Engineer of Record prior to configuring any LAN types.
- D. All analog and binary values shall be programmed with appropriate alarms.
- E. Except as specified otherwise, throttling ranges, proportional bands, and switching differentials shall be centered on the associated set point.
- F. All set points unless otherwise indicated are adjustable and shall be programmable for all control loops.
- G. Each control loop and/or interlock(s) for all mechanical system including terminal unit systems shall be programmed with a control loop specific graphical trend to trend all values associated with each specific control loop or system interlock.
- H. Where any sequence or occupancy schedule calls for more than one motorized unit to start simultaneously, the system start commands shall be staggered by 15-second (adj.) intervals to minimize inrush current.
- I. Scheduling shall be developed for each mechanical system. Final schedules shall be coordinated with the Owner and Engineer of Record prior to system commissioning.
- J. Optimal start/stop programs shall be applied to all regularly scheduled mechanical and electrical systems.
- K. At a minimum, trend log/historical data shall be implemented for every hardware point on the system. Additionally all software (virtual) points used as setpoints shall be trended. Point trends shall be grouped into logically interrelated points for individual mechanical and building systems. Initial set-up shall be to log values once every 5 minutes.
- L. B-AWS Graphical User Interface (GUI) must be approved by the Owner and Engineer of Record and shall incorporate at a minimum the following:
 - 1. At a minimum, all physical hardware, sensors, control devices and set points shall be visible on a B-AWS in graphical form.
 - 2. All mechanical systems shall have a programmed real time color graphic for primary graphical user interface.
 - 3. Individual floor plan graphics will be programmed for each floor or area of the building. All space sensors shall be visible on floor plan graphics and system graphic.

3.4 BACnet PROTOCOL VERIFICATION SOFTWARE

A. Demonstrate exclusive communication utilizing the BACnet Protocol on all segments of the BACnet network.

3.5 LOCAL SYSTEM NETWORK INTERFACE

A. At a minimum the Portable B-AWS shall be able to connect to the BACnet Internetwork within each mechanical equipment space within the project.

3.6 ENCLOSURES & SUB-PANELS

- A. All system components not designed for or required to be field installed shall be mounted in a control enclosure. Those components shall be sub panel mounted except components that are mounted on the panel face. Provide on/off power switch with over-current protection for control power sources in each local enclosure.
- B. All control enclosures shall be located so that visual observation and adjustment can be accomplished while standing flatfooted on the floor in a convenient location adjacent to the equipment served. Install all equipment in readily accessible location as defined by Chapter1 Article 100 Part A of the NEC.
- C. Label all control system components.
- D. A copy of the ÓAs-built application engineering for the system served shall be laminated in clear plastic, shall be legible and suspended within enclosure.
- E. All B-BC shall be mounted in an enclosure.

3.7 INSTALLATION

- A. Install software in control units and operator workstation(s). Implement all features of programs to specified requirements and as appropriate to sequence of operation.
- B. Connect and configure equipment and software to achieve sequence of operation specified.
- C. Verify location of thermostats, humidistats, and other exposed control sensors with Drawings and room details before installation. Install devices 48 inches above the floor.
 - 1. Install averaging elements in ducts and plenums in crossing or zigzag pattern.
- D. Install guards on thermostats in the following locations:
 - 1. Entrances.
 - 2. Public areas.
 - 3. Where indicated.
- E. Install automatic dampers according to Section 233300 "Air Duct Accessories."
- F. Install damper motors on outside of duct in warm areas, not in locations exposed to outdoor temperatures.
- G. Install labels and nameplates to identify control components according to Section 230553 "Identification for HVAC Piping and Equipment."
- H. Install hydronic instrument wells, valves, and other accessories according to Section 232116 Hydronic Piping Specialties."
- I. Install steam and condensate instrument wells, valves, and other accessories according to Section 232216 Steam and Condensate Piping Specialties."
- J. Install refrigerant instrument wells, valves, and other accessories according to Section 232300 "Refrigerant Piping."
- K. Install duct volume-control dampers according to Section 233113 "Metal Ducts" and Section 233116 "Nonmetal Ducts."
- L. Install electronic and fiber-optic cables according to Section 271500 "Communications Horizontal Cabling."

3.8 ELECTRICAL WIRING AND CONNECTION INSTALLATION

- A. Power Wiring and Cabling
 - 1. Obtain power and provide wiring for all enclosures and controls equipment, including branch circuit wiring from circuit breaker panels unless specifically shown on the Plans or Specifications to be provided under Division 26.
 - 2. All B-AWS equipment shall be served from isolated ground receptacles via UPS by dedicated branch circuits.

- 3. All other enclosures, sensor and control devices shall be fed from separate circuits in the electrical distribution panels and shall not be served from the typical floor receptacle or lighting circuits.
- B. Network Wiring and Cabling
 - 1. Network installation shall strictly adhere to the manufacturer¢s networking installation instructions and procedures.
 - Network installation shall conform to standards for the LAN types and cabling types selected. Specific network rules inherent to the ANSI/AHRAE Standard 135-1995, BACnet shall be followed. Those include but are not limited to:
 - a. Only one path can exist from any BACnet device to another.
 - b. Each BACnet device connected to an internetwork LAN must have a unique device instance (0 4,194,303).
 - c. Each internetwork LAN must have a unique Network Number (1 65,545).
 - 3. Primary LAN Network wire and cable shall be run separately from all other wiring.
 - 4. Other LAN Network wire and cabling shall be installed separate from any wiring over thirty (30) volts.
 - 5. All communications shielding shall be grounded as per Networked System manufacturer¢s recommendations.
- C. Installation
 - 1. Install raceways, boxes, and cabinets according to Section 260533 "Raceways and Boxes for Electrical Systems."
 - 2. Install building wire and cable according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
 - 3. Install signal and communication cable according to Section 271500 "Communications Horizontal Cabling."
 - a. Conceal cable, except in mechanical rooms and areas where other conduit and piping are exposed.
 - b. Install exposed cable in raceway.
 - c. Install concealed cable in raceway.
 - d. Bundle and harness multiconductor instrument cable in place of single cables where several cables follow a common path.
 - e. Fasten flexible conductors, bridging cabinets and doors, along hinge side; protect against abrasion. Tie and support conductors.
 - f. Number-code or color-code conductors for future identification and service of control system, except local individual room control cables.
 - g. Install wire and cable with sufficient slack and flexible connections to allow for vibration of piping and equipment.
 - 4. Connect manual-reset limit controls independent of manual-control switch positions. Automatic duct heater resets may be connected in interlock circuit of power controllers.
 - 5. Connect hand-off-auto selector switches to override automatic interlock controls when switch is in hand position.

3.9 ANALOG SENSORS

- A. Temperature
 - 1. All wires attached to sensors shall be air sealed in their conduits or in the wall to stop air transmitted from other areas affecting sensor readings.
 - 2. Install and properly support all enclosures and sensing elements as much as possible in the center of duct cross section and in straight duct runs. In condensing environments use stainless steel flanges to support sensing elements.
 - 3. Sensors mounted on air ducts having exterior insulation shall be provided with handy-box mounting with insulating material firmly fitted around handy-box.
 - 4. Averaging type sensors: provide a minimum of 1 linear foot of sensor per 4 square feet of duct/coil area or equal to duct/coil width where installed, whichever is longer. Averaging sensing tubing shall serpentine vertically across airstream and be supported firmly by mechanical clips.
 - 5. Temperature sensors installed in piping or tanks shall be in separable thermowells. Sensors shall be inserted into thermowells with conductive paste. Assembly shall allow removal of sensor without loss of fluid.

- 6. At a minimum one outside air temperature sensor shall be installed. It shall be mounted outside on a northern exposure as high as serviceable on the building. The sensor shall be mounted within a ventilated enclosure to shield the sensor from the effects of the sun. The sensor location shall be selected such that it may not be affected by artificial and/or mechanical airstreams (i.e., building exhaust, building relief, etc.).
- 7. Terminal Unit Sensors shall be provided one per terminal unit device.
 - a. They shall be wall mounted in the space served 60• above finished floor and located as shown on drawings.
 - b. Provide a minimum of 16¢ of coiled temperature sensor control wiring for equipment with space sensor not located on the Drawings.
- 8. In all areas where terminal unit sensor locations are not known at the time of building startup, sensors shall be hung approximately 24 inches from the ceiling in the area of the controlled zone and connected. Control wiring shall be neatly coiled and attached to ceiling grid.
- 9. Zone temperature sensors shall not be located on perimeter walls. Where explicitly indicated on drawings to do so and/or in locations near exterior walls and/or subject to drafts sensors shall have insulated mounting bases to prevent false room temperature readings.
- 10. Where wall sensors are mounted in an area subject to damage provide suitable protective guard.
- 11. Where wall sensors are mounted in public spaces with adjustable set points provide suitable security guard.
- B. Wet Bulb
 - 1. For outside air mount same as outside air temperature sensor.
 - 2. For duct mounting execute same as duct mounted temperature sensor.
- C. Pressure
 - Orient static pressure sensing taps faced directly down-stream in the airflow so as to eliminate velocity pressure effects. Locate pressure transducers within 10¢ of sensing point and use tubing sized such as to prevent signal phase lag.
 - a. Final location of static/differential pressure sensing taps shall be pursuant with Contract Documents and as indicated on drawings. Where not explicitly indicated on drawings, pressure sensing taps shall be located as follows:
 - Duct static pressure control sensor tap shall be located 2/3 distance from the Air Handling Unit of the total duct length in a straight section of ductwork with a minimum or four (4) duct diameters in both directions.
 - 2) Positive static high-pressure safety cut-outs shall be located at Air Handling Unit immediately downstream of fan section.
 - 3) Mixed-Air static and/or differential sensor tap shall be located in mixing box section.
 - 4) Negative static pressure safety cut-outs shall be located immediately upstream of fan section.
 - 5) Filter differential pressure taps shall be installed on both filter inlet and outlet.
 - b. Mount air differential pressure taps so that true differential is sensed.
 - 2. Water gauge taps shall include snubbers and isolation valves.
 - 3. Water differential pressure sensors shall be piped through a five-valve bypass assembly with snubbers.

SECTION 233113 - METAL DUCTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Single-wall rectangular ducts and fittings.
 - 2. Single-wall round ducts and fittings.
 - 3. Sheet metal materials.
 - 4. Sealants and gaskets.
 - 5. Hangers and supports.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of the following products:
 - 1. Liners and adhesives.
 - 2. Sealants and gaskets.

B. Shop Drawings:

- 1. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
- 2. Factory- and shop-fabricated ducts and fittings.
- 3. Duct layout indicating sizes, configuration, liner material, and static-pressure classes.
- 4. Elevations of top or bottom of ducts.
- 5. Dimensions of main duct runs from building grid lines.
- 6. Fittings.
- 7. Reinforcement and spacing.
- 8. Seam and joint construction.
- 9. Penetrations through fire-rated and other partitions.
- 10. Equipment installation based on equipment being used on Project.
- 11. Locations for duct accessories, including dampers, turning vanes, and access doors and panels.
- 12. Hangers and supports, including methods for duct and building attachment and vibration isolation.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: A single set of plans or BIM model, drawn to scale, showing the items described in this Section, and coordinated with all building trades.

1.5 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel in accordance with the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code Steel," for hangers and supports.
 - 2. AWS D1.2/D1.2M, "Structural Welding Code Aluminum," for aluminum supports.
 - 3. AWS D9.1/D9.1M, "Sheet Metal Welding Code," for duct joint and seam welding.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Duct Design: Duct construction, including sheet metal thicknesses, seam and joint construction, reinforcements, and hangers and supports, shall comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible" and with performance requirements and design criteria indicated in "Duct Schedule" Article.
- B. Structural Performance: Duct hangers and supports shall withstand the effects of gravity loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards -Metal and Flexible".
- C. Airstream Surfaces: Surfaces in contact with airstream shall comply with requirements in ASHRAE 62.1.
- D. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 "Systems and Equipment," and Section 7 "Construction and System Startup."

Β.

- E. ASHRAE/IES Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6.4.4 "HVAC System Construction and Insulation."
- F. Duct Dimensions: Unless otherwise indicated, all duct dimensions indicated on Drawings are inside clear dimensions and do not include insulation or duct wall thickness.

2.2 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS

- A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.
 - Construct ducts of galvanized sheet steel unless otherwise indicated.
 - 1. Duct dimensions indicated on the drawings are the inner duct dimensions.
- C. Transverse Joints: Fabricate joints in accordance with SMACNA's "HVAC Duct Construction Standards -Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
 - 1. For ducts with longest side less than 36 inches, select joint types in accordance with Figure 2-1.
 - For ducts with longest side 36 inches or greater, use factory pre-fabricated, slide-on traverse flanged duct connection systems..
 - 3. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Ductmate Industries Inc.
 - b. Nexus PDQ, a Division of Shilco Holdings, Inc.
 - c. Ward Industries, Inc. a Division of Hart and Cooley, Inc.
 - 4. Pre-fabricated, manufactured flanged connectors shall be provided with:
 - a. Steel materials matching duct construction.
 - b. Roll-formed flanges. Add-on flanged duct connectors may be used with Architects / Engineers approval.
 - c. Gage and shape to be in accordance with manufacturer's guidelines.
 - d. Manufacturer's duct construction and reinforcement guidelines with independent leakage testing, deflection and seismic performance.
 - e. Provide with manufacturer's installation criteria for fastener and cleat spacing.
 - f. Minimum independent test leakage rated at 10" w.g., positive and negative.
 - 5. Where specified for specific applications, all joints shall be welded.
- D. Longitudinal Seams: Select seam types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
 - All longitudinal seams shall be Pittsburgh lock seams unless otherwise specified for a specific application.
 - 2. Where specified for specific applications, all joints shall be welded.
- E. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Ch. 4, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards Metal and Flexible."

2.3 SINGLE-WALL ROUND DUCTS AND FITTINGS

- A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Ch. 3, "Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated.
 - 1. Construct ducts of galvanized sheet steel unless otherwise indicated.
 - 2. Round Ducts: Indicated dimensions on the drawings are the inner duct dimensions.
 - 3. Flat-Oval Ducts: Indicated dimensions on the drawings are the inner duct width (major dimension) and diameter of the round sides connecting the flat portions of the duct (minor dimension).
 - 4. Manufacturers: Subject to compliance with requirements, provide products by one of the following: a. Ductmate Industries, Inc.
 - b. Elgen Manufacturing.
 - c. Linx Industries (formerly Lindab).
 - d. McGill AirFlow LLC.
 - e. MKT Metal Manufacturing.

- f. SEMCO LLC.
- g. Set Duct Manufacturing.
- h. Stamped Fittings Inc.
- i. <Insert manufacturer's name>.
- B. Transverse Joints: Select joint types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Round Duct Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
 - Transverse Joints for Ducts 30 (762) to 60 Inches in Diameter: Factory pre-fabricated, three-piece,gasketed, flanged connectors with one external closure ring, two internal flanges with securements to the neoprene gasket.
 - Manufacturers: Subject to the requirements, provide products by one of the following:
 a. Ductmate Industries, Inc.
 - Traverse Joints Larger than 60 (1524) inches in Diameter: Provide companion angle flanged joints as defined by SMACNA Manual "HVAC Duct Construction Standards, Metal and Flexible", Figure 3-1.
- C. Longitudinal Seams: Select seam types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Round Duct Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
 - 1. Fabricate round ducts larger than 90 inches in diameter with butt-welded longitudinal seams.
 - 2. Fabricate flat-oval ducts larger than 72 inches in width (major dimension) with butt-welded longitudinal seams.
- D. Tees and Laterals: Select types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.4 SHEET METAL MATERIALS

- A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
 - 1. Galvanized Coating Designation: G90.
 - 2. Finishes for Surfaces Exposed to View: Mill phosphatized.
- C. Carbon-Steel Sheets: Comply with ASTM A 1008/A 1008M, with oiled, matte finish for exposed ducts.
- D. Stainless-Steel Sheets: Comply with ASTM A 480/A 480M, Type 304 or 316, or as indicated in "Duct Schedule" Article; cold rolled, annealed, sheet. Exposed surface finish shall be No. 2B as indicated in "Duct Schedule" Article.
- E. Aluminum Sheets: Comply with ASTM B 209 Alloy 3003, H14 temper; with mill finish for concealed ducts, and standard, one-side bright finish for duct surfaces exposed to view.
- F. Reinforcement Shapes and Plates: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
 - 1. Where black- and galvanized-steel shapes and plates are used to reinforce aluminum ducts, isolate the different metals with butyl rubber, neoprene, or EPDM gasket materials.
- G. Tie Rods: Galvanized steel, 1/4-inch- minimum diameter for lengths 36 inches or less; 3/8-inch- minimum diameter for lengths longer than 36 inches.

2.5 DUCT LINER

- A. Fibrous-Glass Duct Liner: Comply with ASTM C 1071, NFPA 90A, or NFPA 90B; and with NAIMA AH124, "Fibrous Glass Duct Liner Standard."
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Johns Manville; a Berkshire Hathaway company.
 - b. Insert manufacturer's nameApproved Equal.
 - 2. Maximum Thermal Conductivity:

- a. Type I, Flexible: [0.27 Btu x in./h x sq. ft. x deg F] <Insert conductivity> at 75 deg F mean temperature.
- b. Type II, Rigid: [0.23 Btu x in./h x sq. ft. x deg F] <Insert conductivity> at 75 deg F mean temperature.
- Antimicrobial Erosion-Resistant Coating: Apply to the surface of the liner that will form the interior surface of the duct to act as a moisture repellent and erosion-resistant coating. Antimicrobial compound shall be tested for efficacy by an NRTL and registered by the EPA for use in HVAC systems.
- 4. Water-Based Liner Adhesive: Comply with NFPA 90A or NFPA 90B and with ASTM C 916.
 - a. Adhesive shall have a VOC content of 80 g/L or less.
 - b. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- B. Flexible Elastomeric Duct Liner: Preformed, cellular, closed-cell, sheet materials complying with ASTM C 534/C 534M, Type II, Grade 1; and with NFPA 90A or NFPA 90B.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following: a. Armacell LLC.
 - a. Armacell LLC.
 - b. Ductmate Industries, Inc.
 - c. K-Flex USA.
 - d. <Insert manufacturer's name>.
 - 2. Surface-Burning Characteristics: Maximum flame-spread index of 25 and maximum smoke-developed index of 50 when tested in accordance with UL 723; certified by an NRTL.
 - 3. Liner Adhesive: As recommended by insulation manufacturer and complying with NFPA 90A or NFPA 90B.
 - a. Adhesive shall have a VOC content of 80 g/L or less.
 - b. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers.
- C. Fiberglass-Free Duct Liner: Made from partially recycled cotton or polyester products and containing no fiberglass. Airstream surface overlaid with fire-resistant thermally bonded FSK smooth surface facing to prevent surface erosion by airstream, complying with ASTM E84, ASTM C518, ASTM D5116, NFPA 90A or NFPA 90B and UL 181. Liner shall be capable of withstanding a constant internal temperature up to 250 Deg. F (121 Deg C), compliant with Greenguard Environmental Institute and contain zero VOC's. Treat natural-fiber products with antimicrobial coating. Liner must be attached using a non-flammable, low VOC water based adhesive. When applicable, apply a non-flammable, low VOC water based lagging adhesive to the exposed leading edge of the insulation. Install fasteners per SMACNA HVAC Duct Liner installation instructions. Liner must be installed per section 7.4 of the 2005 SMACNA Manual, ÓHVAC Duct Construction Standards, Metal and Flexible, Third Edition unless otherwise specified.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Ductmate Industries, Inc.
 - b. <Insert manufacturer's name>.
 - 2. Maximum Thermal Conductivity: [0.24 Btu x in./h x sq. ft. x deg F] <Insert conductivity> at 75 deg F mean temperature when tested in accordance with ASTM C 518.
 - 3. Surface-Burning Characteristics: Maximum flame-spread index of 25 and maximum smoke-developed index of 50 when tested in accordance with ASTM E 84; certified by an NRTL.
 - 4. Liner Adhesive: As recommended by insulation manufacturer and complying with NFPA 90A or NFPA 90B.
 - a. Adhesive shall have a VOC content of 80 g/L or less.
 - b. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- D. Insulation Pins and Washers:
 - 1. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, [0.106-inch-] [0.135-inch-] diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch galvanized carbon-steel washer.
 - 2. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick galvanized steel; with beveled edge sized as required to hold insulation securely in place, but not less than 1-1/2 inches in diameter.

- Ε. Shop Application of Duct Liner: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 7-11, "Flexible Duct Liner Installation."
 - Adhere a single layer of indicated thickness of duct liner with at least 90 percent adhesive coverage 1. at liner contact surface area. Attaining indicated thickness with multiple layers of duct liner is prohibited.
 - 2. Apply adhesive to transverse edges of liner facing upstream that do not receive metal nosing.
 - 3. Butt transverse joints without gaps, and coat joint with adhesive.
 - Fold and compress liner in corners of rectangular ducts or cut and fit to ensure butted-edge 4. overlapping.
 - 5. Do not apply liner in rectangular ducts with longitudinal joints, except at corners of ducts, unless duct size and dimensions of standard liner make longitudinal joints necessary.
 - 6. Apply adhesive coating on longitudinal seams in ducts with air velocity of 2500 fpmor greater.
 - Secure liner with mechanical fasteners 4 inches from corners and at intervals not exceeding 12 7. inches transversely; at 3 inches from transverse joints and at intervals not exceeding 18 inches longitudinally.
 - 8. Secure transversely oriented liner edges facing the airstream with metal nosings that have either channel or "Z" profiles or are integrally formed from duct wall. Fabricate edge facings at the following locations:
 - Fan discharges. a.
 - b. Intervals of lined duct preceding unlined duct.
 - Upstream edges of transverse joints in ducts where air velocities are higher than 2500 fpm c. or where indicated.
 - 9. Secure insulation between perforated sheet metal inner duct of same thickness as specified for outer shell. Use mechanical fasteners that maintain inner duct at uniform distance from outer shell without compressing insulation.
 - Sheet Metal Inner Duct Perforations: 3/32-inch diameter, with an overall open area of 23 a. percent.
 - Terminate inner ducts with buildouts attached to fire-damper sleeves, dampers, turning vane 10. assemblies, or other devices. Fabricated buildouts (metal hat sections) or other buildout means are optional; when used, secure buildouts to duct walls with bolts, screws, rivets, or welds.

2.6 SEALANT AND GASKETS

- General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall Α. be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested in accordance with UL 723; certified by an NRTL.
- Two-Part Tape Sealing System: Β.
 - Tape: Woven cotton fiber impregnated with mineral gypsum and modified acrylic/silicone activator 1. to react exothermically with tape to form hard, durable, airtight seal. 2.
 - Tape Width: 4 inches.
 - Sealant: Modified styrene acrylic. 3.
 - Water resistant. 4
 - 5. Mold and mildew resistant.
 - Maximum Static-Pressure Class: 10-inch wg, positive and negative. 6.
 - 7. Service: Indoor and outdoor.
 - Service Temperature: Minus 40 to plus 200 deg F. 8.
 - Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or 9. aluminum.
 - Sealant shall have a VOC content of 420 g/L or less. 10.
 - Sealant shall comply with the testing and product requirements of the California Department of 11. Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- C. Water-Based Joint and Seam Sealant:
 - Type: Hardcast or Polymer adhesives. 1
 - Application Method: Brush on. 2.
 - 3. Solids Content: Minimum 65 percent.
 - 4. Shore A Hardness: Minimum 20.
 - 5. Water resistant.
 - 6. Mold and mildew resistant.
 - 7. VOC: Maximum 75 g/L (less water).

- 8. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
- 9. Service: Indoor or outdoor.
- 10. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.
- 11. Sealant shall have a VOC content of 420 g/L or less.
- 12. Sealant shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- 13. Maximum Static-Pressure Class: 10-inch wg, positive or negative.
- 14. Service: Indoor or outdoor.
- 15. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.
- D. Flanged Joint Sealant: Comply with ASTM C 920.
 - 1. General: Single-component, acid-curing, silicone, elastomeric.
 - 2. Type: S.
 - 3. Grade: NS.
 - 4. Class: 25.
 - 5. Use: O.
 - 6. Sealant shall have a VOC content of 420 g/L or less.
 - 7. Sealant shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- E. Flange Gaskets: Butyl rubber gaskets must comply with UL 723, ASTM E 84, and meet Mil-C 18969B and TTS-S-001657. Material shall meet LEED E.Q. 4.1, have "zero" VOC, and not contain vegetable oils, fish oils, or any other type vehicle that will support fugal and/or bacterial growth. Material shall be non-skinning, non-drying, and be able to withstand joint movement without cracking. All butyl rubber flange gaskets must be a minimum 3/16-inch by 5/8-inch, have a surface temperature range of minus 65 degrees F to 220 degrees F, and must be tested to withstand operating pressure up to 10-inch wg positive /negative.
- F. Round Duct Joint O-Ring Seals:
 - 1. Seal shall provide maximum leakage class of 3 cfm/100 sq. ft. at 1-inch wg and shall be rated for10-inch wg static-pressure class, positive or negative.
 - 2. EPDM O-ring to seal in concave bead in coupling or fitting spigot.
 - 3. Double-lipped, EPDM O-ring seal, mechanically fastened to factory-fabricated couplings and fitting spigots.

2.7 HANGERS AND SUPPORTS

- A. Hanger Rods for Noncorrosive Environments: Galvanized-steel rods and nuts.
- B. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.
- C. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."
- D. Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A 603.
- E. Steel Cables for Stainless-Steel Ducts: Stainless steel complying with ASTM A 492.
- F. Steel Cable End Connections: Galvanized-steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.
- G. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
- H. Trapeze and Riser Supports:
 - 1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
 - 2. Supports for Stainless-Steel Ducts: Stainless-steel shapes and plates.
 - 3. Supports for Aluminum Ducts: Aluminum or galvanized steel coated with zinc chromate.

PART 3 - EXECUTION

3.1 DUCT INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and coordination drawings.
- B. Install ducts in accordance with SMACNA's "HVAC Duct Construction Standards Metal and Flexible" unless otherwise indicated.
- C. Install ducts in maximum practical lengths with fewest possible joints.
- D. Install factory or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.
- E. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.
- F. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
- G. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.
- H. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.
- I. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches.
- J. Install duct access panels as noted in Section 233300 "Air Duct Accessories".
- K. Install fire, combination fire/smoke, and smoke dampers where indicated on Drawings and as required by code, and by local authorities having jurisdiction. Comply with requirements in Section 233300 "Air Duct Accessories" for fire and smoke dampers and specific installation requirements of the damper UL listing.
- L. Install heating coils, cooling coils, air filters, dampers, and all other duct-mounted accessories in air ducts where indicated on Drawings.
- M. Protect duct interiors from moisture, construction debris and dust, and other foreign materials both before and after installation. Comply with SMACNA's "IAQ Guidelines for Occupied Buildings Under Construction," Appendix G, "Duct Cleanliness for New Construction Guidelines."
- N. Elbows: Use long-radius elbows wherever they fit.
 - 1. Fabricate 90-degree rectangular mitered elbows to include turning vanes. See Section 233300 "Air Duct Accessories" for turning vane specification.
 - 2. Fabricate 90-degree round elbows with a minimum of three segments for 12 inches and smaller and a minimum of five segments for 14 inches and larger.
- O. Branch Connections: Use lateral or conical branch connections.

3.2 ADDITIONAL INSTALLATION REQUIREMENTS FOR EXPOSED DUCTWORK

- A. Protect ducts exposed in finished spaces from being dented, scratched, or damaged.
- B. Trim duct sealants flush with metal. Create a smooth and uniform exposed bead. Do not use two-part tape sealing system.
- C. Grind welds to provide smooth surface free of burrs, sharp edges, and weld splatter. Paint ground surfaces to prevent future rust, color to match ductwork.
- D. Maintain consistency, symmetry, and uniformity in arrangement and fabrication of fittings, hangers and supports, duct accessories, and air outlets.
- E. Repair or replace damaged sections and finished work that does not comply with these requirements.
- F. Paint all exposed duct sealing material to provided uniform appearance of ductwork, color to match ductwork.

3.3 DUCT SEALING

A. Seal ducts for duct static-pressure, seal classes, and leakage classes as specified on the drawings in the Static Pressure Classification for Duct Construction schedule on the drawings." and or in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

3.4 HANGER AND SUPPORT INSTALLATION

- A. Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Chapter 5, "Hangers and Supports."
- B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
 - 1. Where practical, install concrete inserts before placing concrete.
 - 2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
 - 3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
 - 4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.
 - 5. Do not use powder-actuated concrete fasteners for seismic restraints.
- C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.
- D. Hangers Exposed to View: Threaded rod and angle or channel supports.
- E. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet.
- F. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.5 CONNECTIONS

- A. Make connections to equipment with flexible connectors complying with Section 233300 "Air Duct Accessories."
- B. Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.6 PAINTING

A. Paint interior of metal ducts that are visible through registers and grilles and that do not have duct liner. Apply one coat of flat, black, latex paint over a compatible galvanized-steel primer.

3.7 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Leakage Tests:
 - 1. Comply with SMACNA's "HVAC Air Duct Leakage Test Manual." Submit a test report for each test.
 - 2. Test the following systems:
 - a. Ducts with a Pressure Class Higher Than 3-Inch wg: Test representative duct sections, selected by Architect / Engineer from sections installed, totaling no less than 25 percent of total installed duct area for each designated pressure class.
 - 3. (Disassemble, reassemble, and seal segments of systems to accommodate leakage testing and for compliance with test requirements.
 - Testing of each duct section is to be performed with access doors, coils, filters, dampers, and other duct-mounted devices in place as designed. No devices are to be removed or blanked off so as to reduce or prevent additional leakage.
 - 5. Test for leaks before applying external insulation.
 - Conduct tests at static pressures equal to maximum design pressure of system or section being tested. If static-pressure classes are not indicated, test system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure.
 - 7. Give seven days' advance notice for testing.
- C. Duct System Cleanliness Tests:
 - 1. Visually inspect duct system to ensure that no visible contaminants are present.
 - Test sections of metal duct system, chosen randomly by Owner, for cleanliness in accordance with "Description of Method 3 - NADCA Vacuum Test" in NADCA ACR, "Assessment, Cleaning and Restoration of HVAC Systems."

- a. Acceptable Cleanliness Level: Net weight of debris collected on the filter media shall not exceed 0.75 mg/100 sq. cm.
- D. Duct system will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.

3.8 DUCT CLEANING

- A. Clean new duct system(s) before testing, adjusting, and balancing.
- B. Use duct cleaning methodology as indicated in NADCA ACR.
- C. Use service openings for entry and inspection.
 - 1. Provide openings with access panels appropriate for duct static-pressure and leakage class at dampers, coils, and any other locations where required for inspection and cleaning access. Provide insulated panels for insulated or lined duct. Patch insulation and liner as recommended by duct liner manufacturer. Comply with Section 233300 "Air Duct Accessories" for access panels and doors.
 - 2. Disconnect and reconnect flexible ducts as needed for cleaning and inspection.
 - 3. Remove and reinstall ceiling to gain access during the cleaning process.
- D. Particulate Collection and Odor Control:
 - 1. When venting vacuuming system inside the building, use HEPA filtration with 99.97 percent collection efficiency for 0.3-micron-size (or larger) particles.
 - 2. When venting vacuuming system to outdoors, use filter to collect debris removed from HVAC system, and locate exhaust downwind and away from air intakes and other points of entry into building.
- E. Clean the following components by removing surface contaminants and deposits:
 - 1. Air outlets and inlets (registers, grilles, and diffusers).
 - 2. Supply, return, and exhaust fans including fan housings, plenums (except ceiling supply and return plenums), scrolls, blades or vanes, shafts, baffles, dampers, and drive assemblies.
 - 3. Air-handling unit internal surfaces and components including mixing box, coil section, air wash systems, spray eliminators, condensate drain pans, humidifiers and dehumidifiers, filters and filter sections, and condensate collectors and drains.
 - 4. Coils and related components.
 - 5. Return-air ducts, dampers, actuators, and turning vanes except in ceiling plenums and mechanical equipment rooms.
 - 6. Supply-air ducts, dampers, actuators, and turning vanes.
 - 7. Dedicated exhaust and ventilation components and makeup air systems.
- F. Mechanical Cleaning Methodology:
 - 1. Clean metal duct systems using mechanical cleaning methods that extract contaminants from within duct systems and remove contaminants from building.
 - 2. Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of duct sections so areas being cleaned are under negative pressure.
 - 3. Use mechanical agitation to dislodge debris adhered to interior duct surfaces without damaging integrity of metal ducts, duct liner, or duct accessories.
 - 4. Clean fibrous-glass duct liner with HEPA vacuuming equipment; do not permit duct liner to get wet. Replace fibrous-glass duct liner that is damaged, deteriorated, or delaminated or that has friable material, mold, or fungus growth.
 - 5. Clean coils and coil drain pans in accordance with NADCA ACR. Keep drain pan operational. Rinse coils with clean water to remove latent residues and cleaning materials; comb and straighten fins.
 - 6. Provide drainage and cleanup for wash-down procedures.
 - 7. Antimicrobial Agents and Coatings: Apply EPA-registered antimicrobial agents if fungus is present. Apply antimicrobial agents in accordance with manufacturer's written instructions after removal of surface deposits and debris.

3.9 STARTUP

A. Air Balance: Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC."

3.10 DUCT CONSTRUCTION

A. Fabricate ducts with the materials indicated in Part 2, except as otherwise indicated and as follows:

1. Fabricate all ducts to achieve SMACNA pressure class, seal class, and leakage class as indicated by the Static Pressure Classification for Duct Construction schedule on the drawings.

B. Liner:

- 1. Air Ducts: Fibrous glass, (Type I) or Flexible elastomeric, 1-1/2 inch(es) thick.
- 2. Acoustical liner not for ductwork to be 2 inches thick.
- 3. All hard duct within practice lab to be internally lined.
- C. Elbow Configuration:
 - 1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Figure 4-2, "Rectangular Elbows."
 - a. Velocity 1000 fpm or Lower:
 - 1) Radius Type RE 1 with minimum 0.5 radius-to-diameter ratio.
 - 2) Mitered Type RE 4 without vanes.
 - b. Velocity 1000 to 1500 fpm:
 - 1) Radius Type RE 1 with minimum 1.0 radius-to-diameter ratio.
 - 2) Radius Type RE 3 with minimum 0.5 radius-to-diameter ratio and two vanes.
 - 3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction
 - Standards Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."
 - c. Velocity 1500 fpm or Higher:
 - 1) Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
 - 2) Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
 - 3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."
 - Round Duct: Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Figure 3-4, "Round Duct Elbows."
 - a. Minimum Radius-to-Diameter Ratio and Elbow Segments: Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Table 3-1, "Mitered Elbows." Elbows with less than 90-degree change of direction have proportionately fewer segments.
 - 1) Velocity 1000 fpm or Lower: 0.5 radius-to-diameter ratio and minimum three segments for 90-degree elbow.
 - 2) Velocity 1000 to 1500 fpm: 1.0 radius-to-diameter ratio and minimum four segments for 90-degree elbow.
 - 3) Velocity 1500 fpm or Higher: 1.5 radius-to-diameter ratio and minimum five segments for 90-degree elbow.
 - 4) Radius-to Diameter Ratio: 1.5.
 - b. Round Elbows, 12 Inches and Smaller in Diameter: Stamped or pleated.
 - c. Round Elbows, 14 Inches and Larger in Diameter: Welded.
- D. Branch Configuration:
 - 1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Figure 4-6, "Branch Connection."
 - a. Rectangular Main to Rectangular Branch: 45-degree entry.
 - b. Rectangular Main to Round Branch: Conical spin in.
 - 2. Round and Flat Oval: Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees." Saddle taps are permitted in existing duct.
 - a. Velocity 1000 fpm or Lower: 90-degree tap.
 - b. Velocity 1000 to 1500 fpm: Conical tap.
 - c. Velocity 1500 fpm or Higher: 45-degree lateral.

SECTION 233300 - AIR DUCT ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Manual volume dampers.
 - 2. Turning vanes.
 - 3. Flexible connectors.
 - 4. Duct accessory hardware.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

- 1. Product data showing compliance with ASHRAE 62.1.
 - 2. Detail duct accessories fabrication and installation in ducts and other construction. Include dimensions, weights, loads, and required clearances; and method of field assembly into duct systems and other construction. Include the following:
 - a. Special fittings.
 - b. Manual volume damper installations.
 - c. Control-damper installations.
 - d. Fire-damper, smoke-damper and combination fire-smoke damper installations, including sleeves; and duct-mounted access doors.
 - e. Access doors.
 - f. Wiring Diagrams: For power, signal, and control wiring.

1.3 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.
- B. Facility drawing file with locations of all fire, smoke and combination fire and smoke dampers. Indicate access panel and reset switch locations.

PART 2 - PRODUCTS

2.1 ASSEMBLY DESCRIPTION

- A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."
- B. Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

2.2 MATERIALS

- A. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
 - 1. Galvanized Coating Designation: G90.
 - 2. Exposed-Surface Finish: Mill phosphatized.
- B. Stainless-Steel Sheets: Comply with ASTM A 480/A 480M, Type 304, and having a minimum No. 2b finish for ducts.
- C. Aluminum Sheets: Comply with ASTM B 209, Alloy 3003, Temper H14; with mill finish for concealed ducts and standard, 1-side bright finish for exposed ducts.
- D. Extruded Aluminum: Comply with ASTM B 221, Alloy 6063, Temper T6.
- E. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.
- F. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.3 MANUAL VOLUME DAMPERS

- A. Standard, Steel, Manual Volume Dampers:
 - 1. Standard leakage rating, with linkage outside airstream.
 - 2. Suitable for horizontal or vertical applications.

- 3. Material: Match ductwork material or application.
- 4. Frames:
 - a. Frame: Hat-shaped, 0.094-inch- thick, galvanized sheet steel or 0.05-inch- thick stainless steel.
 - b. Mitered and welded corners.
 - c. Flanges for attaching to walls and flangeless frames for installing in ducts.
- 5. Blades:
 - a. Multiple or single blade.
 - b. Parallel- or opposed-blade design.
 - c. Stiffen damper blades for stability.
 - d. Galvanized or Stainless-steel, 0.064 inch thick.
 - Blade Axles: Galvanized steel, Stainless steel or Nonferrous metal.
- 7. Bearings:

6.

8.

- a. Oil-impregnated bronze, Molded synthetic, Oil-impregnated stainless-steel sleeve or Stainless-steel sleeve.
- b. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
- Tie Bars and Brackets: Galvanized steel.
- B. Standard, Aluminum, Manual Volume Dampers:
 - 1. Standard leakage rating, with linkage outside airstream.
 - 2. Suitable for horizontal or vertical applications.
 - 3. Frames: Hat-shaped, 0.10-inch- thick, aluminum sheet channels; frames with flanges for attaching to walls and flangeless frames for installing in ducts.
 - 4. Blades:
 - a. Multiple or single blade.
 - b. Parallel- or opposed-blade design.
 - c. Stiffen damper blades for stability.
 - d. Roll-Formed Aluminum Blades: 0.10-inch- thick aluminum sheet.
 - e. Extruded-Aluminum Blades: 0.050-inch- thick extruded aluminum.
 - Blade Axles: Galvanized steel, Stainless steel or Nonferrous metal.
 - 6. Bearings:
 - a. Oil-impregnated bronze.
 - b. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
 - 7. Tie Bars and Brackets: Aluminum.
- C. Jackshaft:

5.

- 1. Size: 0.5-inch or 1-inch diameter.
- 2. Material: Galvanized-steel pipe rotating within pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies.
- 3. Length and Number of Mountings: As required to connect linkage of each damper in multiple-damper assembly.
- D. Damper Hardware:
 - 1. Zinc-plated, die-cast core with dial and handle made of 3/32-inch- thick zinc-plated steel, and a 3/4-inch hexagon locking nut.
 - 2. Include center hole to suit damper operating-rod size.
 - 3. Include elevated platform for insulated duct mounting.

2.4 TURNING VANES

- A. Manufactured Turning Vanes for Metal Ducts: Curved blades of galvanized sheet steel; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.
 - 1. Acoustic Turning Vanes: Fabricate airfoil-shaped aluminum extrusions with perforated faces and fibrous-glass fill.
- B. General Requirements: Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible"; Figures 4-3, "Vanes and Vane Runners," and 4-4, "Vane Support in Elbows."
- C. Vane Construction: For duct systems less than or equal to 2" w.g. static pressure, provide single wall vanes. For duct systems greater than 2" w.g., provide double walled turning vanes.

2.5 FLEXIBLE CONNECTORS

- A. Materials: Flame-retardant or noncombustible fabrics.
- B. Coatings and Adhesives: Comply with UL 181, Class 1.
- C. Metal-Edged Connectors: Factory fabricated with a fabric strip 3-1/2 inches wide attached to two strips of 2-3/4-inch- wide, 0.028-inch- thick, galvanized sheet steel or 0.032-inch- thick aluminum sheets. Provide metal compatible with connected ducts.
- D. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.
 - 1. Minimum Weight: 26 oz./sq. yd..
 - 2. Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
 - 3. Service Temperature: Minus 40 to plus 200 deg F.
- E. Outdoor System, Flexible Connector Fabric: Glass fabric double coated with weatherproof, synthetic rubber resistant to UV rays and ozone.
 - 1. Minimum Weight: 24 oz./sq. yd..
 - 2. Tensile Strength: 530 lbf/inch in the warp and 440 lbf/inch in the filling.
 - 3. Service Temperature: Minus 50 to plus 250 deg F.

2.6 DUCT ACCESSORY HARDWARE

- A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct-insulation thickness.
- B. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards Metal and Flexible" for metal ducts.
- B. Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.
- C. Install backdraft or control dampers at inlet of exhaust fans or exhaust ducts as close as possible to exhaust fan unless otherwise indicated.
- D. Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts. Where dampers are installed in ducts having duct liner, install dampers with hat channels of same depth as liner, and terminate liner with nosing at hat channel.
 - 1. Install steel volume dampers in steel ducts.
 - 2. Install aluminum volume dampers in aluminum ducts.
- E. Set dampers to fully open position before testing, adjusting, and balancing.
- F. Install test holes at fan inlets and outlets and elsewhere as indicated.
- G. Install fire, smoke and combination fire and smoke dampers according to UL listing.
- H. Install duct access doors on sides or bottom of ducts as required to allow for inspecting, adjusting, and maintaining accessories and equipment.
- I. Install access doors adjacent and close enough to fire, smoke, and combination fire and smoke dampers to allow, maintenance, inspection, resetting and re-installation of fusible links.
- J. Access doors shall be pressure relief type, and be provided with a warning label for: "Relieve pressure prior to opening access door".
- K. Label access doors according to Section 230553 "Identification for HVAC Piping and Equipment" to indicate the purpose of access door.
- L. Install flexible connectors to connect ducts to equipment.
- M. Connect terminal units to supply ducts with a maximum 12-inch length of flexible duct. Do not use flexible ducts to change directions.

- N. Connect diffusers or linear plenums to ducts with a maximum 60-inch length of flexible duct clamped or strapped in place.
- O. Connect flexible ducts to metal ducts with draw bands, and adhesive or tape.
- P. Install duct test holes where required for testing and balancing purposes.

SECTION 233346 - FLEXIBLE DUCTS

PART1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:1. Insulated flexible ducts.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 ASSEMBLY DESCRIPTION

- A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."
- B. Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- C. Comply with the Air Diffusion Council's "ADC Flexible Air Duct Test Code FD 72-R1."
- D. Comply with ASTM E 96/E 96M, "Test Methods for Water Vapor Transmission of Materials."

2.2 INSULATED FLEXIBLE DUCTS

- A. Insulated, Flexible Duct: UL 181, Class 1, two-ply vinyl film supported by helically wound, spring-steel wire; fibrous-glass insulation; polyethylene vapor-barrier film.
 - 1. Maximum Air Velocity: 4000 fpm.
 - 2. Temperature Range: Minus 10 to plus 160 deg F.
 - 3. Insulation R-Value: R8.
- B. Insulated, Flexible Duct: UL 181, Class 1, black polymer film supported by helically wound, spring-steel wire; fibrous-glass insulation; polyethylene vapor-barrier film.
 - 1. Pressure Rating: 4-inch wg positive and 0.5-inch wg negative.
 - 2. Maximum Air Velocity: 4000 fpm.
 - 3. Temperature Range: Minus 20 to plus 175 deg F.
 - 4. Insulation R-Value: R8.

2.3 FLEXIBLE DUCT CONNECTORS

- A. Clamps: Nylon strap in sizes 3 through 18 inches, to suit duct size.
- B. Non-Clamp Connectors: Liquid adhesive plus tape.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install flexible ducts according to applicable details in SMACNA's "HVAC Duct Construction Standards -Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.
- B. Install in indoor applications only. Flexible ductwork should not be exposed to UV lighting.
- C. Connect terminal units to supply ducts directly or with maximum 12-inch lengths of flexible duct. Do not use flexible ducts to change directions.
- D. Connect diffusers or light troffer boots to ducts with maximum 60-inch lengths of flexible duct clamped or strapped in place.
- E. Connect flexible ducts to metal ducts with draw bands.
- F. Install duct test holes where required for testing and balancing purposes.

- G. Installation:
 - 1. Install ducts fully extended.
 - 2. Do not bend ducts across sharp corners.
 - 3. Bends of flexible ducting shall not exceed a minimum of one duct diameter.
 - 4. Avoid contact with metal fixtures, water lines, pipes, or conduits.
 - 5. Install flexible ducts in a direct line, without sags, twists, or turns.
- H. Supporting Flexible Ducts:
 - 1. Suspend flexible ducts with bands 1-1/2 inches wide or wider and spaced a maximum of 48 inches apart. Maximum centerline sag between supports shall not exceed 1/2 inch per 12 inches.
 - 2. Install extra supports at bends placed approximately one duct diameter from center line of the bend.
 - 3. Ducts may rest on ceiling joists or truss supports. Spacing between supports shall not exceed the maximum spacing per manufacturer's written installation instructions.
 - 4. Vertically installed ducts shall be stabilized by support straps at a maximum of 72 inches o.c.

SECTION 233600 - AIR TERMINAL UNITS

PART1- GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. See section 230513 COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT, for information regarding line filter requirements for EC motors.

1.2 SUMMARY

- A. Section Includes:
 - 1. Shutoff, single-duct air terminal units.
 - 2. Casing liner.
- B. Related Requirements:
 - 1. Section 013573 "Delegated Design Requirements and Procedures" for definitions, submittal procedures, responsibilities, and scheduling requirements associated with delegated design assignment indicated in this Section.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of air terminal unit.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for air terminal units.
 - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
 - Manufacturer shall include terminal unit schedules listing discharge and radiated sound power level, at AHRI Certification Rating Points, for each of the second through seventh octave bands (125 - 4000 Hertz) at specified differential static pressures.
 - 4. Manufacturer shall include terminal unit schedules listing discharge and radiated sound power level, at AHRI Certification Rating Points, for each of second through seventh octave bands at inlet static pressures from 1 to 4 inch water gauge.
 - 5. The terminal unit manufacturer shall list any exceptions to the specification, in a paragraph by paragraph specifications review; submittals not containing a paragraph by paragraph specification review will be rejected.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For air terminal units to include in emergency, operation, and maintenance manuals.
 - 1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
 - a. Instructions for resetting minimum and maximum air volumes.
 - b. Instructions for adjusting software set points.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 "Systems and Equipment" and Section 7 "Construction and System Start-up."
- C. ASHRAE Compliance: Applicable requirements in ASHRAE/IES 90.1, "Section 6 Heating, Ventilating, and Air Conditioning."
- D. Unless otherwise noted, the terminal unit controller shall be provided by the Contractor responsible for specification section 230900 and shall be shipped to the terminal unit manufacturer for factory installation. Field installation of terminal unit controllers is not acceptable.

2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a registered design professional, as defined in Section 013573 "Delegated Design Requirements and Procedures" to design air terminal units.
 - 1. Material properties indicated in this Section shall be considered as minimum properties.

2.3 SHUTOFF, SINGLE-DUCT AIR TERMINAL UNITS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Carrier Corporation; a unit of United Technologies Corp.
 - 2. ENVIRO-TEC; by Johnson Controls, Inc.
 - 3. Krueger.
 - 4. METALAIRE, Inc.
 - 5. Nailor Industries Inc.
 - 6. Price Industries.
 - Titus.
 Trane.
- B. Configuration: Volume-damper assembly inside unit casing with control components inside a protective metal shroud.
- C. Casing: 0.032-inch- thick galvanized steel, single wall.
 - 1. Casing Liner: Comply with requirements in "Casing Liner" Article for flexible elastomeric duct liner.
 - 2. Air Inlet: Round stub connection or S-slip and drive connections for duct attachment.
 - 3. Air Outlet: S-slip and drive connections, size matching inlet size.
 - 4. Access: Removable panels for access to parts requiring service, adjustment, or maintenance; with airtight gasket.
 - 5. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
- D. Regulator Assembly: System-air-powered bellows section incorporating polypropylene bellows for volume regulation and thermostatic control. Bellows shall operate at temperatures from zero to 140 deg F, shall be impervious to moisture and fungus, shall be suitable for 10-inch wg static pressure, and shall be factory tested for leaks.
- E. Volume Damper: Galvanized steel with peripheral gasket and self-lubricating bearings.
 - 1. Maximum Damper Leakage: AHRI 880 rated, 2 percent of nominal airflow at 3-inch wg inlet static pressure.
 - 2. Damper Position: Normally open.
- F. Attenuator Section: 0.034-inch steel or 0.032-inch aluminum sheet.
 - 1. Attenuator Section Liner: Comply with requirements in "Casing Liner" Article for flexible elastomeric duct liner.
 - 2. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
- G. Control devices shall be compatible with temperature controls system specified in Section 230900 "Direct Digital Control (DDC) System for HVAC."
 - 1. Electric Damper Actuator: 24 V, powered open, spring return.
 - 2. Electronic Damper Actuator: 24 V, powered open, spring return.
 - 3. Electronic Thermostat: Wall-mounted electronic type with temperature set-point display in Fahrenheit and Celsius.
 - 4. Electronic Velocity Controller: Factory calibrated and field adjustable to minimum and maximum air volumes; shall maintain constant airflow dictated by thermostat within 5 percent of set point while compensating for inlet static-pressure variations up to 4-inch wg; and shall have a multipoint velocity sensor at air inlet.
 - 5. Terminal Unit Controller: Pressure-independent, variable-air-volume (VAV) controller with electronic airflow transducer with multipoint velocity sensor at air inlet, factory calibrated to minimum and maximum air volumes, and having the following features:

2.4 CASING LINER

- A. Casing Liner: Flexible elastomeric duct liner fabricated of preformed, cellular, closed-cell, sheet materials complying with ASTM C 534, Type II, Grade 1; and with NFPA 90A or NFPA 90B.
 - 1. Minimum Thickness: 3/4 inch.

- Surface-Burning Characteristics: Maximum flame-spread index of 25 and maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
- 3. Liner Adhesive: As recommended by insulation manufacturer and complying with NFPA 90A or NFPA 90B.

2.5 SOURCE QUALITY CONTROL

- A. Factory Tests: Test assembled air terminal units according to AHRI 880.
 - 1. Label each air terminal unit with plan number, nominal airflow, maximum and minimum factory-set airflows, [coil type,]and AHRI certification seal.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT INSTALLATION

- A. Comply with SMACNA's "HVAC Duct Construction Standards Metal and Flexible," Ch. 5, "Hangers and Supports" and with Section 230529 "Hangers and Supports for HVAC Piping and Equipment."
- B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
 - 1. Where practical, install concrete inserts before placing concrete.
 - 2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
 - 3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes and for slabs more than 4 inches thick.
 - 4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes and for slabs less than 4 inches thick.
 - 5. Do not use powder-actuated concrete fasteners for seismic restraints.
- C. Hangers Exposed to View: Threaded rod and angle or channel supports.
- D. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.2 TERMINAL UNIT INSTALLATION

- A. Install air terminal units according to NFPA 90A, "Standard for the Installation of Air Conditioning and Ventilating Systems."
- B. Install air terminal units level and plumb. Maintain sufficient clearance for normal service and maintenance.
- C. Install wall-mounted thermostats.

3.3 IDENTIFICATION

A. Label each air terminal unit with plan number, nominal airflow, and maximum and minimum factory-set airflows. Comply with requirements in Section 230553 "Identification for HVAC Piping and Equipment" for equipment labels and warning signs and labels.

3.4 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- B. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
 - 1. After installing air terminal units and after electrical circuitry has been energized, test for compliance with requirements.
 - 2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - 3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- C. Air terminal unit will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

3.5 STARTUP SERVICE

- A. Perform startup service.
 - 1. Complete installation and startup checks according to manufacturer's written instructions.

- 2. Verify that inlet duct connections are as recommended by air terminal unit manufacturer to achieve proper performance.
- 3. Verify that controls and control enclosure are accessible.
- 4. Verify that control connections are complete.
- 5. Verify that nameplate and identification tag are visible.
- 6. Verify that controls respond to inputs as specified.

3.6 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain air terminal units.

SECTION 260413 - COMMON SUBMITTAL REQUIREMENTS FOR ELECTRICAL

PART1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Supplementary administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals specific to the work of this Division.
- B. Related Requirements:
 - 1. Division 01 submittal requirements.

1.3 DEFINITIONS

- A. Contractor: Refers to an entity in direct Contract with the Owner to furnish and/or perform any portion of the Work of the Contract, including but not limited to a Construction Manager.
 - 1. Contractor shall review and approve Product Submittals prior to fowarding them to the Architect.
- B. Product Submittals: In general, Product Submittals show characteristics of the proposed construction in one of the following forms:
 - 1. Shop Drawings.
 - 2. Product Data.
 - 3. Samples.
- C. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- D. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."
- E. Submittal Review Sheet: Specific form required to accompany each submittal. Obtain Submittal Review Sheet from the SmithGroup Project Manager.

1.4 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Requirements specified for submittals are intended to provide efficient handling, while permitting review responsibilities to be carried out.
- B. Avoidable Resubmittals: The first two reviews of each specified submittal will be processed without cost to the Contractor. After the second review, the Owner may charge the Contractor for the cost of such additional processing, unless the processing results from approved Change Orders causing revisions to previously approved submittals.
- C. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 - 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 - 4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architectreserve the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- D. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

- 1. Initial Review: Allow 10 business days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required.
- 2. When a large volume of submittal materials is scheduled, additional review time may be required. Similarly, a particular submittal may require review completion in less than the agreed normal time. Due to variations in submittal volume and processing needs, agreed review time is not intended to apply to extreme conditions.
- 3. Resubmittal Review: Allow 10 business days for review of each resubmittal.
- 4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 15 business days for initial review of each submittal.
- E. Maintain at the Project Site ready access to the latest reviewed Shop Drawings and Product Data, and one set of samples.

1.5 DELEGATED-DESIGN SERVICES

- A. Definitions:
 - 1. Delegated Design: A portion or component of the Work identified by the Contract Documents to be designed by the Contractor, or an entity assigned by the Contractor, to satisfy performance and design criteria specified in the Contract Documents for that portion or component.
 - 2. Registered Design Professional: Design professional, assigned by the Contractor, who is responsible for providing the delegated design work, and for certifying that the work is in compliance with the specified performance requirements and design criteria. Design professional shall be legally qualified to practice in jurisdiction where Project is located and shall be experienced in providing delegated design services of the kind indicated. Delegated design services are defined as those performed for installation of the system, assembly or product that are similar in material, design, and extent to those indicated for this Project.
- B. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- C. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Combine with Submittal Review Sheet before submitting to Architect .
- B. Project Closeout and Maintenance Material Submittals: See requirements in Division 01.
- C. Be responsible for quantities, weights, and dimensions to be confirmed and correlated at the site; for information that pertains solely to the fabrication processes and to the means, methods, techniques, sequences, and procedures of construction; and for coordination of the work of every trade, supplier, and subcontractor.
- D. Be responsible for each submittal to be in conformance with information given and the design intent expressed in the Contract Documents.
- E. Provide with each submittal specific written notice of any variation from the requirements of the Contract Documents by causing a specific notation to be made on the Submittal Review Sheet and Submittal Transmittal.

3.2 ARCHITECT'S AND GENERAL CONTRACTOR'S ACTION

A. General: Architect will not review submittals that do not include the Submittal Review Sheet.

- B. Action Submittals: Architect's staff and consultants will review the submittal, and mark the Submittal Review Sheet with an action code. The code meanings are described below.
- C. Additional codes may be provided within comments or as an electronic submittal review stamp and shall be used in help indicating return of partial submittals.
- D. The Final Review Code on the Submittal Review Sheet prevails and governs the action of the overall submittal.
- E. Review Code meanings are as follows:
 - 1. Action Codes Permitting Use:
 - a. When an action code permitting use is assigned to a submittal, it does not authorize work that does not comply with the requirements of the Contract Documents. Acceptance of the Work will depend on compliance.
 - b. Code AP Approved: The Work covered by the submittal item may proceed, provided it complies with Contract Document requirements.
 - c. Code AN Approved as Noted: The Work covered by the submittal item may proceed, provided it complies with the Architect's notations and Contract Document requirements.
 - d. Code AN-R Approved as Noted Resubmit: Do not deliver or install the related work until the resubmittal has received Code AP or AN. However, fabrication and other off-site work covered by the submittal item may proceed, at the Contractor's risk, provided it complies with the Architect's notations and Contract Document requirements.
 - 2. Action Code Prohibiting Use:
 - a. Action Code REJ Not Approved: The Work covered by the submittal item, including purchasing, fabrication, delivery, and other activity, shall not proceed. Revise the submittal item or prepare a new item in accordance with the Architect's notations. Resubmit the corrected or new item without delay; do not permit submittal items marked "Not Approved" to be used. Work incorporating such items will be rejected.
 - 3. Action Code for Items Not Required:
 - a. Action Code X Not Requested by Contract Documents: The submittal item is not called for by the Contract Documents and is being returned unreviewed by the Architect except to the extent necessary to determine its status.
- F. Informational Submittals: For Architect's information only. Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
 - 1. Action Code for Information Only:
 - a. Action Code INF Information Only Received: The submittal item is not called for a return with a reviewed action code by the Contract Documents and is being returned un-reviewed by the Architect except to the extent necessary to determine its status.
- G. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- H. Incomplete submittals are not acceptable, will be considered non-responsive, and will be returned without review.
- I. Architect will return without review or discard submittals received from sources other than the Contractor.
- J. Submittals not required by the Contract Documents may be returned by the Architect without action.
 1. Do not submit Material Safety Data Sheets. They will be returned without review.

3.3 SUBMITTAL TRANSMITTAL REQUIREMENTS

- A. Submittal Transmittal shall be a PDF file in electronic format. It is recommended, to expedite the submittal review, the electronic form be emailed for review to the Architect as early as possible.
 - 1. Submittal Numbering: See below.
 - 2. Contact Information: Full Name, Phone Number and Email Address.
- B. Submittal Definition
 - 1. Each submittal consists of items from only ONE Specifications section.
 - 2. Complete Submittal: If ALL the items required by the Specifications section are listed on one Submittal Form (including continuation sheet), it is a complete submittal.
 - 3. Partial Submittals: If it is necessary to divide the required items of a given Specifications section into two or more submittals to meet schedule or handling requirements, the separate submittals are partial submittals. All partial submittals have the same submittal number, and are differentiated by sequential P-numbers (see below).

- 4. All items in each submittal, whether complete or partial, will be processed together: Individual items will not be 'broken out' for special handling. Arrange submittals accordingly.
- C. Submittal Numbering
 - 1. Number submittals as described below to assist tracking.
 - 2. Number each submittal in the format nnnnn-nn.
 - a. The 6-digit number is the number of the section that requires the submittal. For example, 044200.
 - b. The 2-digit number is based on the numerical sequence of submittals from that section. In other words, for each section, the first submittal is 01, the second is 02, and so on. The 2-digit number does not change for partial or re-submittals, so that the submittal can be tracked.
 - c. P-Number for Partial Submittals: Number each partial submittal in the pee space, beginning with P1, and increasing by one for each partial submittal of that submittal. If the submittal is a complete submittal, leave the P space blank.
 - d. R-Number for Re-submittals: Number each re-submittal in the arr space, beginning with R1, and increasing by one for each re-submittal of that submittal. Do not include an R-Number for the initial submittal.
 - e. Examples:
 - 1) Initial Complete Submittal: 044200-01. First Re-Submittal: 044200-01-R1.
 - 2) Initial Partial Submittal: 044200-01-P1. Second Partial Submittal: 0044200-01-P2. First Re-submittal of Second Partial Submittal: 044200-R1-P2.

3.4 SUBMITTAL REVIEW SHEET REQUIREMENTS

- A. Provide Submittal Review Sheet in PDF format. Submit as the page after the Submittal Transmittal.
- B. When attached, the Submittal Review Sheet shall not obscure information contained in the submittal.
- C. Do not edit any of the information contained within the Submittal Review Sheet except as follows:
- 1. Submittal Number: See Submittal Numbering in Submittal Transmittal Requirements paragraph.
- D. The Contractor shall submit the PDF file in a manner that will allow editing of the Submittal Review Sheet fields by SmithGroup and its consultants.

SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Building wires and cables rated 600 V and less.
 - 2. Connectors, splices, and terminations rated 600 V and less.

1.3 DEFINITIONS

- A. VFC: Variable frequency controller.
- B. EPDM: Ethylene-propylene-diene terpolymer rubber
- C. NBR: Acrylonitrile-butadiene rubber

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Field quality-control reports.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
 - Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association or the National Institute for Certification in Engineering Technologies to supervise on-site testing specified in Part 3.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with NFPA 70.

1.7 COORDINATION

A. Set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Alcan Products Corporation; Alcan Cable Division.
 - 2. Alpha Wire Company.
 - 3. Belden Inc.
 - 4. Encore Wire Corporation.
 - 5. General Cable Technologies Corporation.
 - 6. Southwire Incorporated.
- B. Copper Conductors: Comply with NEMA WC 70/ICEA S-95-658.
- C. Conductor Insulation: Comply with NEMA WC 70/ICEA S-95-658 for Type THHN/THWN-2 Type XHHW-2.

2.2 CONNECTORS AND SPLICES

- A. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.
- B. Connectors: Make splices and connections in conductors using UL listed solderless pressure connectors. For all connections up to a maximum of one (1) No. 6 with two (2) No. 8 conductors, use Ideal Wingnuts• of required sizes. Connections in conductors or combination of conductors larger than described above shall be made using Burndy cable fittings of the type and size required for the specific duty. After splice is securely made-up•, entire assembly shall be insulated with UL listed insulating tape to a value equivalent to the adjacent insulation. Ground connections shall be made using Burndy ground clamps or connectors of a type suitable and UL listed for duty involved.
- C. Motor connections will use a mechanical connector to join leads to power conductors. #8 and larger wires shall use Kearney type split bolt connectors. #10 and #12 wires may use crimp on rings and bolts with nuts for connection. Wire nuts, Scotch locks•, etc. are not acceptable.

2.3 SYSTEM DESCRIPTION

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NFPA 70.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders: Copper. Solid for No. 14 AWG and smaller; stranded for No. 12 AWG and larger.
- B. Branch Circuits: Copper. Solid for No.14 AWG and smaller; stranded for No. 12 AWG and larger.

3.2 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.
- B. Complete raceway installation between conductor and cable termination points according to Section 260533 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.
- C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- F. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems."

3.3 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.
- B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
 1. Use oxide inhibitor in each splice, termination, and tap for aluminum conductors.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches of slack.

3.4 IDENTIFICATION

- A. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."
- B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

3.5 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.6 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Section 078413 "Penetration Firestopping."

3.7 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- C. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
 - 1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors and conductors feeding the following critical equipment and services for compliance with requirements.
 - 2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - 3. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each splice in conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner. Correct deficiencies determined during the scan.
 - a. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each splice 11 months after date of Substantial Completion.
 - b. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
 - c. Record of Infrared Scanning: Prepare a certified report that identifies splices checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.
- D. Test and Inspection Reports: Prepare a written report to record the following:
 - 1. Procedures used.
 - 2. Results that comply with requirements.
 - 3. Results that do not comply with requirements and corrective action taken to achieve compliance with requirements.
- E. Cables will be considered defective if they do not pass tests and inspections, remove defective cables and replace with new cables and retest as specified above

SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Steel slotted support systems.
 - 2. Aluminum slotted support systems.
 - 3. Nonmetallic slotted support systems.
 - 4. Conduit and cable support devices.
 - 5. Support for conductors in vertical conduit.
 - 6. Structural steel for fabricated supports and restraints.
 - Mounting, anchoring, and attachment components, including powder-actuated fasteners, mechanical expansion anchors, concrete inserts, clamps, through bolts, toggle bolts, and hanger rods.
 - 8. Fabricated metal equipment support assemblies.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:
 - a. Slotted support systems, hardware, and accessories.
 - b. Clamps.
 - c. Hangers.
 - d. Sockets.
 - e. Eye nuts.
 - f. Fasteners.
 - g. Anchors.
 - h. Saddles.
 - i. Brackets.
 - 2. Include rated capacities and furnished specialties and accessories.
- B. Shop Drawings: Signed and sealed by a qualified professional engineer. For fabrication and installation details for electrical hangers and support systems.
 - 1. Hangers. Include product data for components.
 - 2. Slotted support systems.
 - 3. Equipment supports.
- C. Delegated-Design Submittal: For hangers and supports for electrical systems.
 - 1. Include design calculations and details of hangers.

1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 - 1. Suspended ceiling components.
 - 2. Ductwork, piping, fittings, and supports.
 - 3. Structural members to which hangers and supports will be attached.
 - 4. Size and location of initial access modules for acoustical tile.
 - 5. Items penetrating finished ceiling, including the following:
 - a. Luminaires.
 - b. Air outlets and inlets.
 - c. Speakers.
 - d. Sprinklers.
 - e. Access panels.
 - f. Projectors.
- B. Welding certificates.

1.5 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.
- B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
- C. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of five times the applied force.

2.2 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Preformed steel channels and angles with minimum 13/32-inch- diameter holes at a maximum of 8 inches o.c. in at least one surface.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Allied Tube & Conduit; a part of Atkore International.
 - b. B-line, an Eaton business.
 - c. ERICO International Corporation.
 - d. Flex-Strut Inc..
 - e. GS Metals Corp.
 - f. G-Strut.
 - g. Haydon Corporation.
 - h. Metal Ties Innovation.
 - i. Thomas & Betts Corporation; A Member of the ABB Group.
 - j. Unistrut; Part of Atkore International.
 - k. Wesanco, Inc.
 - 2. Channel Width: Selected for applicable load criteria.
 - 3. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
 - 4. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
 - 5. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
 - 6. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Nonmetallic Slotted Support Systems: Structural-grade, factory-formed, glass-fiber-resin channels and angles with minimum 13/32-inch- diameter holes at a maximum of 8 inches o.c., in at least one surface.
 - Manufacturers: Subject to compliance with requirements, provide products by one of the following:

 Allied Tube & Conduit; a part of Atkore International.
 - b. B-line. an Eaton business.
 - c. Fabco Plastics Wholesale Limited.
 - d. G-Strut.
 - e. Haydon Corporation.
 - f. Seasafe, Inc.; AMICO, a Gibraltar Industries Company.
 - 2. Fittings and Accessories: Products provided by channel and angle manufacturer and designed for use with those items.
 - 3. Fitting and Accessory Materials: Same as those for channels and angles.
 - 4. Rated Strength: Selected to suit applicable load criteria.
 - 5. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- D. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for nonarmored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be made of malleable iron.
- E. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M steel plates, shapes, and bars; black and galvanized.

- F. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
 - 1. Mechanical-Expansion Anchors: Insert-wedge-type, stainless steel, for use in hardened portland cement concrete, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) B-line, an Eaton business.
 - 2) Empire Tool and Manufacturing Co., Inc..
 - 3) Hilti, Inc..
 - 4) ITW Ramset/Red Head; Illinois Tool Works, Inc..
 - 5) MKT Fastening, LLC.
 - 2. Concrete Inserts: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.
 - 3. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.
 - 4. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
 - 5. Toggle Bolts: All -steel springhead type.
 - 6. Hanger Rods: Threaded steel.

2.3 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.
- B. Materials: Comply with requirements in Section 055000 "Metal Fabrications" for steel shapes and plates.
- C. All structural steel elements and related equipment (fasteners, etc.) shall be hot dipped galvanized.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Comply with the following standards for application and installation requirements of hangers and supports, except where requirements on Drawings or in this Section are stricter:
 - 1. NECA 1.
 - 2. NECA 101
 - 3. NECA 102.
 - 4. NECA 105.
 - 5. NECA 111.
- B. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping materials and installation for penetrations through fire-rated walls, ceilings, and assemblies.
- C. Comply with requirements for raceways and boxes specified in Section 260533 "Raceways and Boxes for Electrical Systems."
- D. Maximum Support Spacing and Minimum Hanger Rod Size for Raceways: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch in diameter.
- E. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 100 percent in future without exceeding specified design load limits.
 - 1. Secure raceways and cables to these supports with single-bolt conduit clamps using spring friction action for retention in support channel.
- F. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings, and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this article.
- B. Raceway Support Methods: In addition to methods described in NECA 1, EMT IMC and RMC may be supported by openings through structure members, according to NFPA 70.

- C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.
- D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
 - 1. To Wood: Fasten with lag screws or through bolts.
 - 2. To New Concrete: Bolt to concrete inserts.
 - 3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
 - 4. To Existing Concrete: Expansion anchor fasteners.
 - 5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches thick.
 - 6. To Steel: Beam clamps (MSS SP-58, Type 19, 21, 23, 25, or 27), complying with MSS SP-69.
 - 7. To Light Steel: Sheet metal screws.
 - 8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate.
- E. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Comply with installation requirements in Section 055000 "Metal Fabrications" for site-fabricated metal supports.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- C. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 CONCRETE BASES

- A. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.
- B. Use 3000-psi, 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Section 033000 "Cast-in-Place Concrete."
- C. Anchor equipment to concrete base as follows:
 - 1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 2. Install anchor bolts to elevations required for proper attachment to supported equipment.
 - 3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.5 PAINTING

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 - 1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.
- B. Touchup: Comply with requirements in Section 099113 "Exterior Painting" Section 099123 "Interior Painting" and Section 099600 "High-Performance Coatings" for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.
- C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

SECTION 260533 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Metal conduits and fittings.
 - 2. Nonmetallic conduits and fittings.
 - 3. Metal wireways and auxiliary gutters.
 - 4. Surface raceways.
 - 5. Boxes, enclosures, and cabinets.
- B. Related Requirements:
 - 1. Section 078413 "Penetration Firestopping" for firestopping at conduit and box entrances.
 - 2. Section 270528 "Pathways for Communications Systems" for conduits, wireways, surface pathways, innerduct, boxes, faceplate adapters, enclosures, cabinets, and handholes serving communications systems.

1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. ENT: Electrical nonmetallic tubing.
- C. EPDM: Ethylene-propylene-diene terpolymer rubber.
- D. FMC: Flexible metal conduit.
- E. GRC: Galvanized rigid steel conduit.
- F. IMC: Intermediate metal conduit.
- G. LFMC: Liquidtight flexible metal conduit.
- H. LFNC: Liquidtight flexible nonmetallic conduit.
- I. NBR: Acrylonitrile-butadiene rubber.
- J. RNC: Rigid nonmetallic conduit.

1.4 SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.
- B. Sustainable Design Submittals:
 - 1. Product Data: For solvents and adhesives, indicating VOC content.
 - 2. Laboratory Test Reports: For solvents and adhesives, indicating compliance with requirements for low-emitting materials.
- C. Samples: For wireways, nonmetallic wireways, and surface raceways and for each color and texture specified, 12 inches long.
- D. Sealing/fire stopping materials and details.
- E. Source quality-control test reports.

PART 2 - PRODUCTS

1

2.1 METAL CONDUITS AND FITTINGS

- A. Metal Conduit:
 - Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AFC Cable Systems; a part of Atkore International.
 - b. Allied Tube & Conduit; a part of Atkore International.
 - c. Anamet Electrical, Inc.
 - d. Calconduit.
 - e. Electri-Flex Company.

- f. FSR Inc.
- g. Korkap.
- h. Opti-Com Manufacturing Network, Inc (OMNI).
- i. O-Z/Gedney; a brand of Emerson Industrial Automation.
- j. Patriot Aluminum Products, LLC.
- k. Perma-Cote.
- I. Plasti-Bond.
- m. Republic Conduit.
- n. Southwire Company.
- o. Thomas & Betts Corporation; A Member of the ABB Group.
- p. Topaz Electric; a division of Topaz Lighting Corp.
- q. Western Tube and Conduit Corporation.
- r. Wheatland Tube Company.
- 2. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- 3. GRC: Comply with ANSI C80.1 and UL 6.
- 4. ARC: Comply with ANSI C80.5 and UL 6A.
- 5. IMC: Comply with ANSI C80.6 and UL 1242.
- 6. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit IMC.
 - a. Comply with NEMA RN 1.
 - b. Coating Thickness: 0.040 inch, minimum.
- 7. EMT: Comply with ANSI C80.3 and UL 797.
- 8. FMC: Comply with UL 1; zinc-coated steel or aluminum.
- 9. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.
- B. Metal Fittings:
 - 1. Manufacturers: As specified above. provide products by one of the following
 - a. AFC Cable Systems; a part of Atkore International.
 - b. Allied Tube & Conduit; a part of Atkore International.
 - c. Anamet Electrical, Inc.
 - d. Calconduit.
 - e. Electri-Flex Company.
 - f. FSR Inc.
 - g. Korkap.
 - h. Opti-Com Manufacturing Network, Inc (OMNI).
 - i. O-Z/Gedney; a brand of Emerson Industrial Automation.
 - j. Patriot Aluminum Products, LLC.
 - k. Perma-Cote.
 - I. Picoma Industries, Inc.
 - m. Plasti-Bond.
 - n. Republic Conduit.
 - o. Southwire Company.
 - p. Thomas & Betts Corporation; A Member of the ABB Group.
 - q. Topaz Electric; a division of Topaz Lighting Corp.
 - r. Western Tube and Conduit Corporation.
 - s. Wheatland Tube Company.
 - 2. Comply with NEMA FB 1 and UL 514B.
 - 3. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - 4. Fittings, General: Listed and labeled for type of conduit, location, and use.
 - 5. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 1203 and NFPA 70.
 - 6. Fittings for EMT:
 - a. Material: Steel or die cast.
 - b. Type: Setscrew or compression.
 - 7. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
 - 8. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch, with overlapping sleeves protecting threaded joints.
- C. Joint Compound for IMC, GRC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 NONMETALLIC CONDUITS AND FITTINGS

- A. Nonmetallic Conduit:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following: a. AFC Cable Systems; a part of Atkore International.
 - b. Anamet Electrical, Inc.
 - c. Arnco Corporation.
 - d. CANTEX INC.
 - e. CertainTeed Corporation.
 - f. Champion Fiberglass, Inc.
 - g. Condux International, Inc.
 - h. Electri-Flex Company.
 - i. FRE Composites.
 - j. Kraloy.
 - k. Lamson & Sessions.
 - I. Niedax Inc.
 - m. RACO; Hubbell.
 - n. Thomas & Betts Corporation; A Member of the ABB Group.
 - o. Topaz Electric; a division of Topaz Lighting Corp.
 - p. United Fiberglass.
 - 2. Listing and Labeling: Nonmetallic conduit shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - 3. Fiberglass:
 - 4. ENT: Comply with NEMA TC 13 and UL 1653.
 - 5. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.
- B. Nonmetallic Fittings:
 - 1. Manufacturers: As specified above.
 - a. AFC Cable Systems; a part of Atkore International.
 - b. Anamet Electrical, Inc.
 - c. Arnco Corporation.
 - d. CANTEX INC.
 - e. CertainTeed Corporation.
 - f. Champion Fiberglass, Inc.
 - g. Condux International, Inc.
 - h. Electri-Flex Company.
 - i. FRE Composites.
 - j. Kraloy.
 - k. Lamson & Sessions.
 - I. Niedax Inc.
 - m. RACO; Hubbell.
 - n. Thomas & Betts Corporation; A Member of the ABB Group.
 - o. Topaz Electric; a division of Topaz Lighting Corp.
 - p. United Fiberglass.
 - q. Insert manufacturer's name.
 - 2. Fittings, General: Listed and labeled for type of conduit, location, and use.
 - Fittings for ENT and RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.
 a. Fittings for LFNC: Comply with UL 514B.
 - 4. Solvents and Adhesives: As recommended by conduit manufacturer.
 - 5. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.3 METAL WIREWAYS AND AUXILIARY GUTTERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. B-line, an Eaton business.
 - 2. Hoffman; a brand of Pentair Equipment Protection.
 - 3. MonoSystems, Inc.
 - 4. Square D.

- Β. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 1 unless otherwise indicated, and sized according to NFPA 70.
 - Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a gualified 1. testing agency, and marked for intended location and application.
- Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down C. straps, end caps, and other fittings to match and mate with wireways as required for complete system.
- D. Wireway Covers: Screw-cover type unless otherwise indicated.
- Ε. Finish: Manufacturer's standard enamel finish.

SURFACE RACEWAYS 2.4

1.

- Listing and Labeling: Surface raceways and tele-power poles shall be listed and labeled as defined in Α. NFPA 70, by a qualified testing agency, and marked for intended location and application.
- Surface Metal Raceways: Galvanized steel with snap-on covers complying with UL 5. Manufacturer's Β. standard enamel finish in color selected by Architect.
 - Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - Hubbell Incorporated; Wiring Device-Kellems. а
 - b. MonoSystems, Inc.
 - Panduit Corp. c.
 - d. Wiremold / Legrand.
- Surface Nonmetallic Raceways: Two- or three-piece construction, complying with UL 5A, and C. manufactured of rigid PVC with texture and color selected by Architect from manufacturer's standard colors. Product shall comply with UL 94 V-0 requirements for self-extinguishing characteristics. 1.
 - Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - Hubbell Incorporated. a.
 - b. MonoSystems, Inc.
 - Panduit Corp. c.
 - d. Wiremold / Legrand.

BOXES, ENCLOSURES, AND CABINETS 2.5

- Α. Manufacturers: Subject to compliance with requirements, provide products by one of the following: 1. Adalet.
 - 2. Crouse-Hinds, an Eaton business.
 - 3. EGS/Appleton Electric.
 - Erickson Electrical Equipment Company. 4.
 - 5. FSR Inc.
 - Hoffman; a brand of Pentair Equipment Protection. 6.
 - 7. Hubbell Incorporated.
 - 8. Hubbell Incorporated: Wiring Device-Kellems.
 - Kraloy. 9.
 - 10. Milbank Manufacturing Co.
 - MonoSystems, Inc. 11.
 - 12. Oldcastle Enclosure Solutions.
 - 13. O-Z/Gedney; a brand of Emerson Industrial Automation.
 - Plasti-Bond. 14.
 - RACO; Hubbell. 15.
 - Spring City Electrical Manufacturing Company. 16.
 - Stahlin Non-Metallic Enclosures. 17.
 - Thomas & Betts Corporation; A Member of the ABB Group. 18
 - 19. Topaz Electric; a division of Topaz Lighting Corp.
 - 20. Wiremold / Legrand.
- General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in В. wet locations shall be listed for use in wet locations.
- Junction and pull boxes 100 cubic inches in volume and smaller shall be standard outlet boxes. Those C. larger than 100 cubic inches shall be constructed as specified for cabinet construction and shall be furnished with covers. Boxes shall be factory-fabricated from galvanized steel to prevent corrosion.

- D. Size boxes in accordance with the requirements of the NEC. Boxes not used for service entrance duty shall be no smaller than 4 inches square and 2-1/8 inches deep with covers accessible at all times. Set boxes on concealed conduits with covers flush with the finished wall or ceiling line. Provide junction and pull boxes of appropriate dimensions for conduits and conductors noted, where shown and where necessary for the installation and pulling of cables and wires. Install covers on junction boxes and conduits after wiring and connections are completed.
- E. At each outlet shown provide a box of suitable size and construction. Provide plaster rings, where required, in connection with adjacent plaster finishes. In unfinished masonry walls provide handy boxes of such size as to permit their being completely covered by the device plates. All interior boxes shall be hot-dipped galvanized steel or cast aluminum. Any outlet box for exterior devices or fixtures shall be hot-dipped galvanized. Unused knockouts in boxes shall be filled or capped before plates or devices are installed.
- F. Ceiling outlets shall be 4-inch square boxes of the appropriate depth, furnished with 3/8-inch fixture studs fastened through from backs of the boxes. For plaster surfaces provide plaster rings and ears.
- G. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.
- H. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, aluminum, Type FD, with gasketed cover.
- I. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.
- J. Metal Floor Boxes:
 - 1. Material: Cast metal or sheet metal.
 - 2. Type: Fully adjustable.
 - 3. Shape: Rectangular.
 - 4. Listing and Labeling: Metal floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- K. Nonmetallic Floor Boxes: Nonadjustable, round.
 - 1. Listing and Labeling: Nonmetallic floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- L. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb. Outlet boxes designed for attachment of luminaires weighing more than 50 lb shall be listed and marked for the maximum allowable weight.
- M. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- N. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, cast aluminum with gasketed cover.
- O. Box extensions used to accommodate new building finishes shall be of same material as recessed box.
- P. Device Box Dimensions: 4 inches square by 2-1/8 inches deep or 4 inches by 2-1/8 inches by 2-1/8 inches deep depending on need.
- Q. Gangable boxes are allowed.
- R. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1 with continuous-hinge cover with flush latch unless otherwise indicated.
 - 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
 - 2. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.
- S. Cabinets:
 - 1. NEMA 250, Type 1 galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
 - 2. Hinged door in front cover with flush latch and concealed hinge.
 - 3. Key latch to match panelboards.
 - 4. Metal barriers to separate wiring of different systems and voltage.
 - 5. Accessory feet where required for freestanding equipment.

2.6 SLEEVES FOR RACEWAYS

- A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
- B. Sleeves for Rectangular Openings: Galvanized sheet steel with minimum 0.052- or 0.138-inch thickness as indicated and of length to suit application.
- C. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."

2.7 SLEEVE SEALS

- A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and cable.
 - 1. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
 - 2. Pressure Plates: Stainless steel. Include two for each sealing element.
 - 3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.8 FLOOR, CEILING AND WALL PLATES

- A. In finished areas having ceilings, provide chrome plated, sectional escutcheons on exposed conduits and hanger rods penetrating walls, floors, and ceilings.
- B. Size escutcheons to fit snugly around conduits and rods and cover completely the openings through which the conduits and rods pass. Hold escutcheons firmly in place with set screws or clamps.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below unless otherwise indicated:
 - 1. Exposed Conduit: RNC, Type EPC-80-PVC.
 - 2. Concealed Conduit, Aboveground: RNC, Type EPC-40-PVC.
 - 3. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
 - 4. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.
- B. Indoors: Apply raceway products as specified below unless otherwise indicated:
 - 1. Exposed, Not Subject to Physical Damage: EMT.
 - Exposed, Not Subject to Severe Physical Damage: EMT.
 Exposed and Subject to Severe Physical Damage: GRC.
 - Exposed and Subject to Severe Physical Damage: GRC. Raceway locations include the following: a. Loading dock.
 - b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
 - c. Mechanical rooms.
 - 4. Concealed in Ceilings and Interior Walls and Partitions: EMT.
 - 5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
 - 6. Damp or Wet Locations: GRC.
 - 7. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 nonmetallic in damp or wet locations.
- C. Minimum Raceway Size: 3/4-inch trade size.
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.
 - 1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
 - 2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
- E. Install surface raceways only where indicated on Drawings.

3.2 INSTALLATION

- A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.
- B. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.
- C. Do not install raceways or electrical items on any "explosion-relief" walls or rotating equipment.
- D. Do not fasten conduits onto the bottom side of a metal deck roof.

- E. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- F. Do not install boxes back-to-back in the same stud wall cavity. Provide minimum 6-inch separation. Provide minimum 24-inch separation in acoustic-rated walls. If boxes are connected together, install flexible connection between the two and pack openings with fiberglass.
- G. Complete raceway installation before starting conductor installation.
- H. Arrange stub-ups so curved portions of bends are not visible above finished slab.
- I. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches of changes in direction.
- J. Make bends in raceway using large-radius preformed ells. Field bending shall be according to NFPA 70 minimum radii requirements. Use only equipment specifically designed for material and size involved.
- K. Conceal conduit within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
- L. Support conduit within 12 inches of enclosures to which attached.
- M. Raceways Embedded in Slabs:
 - 1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure raceways to reinforcement at maximum 10-foot intervals.
 - 2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
 - 3. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location.
- N. Stub-Ups to Above Recessed Ceilings:
 - 1. Use EMT, IMC, or RMC for raceways.
 - 2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.
- O. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- P. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.
- Q. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.
- R. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire.
 - 1. Install surface raceway with a minimum 2-inch radius control at bend points.
 - 2. Secure surface raceway with screws or other anchor-type devices at intervals not exceeding 48 inches and with no less than two supports per straight raceway section. Support surface raceway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.
- S. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70.
- T. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:
 - 1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
 - 2. Conduit extending from interior to exterior of building.
 - 3. Conduit extending into pressurized duct and equipment.
 - 4. Conduit extending into pressurized zones that are automatically controlled to maintain different pressure set points.
 - 5. Where otherwise required by NFPA 70.
- U. Comply with manufacturer's written instructions for solvent welding RNC and fittings.
- V. Expansion-Joint Fittings:

- 1. Install in each run of aboveground RMC and EMT conduit that is located where environmental temperature change may exceed 100 deg F and that has straight-run length that exceeds 100 feet.
- 2. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
- 3. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.
- W. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches of flexible conduit for recessed and semirecessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
 - 1. Use LFMC in damp or wet locations subject to severe physical damage.
 - 2. Use LFMC in damp or wet locations not subject to severe physical damage.
- X. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.
- Y. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.
- Z. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.
- AA. Locate boxes so that cover or plate will not span different building finishes.
- BB. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.
- CC. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.
- DD. Set metal floor boxes level and flush with finished floor surface.

3.3 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.4 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.5 PROTECTION

- A. Protect coatings, finishes, and cabinets from damage and deterioration.
 - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 - 2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

SECTION 260544 - SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Sleeves for raceway and cable penetration of non-fire-rated construction walls and floors.
 - 2. Grout.
 - 3. Silicone sealants.
- B. Related Requirements:
 - 1. Section 078413 "Penetration Firestopping" for penetration firestopping installed in fire-resistance-rated walls, horizontal assemblies, and smoke barriers, with and without penetrating items.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 SLEEVES

- A. Wall Sleeves:
 - 1. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, plain ends.
 - 2. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.
- B. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies: Galvanized-steel sheet; 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint, with tabs for screw-fastening the sleeve to the board.
- C. Sleeves for Rectangular Openings:
 - 1. Material: Galvanized sheet steel.
 - 2. Minimum Metal Thickness:
 - a. For sleeve cross-section rectangle perimeter less than 50 inches and with no side larger than 16 inches, thickness shall be 0.052 inch.
 - b. For sleeve cross-section rectangle perimeter 50 inches or more and one or more sides larger than 16 inches, thickness shall be 0.138 inch.

2.2 GROUT

- A. Description: Nonshrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.
- B. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- C. Design Mix: 5000-psi, 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

2.3 SILICONE SEALANTS

- A. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below.
 - 1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces that are not fire rated.
 - Sealant shall have VOC content of <Insert value> g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - Sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- B. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

- A. Comply with NECA 1.
- B. Comply with NEMA VE 2 for cable tray and cable penetrations.
- C. Sleeves for Conduits Penetrating Above-Grade Non-Fire-Rated Concrete and Masonry-Unit Floors and Walls:
 - 1. Interior Penetrations of Non-Fire-Rated Walls and Floors:
 - a. Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Section 079200 "Joint Sealants."
 - b. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect material while curing.
 - 2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
 - 3. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway or cable unless sleeve seal is to be installed.
 - Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.
 - 5. Install sleeves for floor penetrations. Extend sleeves installed in floors 2 inches above finished floor level. Install sleeves during erection of floors.
- D. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies:
 - 1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.
 - 2. Seal space outside of sleeves with approved joint compound for gypsum board assemblies.
- E. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.
- F. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- G. Underground, Exterior-Wall and Floor Penetrations: Install steel pipe sleeves and mechanical sleeve seals. Size sleeves to allow for 1-inch annular clear space between raceway or cable and sleeve for installing sleeve-seal system.

SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Identification for raceways.
 - 2. Identification of power and control cables.
 - 3. Identification for conductors
 - 4. Warning labels and signs
 - 5. Instruction signs.
 - 6. Equipment identification labels
 - 7. Miscellaneous identification products

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each type of label and sign to illustrate composition, size, colors, lettering style, mounting provisions, and graphic features of identification products.
- C. Identification Schedule: An index of nomenclature of electrical equipment and system components used in identification signs and labels.

1.4 COORDINATION

- A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.
- B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- C. Coordinate installation of identifying devices with location of access panels and doors.
- D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- B. Comply with ANSI Z535.4 for safety signs and labels.
- C. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

2.2 POWER RACEWAY AND CABLE IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway size.
- B. Colors for Raceways Carrying Circuits at 600 V or Less:
 - 1. Color scheme to comply with ANSI A13.1 and IECC C2.
 - 2. Legend: Indicate voltage and system or service type.
- C. Color-Coding for Phase Identification, 600 V or Less: Use colors listed below for ungrounded service, feeder and branch-circuit conductors.
 - 1. Color shall be factory applied or field applied for sizes larger than No. 8 AWG if authorities having jurisdiction permit.
 - 2. Colors for 208/120-V Circuits:
 - a. Phase A: Black.
 - b. Phase B: Red.
 - c. Phase C: Blue.

- 3. Colors for 480/277-V Circuits:
 - Phase A: Brown. a.
 - Phase B: Orange. b.
 - Phase C: Yellow. C.
 - Color for Neutral: White.
- 4. Color for Equipment Grounds: Green. 5.
- Colors for Isolated Grounds: Green with white stripe. 6.
- Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 7 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.
- D. Colors for Raceways Carrying Circuits at More Than 600 V:
 - Black letters on an orange field. 1.
 - Legend: "DANGER CONCEALED HIGH VOLTAGE WIRING" with 3-inch- high letters on 20-inch 2. centers.
- Self-Adhesive Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible label Ε. laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
- Snap-Around Labels for Raceways Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, F. preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- Snap-Around, Color-Coding Bands for Raceways Carrying Circuits at 600 V or Less: Slit, pretensioned, G. flexible, solid-colored acrylic sleeve, 2 inches long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- Tape and Stencil for Raceways Carrying Circuits More Than 600 V: 4-inch- wide black stripes on 10-inch Н. centers diagonally over orange background that extends full length of raceway or duct and is 12 inches wide. Stop stripes at legends.
- I. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch, with stamped legend, punched for use with self-locking cable tie fastener.

2.3 CONDUCTOR IDENTIFICATION MATERIALS

- Α. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.
- Β. Snap-around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeves, with diameters sized to suit diameter and that stay in place by gripping action.
- C. Self-Adhesive Labels: Vinyl, Preprinted, flexible label laminated with a clear, weather and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label. Minimum Nominal Size: 1.
 - 1-1/2 by 6 inchesfor raceway and conductors a.
 - 3-1/2 by 5 inchesfor equipment. b.
 - As required by authorities having jurisdiction. C.
- D. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- Ε. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

2.4 WARNING LABELS AND SIGNS

- Comply with NFPA 70 and 29 CFR 1910.145. Α.
- Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured В. for display on front cover, door, or other access to equipment unless otherwise indicated.
- Warning label and sign shall include, but are not limited to, the following legends: C.
 - Multiple Power Source Warning: "DANGER ELECTRICAL SHOCK HAZARD EQUIPMENT HAS 1. MULTIPLE POWER SOURCES."

2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES."

2.5 EQUIPMENT IDENTIFICATION LABELS

- A. Self-Adhesive or punched for screw mounting, Engraved, Laminated Acrylic or Melamine Label: Adhesive backed, with white letters on a dark-gray background. Minimum letter height shall be 3/8 inch.
 - 1. Label all service disconnects.
 - 2. Labels shall include voltage, circuit fed by, and name of device.
- B. Labels for exterior equipment shall be engraved or embossed metal aluminum or stainless steel. Fasteners to be stainless steel.

2.6 ELECTRICAL DEVICES

A. Receptacles

- 1. Label with panel and circuit using black text on white background.
- B. Power Switches
 - 1. Label with panel, circuit, equipment served, using black text on white background.
- C. Light switches 1. Factory engraving of area/zone served.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.
- B. Install identifying devices before installing acoustical ceilings and similar concealment.
- C. Verify identity of each item before installing identification products.
- D. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.
- E. Apply identification devices to surfaces that require finish after completing finish work.
- F. Install signs with approved legend to facilitate proper identification, operation, and maintenance of electrical systems and connected items.
- G. Self-Adhesive Identification Products: Before applying electrical identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.
- H. System Identification for Raceways and Cables under 600 V: Identification shall completely encircle cable or conduit. Place identification of two-color markings in contact, side by side.
 - 1. Secure tight to surface of conductor, cable, or raceway.
- I. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
- J. Elevated Components: Increase sizes of labels, signs, and letters to those appropriate for viewing from the floor.
- K. Snap-around Color-Coding Bands: Secure tight to surface at a location with high visibility and accessibility.

3.2 IDENTIFICATION SCHEDULE

- A. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. Install access doors or panels to provide view of identifying devices.
- B. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations of high visibility. Identify by system and circuit designation.
- C. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits, More Than 30 A and 120 V to Ground: Identify with self-adhesive raceway labels.
 - 1. Locate identification at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.

- D. Accessible Fittings for Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive labels containing the wiring system legend and system voltage. System legends shall be as follows:
 - 1. "POWER."
 - 2. "UPS."
- E. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.
 - 1. Locate identification at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.
- F. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, manholes, and handholes, use self-adhesive wraparound labels with the conductor or cable designation, origin, and destination.
- G. Control-Circuit Conductor Termination Identification: For identification at terminations, provide self-adhesive wraparound labels with the conductor designation.
- H. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
 - 1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
 - 2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
 - 3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.
- I. Workspace Indication: Apply floor marking tape to finished surfaces. Show working clearances in the direction of access to live parts. Workspace shall comply with NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.
- J. Instructional Signs: Self-adhesive labels, including the color code for grounded and ungrounded conductors.
- K. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive equipment labels.
 - 1. Comply with 29 CFR 1910.145.
 - 2. Apply to exterior of door, cover, or other access.
 - 3. For equipment with multiple power or control sources, apply to door or cover of equipment, including, but not limited to, the following:
 - a. Power-transfer switches.
 - b. Controls with external control power connections.
- L. Arc Flash Warning Labeling: Self-adhesive labels.
- M. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.
- N. Emergency Operating Instruction Signs: Self-adhesive labels with white legend on a red background with minimum 3/8-inch- high letters for emergency instructions at equipment used for power transfer.
- O. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.
 - 1. Label Instructions:
 - a. Indoor Equipment: Self-adhesive label or drilled for screw mounting, engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch- high letters on 1-1/2-inch- high label; where two lines of text are required, use labels 2 inches high.
 - b. Outdoor Equipment: Engraved, laminated acrylic or melamine label.
 - c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
 - d. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.

- 2. Equipment to Be Labeled. If existing equipment is properly labeled it does not need to be relabeled:
 - a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be self-adhesive, engraved, laminated acrylic or melamine label.
 - b. Enclosures and electrical cabinets.
 - c. Access doors and panels for concealed electrical items.
 - d. Emergency system boxes and enclosures.
 - e. Enclosed switches.
 - f. Enclosed circuit breakers.
 - g. Enclosed controllers.
 - h. Remote-controlled switches, dimmer modules, and control devices.
 - i. Monitoring and control equipment.

3.3 DOCUMENTATION

- A. Provide a type written chart, framed under glass, to correlate identification, abbreviations, equipment numbers, color schemes, and similar information.
- B. Provide an overall 1-line power distribution drawing, multi-colored, of the entire electrical distribution system, framed under glass and mounted in each building's main electrical room where directed. Contact architect for color scheme.

SECTION 260923 - LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Standalone daylight-harvesting switching and dimming controls.
 - 2. Indoor occupancy and vacancy sensors.
 - 3. Switchbox-mounted occupancy and vacancy sensors

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings:
 - 1. Show installation details for the following:
 - a. Occupancy sensors.
 - b. Vacancy sensors.
 - Interconnection diagrams showing field-installed wiring.
 - 3. Include diagrams for power, signal, and control wiring.

1.3 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.
- B. Software and firmware operational documentation.

1.4 WARRANTY

2.

- A. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace lighting control devices that fail(s) in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Two year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 INDOOR OCCUPANCY AND VACANCY SENSORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
 - 1. Crestron
 - 2. Hubbell Building Automation, Inc.
 - 3. Leviton Manufacturing Co., Inc.
 - 4. Lithonia Lighting; Acuity Brands Lighting, Inc.
 - 5. Watt Stopper.

B. General Requirements for Sensors:

- 1. Wall or ceiling-mounted as indicated, solid-state indoor vacancy sensors.
- 2. Dual technology.
- 3. Integrated power pack.
- 4. Hardwired connection to switch.
- 5. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- 6. Operation:
 - a. Occupancy Sensor: Unless otherwise indicated, turn lights on when coverage area is occupied, and turn them off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 20 minutes.
 - b. Vacancy Sensor: Unless otherwise indicated, lights are manually turned on and sensor turns lights off when the room is unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 20 minutes.
 - c. Combination Sensor: Unless otherwise indicated, sensor shall be programmed to turn lights on when coverage area is occupied and turn them off when unoccupied, or to turn off lights that have been manually turned on; with a time delay for turning lights off, adjustable over a minimum range of 1 to 20 minutes.
- 7. Mounting:
 - a. Sensor: Suitable for mounting in any position on a standard outlet box.
 - b. Relay: Externally mounted through a 1/2-inch knockout in a standard electrical enclosure.

- c. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.
- 8. Indicator: Digital display, to show when motion is detected during testing and normal operation of sensor.
- 9. Bypass Switch: Override the "on" function in case of sensor failure.
- 10. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc; dim lights until light levels reach targeted light levels, turn lights off when selected lighting level is still present after dimming lights completely.
- C. PIR Type: Wall or Ceiling-mounted as indicated; detect occupants in coverage area by their heat and movement.
 - 1. Detector Sensitivity: Detect occurrences of 6-inch- minimum movement of any portion of a human body that presents a target of not less than 36 sq. in..
 - 2. Detection Coverage (Room, Ceiling Mounted): Detect occupancy anywhere in a circular area of 1000 sq. ft. when mounted on a 96-inch- high ceiling.
 - 3. Detection Coverage (Corridor, Ceiling Mounted): Detect occupancy within 90 feet when mounted on a 10-foot- high ceiling.
 - 4. Detection Coverage (Room, Wall Mounted): Detect occupancy anywhere within a 180-degree pattern centered on the sensor over an area of1000 square feet when mounted 48 inches above finished floor.
- D. Dual-Technology Type: Wall or Ceiling-mounted as indicated; detect occupants in coverage area using PIR and ultrasonic detection methods. The particular technology or combination of technologies that control on-off functions is selectable in the field by operating controls on unit.
 - 1. Sensitivity Adjustment: Separate for each sensing technology.
 - 2. Detector Sensitivity: Detect occurrences of 6-inch- minimum movement of any portion of a human body that presents a target of not less than 36 sq. in., and detect a person of average size and weight moving not less than 12 inches in either a horizontal or a vertical manner at an approximate speed of 12 inches/s.
 - 3. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of 1000 sq. ft. when mounted on a 96-inch- high ceiling.
 - 4. Detection Coverage (Room, Wall Mounted): Detect occupancy anywhere within a 180-degree pattern centered on the sensor over an area of 1000 square feet when mounted48 inches above finished floor.

2.2 SWITCHBOX-MOUNTED OCCUPANCY SENSORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
 - 1. Crestron
 - 2. Hubbell Building Automation, Inc.
 - 3. Leviton Manufacturing Co., Inc.
 - 4. Lithonia Lighting; Acuity Brands Lighting, Inc.
 - 5. Watt Stopper.
- B. General Requirements for Sensors: Automatic-wall-switch occupancy sensor with manual on-off switch, suitable for mounting in a single gang switchbox.
 - 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - 2. Occupancy Sensor Operation: Unless otherwise indicated, turn lights on when coverage area is occupied, and turn lights off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
 - 3. Operating Ambient Conditions: Dry interior conditions, 32 to 120 deg F.
 - 4. Switch Rating: Not less than 800-VA LED load at 120 V, 1200-VA LED load at 277 V, and 800-W incandescent.
- C. Wall-Switch Sensor:
 - 1. Standard Range: 180-degree field of view, field adjustable from 180 to 40 degrees; with a minimum coverage area of 900 sq. ft..
 - 2. Sensing Technology: Dual technology PIR and ultrasonic.
 - 3. Capable of controlling load in three-way application.
 - 4. Voltage: Match the circuit voltage.

- 5. Ambient-Light Override: Concealed, field-adjustable, light-level sensor from 10 to 150 fc. The switch prevents the lights from turning on when the light level is higher than the set point of the sensor.
- 6. Concealed, field-adjustable, "off" time-delay selector at up to 20 minutes.
- 7. Adaptive Technology: Self-adjusting circuitry detects and memorizes usage patterns of the space and helps eliminate false "off" switching.
- 8. Color: White.
- 9. Faceplate: Color matched to switch.

2.3 CONDUCTORS AND CABLES

- A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
- B. Classes 2 and 3 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 22 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
- C. Class 1 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 14 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with NECA 1.
- B. Examine lighting control devices before installation. Reject lighting control devices that are wet, moisture damaged, or mold damaged.
- C. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, smoke detectors, fire-suppression systems, and partition assemblies.
- D. Install and aim sensors in locations to achieve not less than 90-percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's written instructions.
- E. Mount electrically held lighting contactors with elastomeric isolator pads to eliminate structure-borne vibration unless contactors are installed in an enclosure with factory-installed vibration isolators.

3.2 IDENTIFICATION

- A. Identify components and power and control wiring according to Section 260553 "Identification for Electrical Systems."
- B. Label time switches and contactors with a unique designation.

3.3 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
 - 1. Operational Test: After installing time switches and sensors, and after electrical circuitry has been energized, start units to confirm proper unit operation.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- B. Lighting control devices will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports.

3.4 ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting lighting control devices to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.
 - 1. For occupancy and motion sensors, verify operation at outer limits of detector range. Set time delay to suit Owner's operations.
 - 2. For daylighting controls, adjust set points and deadband controls to suit Owner's operations.
 - 3. Align high-bay occupancy sensors using manufacturer's laser aiming tool.

3.5 FUNCTIONAL TESTING

- A. Functional Testing: Perform the required Energy Code functional testing per ASHRAE 90.1-2013 using an independent third-party contractor not directly involved in either the design or construction of the project.
 - 1. Test lighting Control devices and control systems to ensure that control hardware and software are calibrated, adjusted, programmed and in proper working condition in accordance with the Contract Documents and manufacturer's installation instructions.
 - 2. The contractor responsible for functional testing shall provide documentation certifying the installed lighting and lighting controls.

3.6 SOFTWARE SERVICE AGREEMENT

- A. Technical Support: Beginning at Substantial Completion, service agreement shall include software support for two years.
- B. Upgrade Service: At Substantial Completion, update software to latest version. Install and program software upgrades that become available within two years from date of Substantial Completion. Upgrading software shall include operating system and new or revised licenses for using software.
 - 1. Upgrade Notice: At least 30 days to allow Owner to schedule and access the system and to upgrade computer equipment if necessary.

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain lighting control devices.

SECTION 260943.23 - RELAY-BASED LIGHTING CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes: Networked lighting control panels using control-voltage relays for switching and that are interoperable with HVAC DDC system.

1.3 DEFINITIONS

- A. BAS: Building automation system.
- B. DDC: Direct digital control.
- C. IP: Internet protocol.
- D. Monitoring: Acquisition, processing, communication, and display of equipment status data, metered electrical parameter values, power quality evaluation data, event and alarm signals, tabulated reports, and event logs.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for control modules, power distribution components, relays, manual switches and plates, and conductors and cables.
 - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
 - 3. Operational documentation for software and firmware.
- B. Shop Drawings: For each relay panel and related equipment.
 - 1. Include dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings.
 - 2. Detail enclosure types and details for types other than NEMA 250, Type 1.
 - 3. Detail wiring partition configuration, current, and voltage ratings.
 - 4. Short-circuit current rating of relays.
 - 5. Address Drawing: Reflected ceiling plan and floor plans, showing connected luminaires, address for each luminaire, and luminaire groups. Base plans on construction plans, using the same legend, symbols, and schedules.
 - 6. Point List and Data Bus Load: Summary list of all control devices, sensors, ballasts, and other loads. Include percentage of rated connected load and device addresses.
 - 7. Wire Termination Diagrams and Schedules: Coordinate nomenclature and presentation with Drawings and block diagram. Differentiate between manufacturer-installed and field-installed wiring.
 - 8. Block Diagram: Show interconnections between components specified in this Section and devices furnished with power distribution system components. Indicate data communication paths and identify networks, data buses, data gateways, concentrators, and other devices to be used. Describe characteristics of network and other data communication lines.

1.5 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.
- B. Software licenses and upgrades required by and installed for operation and programming of digital and analog devices.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For lighting controls to include in emergency, operation, and maintenance manuals.
- B. Software and Firmware Operational Documentation:
 - 1. Software operating and upgrade manuals.
 - 2. Testing and adjusting of panic and emergency power features.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Handle and prepare panels for installation according to NECA 407.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. Sequence of Operations: Input signal from field-mounted manual switches, or digital signal sources, shall open or close one or more lighting control relays in the lighting control panels. Any combination of inputs shall be programmable to any number of control relays.
- B. Surge Protective Device: Factory installed as an integral part of control components or field-mounted surge suppressors complying with UL 1449, SPD Type 2.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- D. Comply with 47 CFR 15, Subparts A and B, for Class A digital devices.
- E. Comply with UL 916.

2.2 NETWORKED LIGHTING CONTROL PANELS

- A. Manufacturers: Basis of design is WattStopper. Subject to compliance with requirements, provide products by one of the following or approved equal:
 - 1. Lithonia Lighting; Acuity Brands Lighting, Inc.
 - 2. WattStopper; a Legrand? Group brand.
 - 3. Hubbell Building Automation, Inc.
 - 4. Crestron.
- B. Description: Lighting control panels using mechanically latched relays to control lighting and appliances. The panels shall be capable of being interconnected with digital communications to appear to the operator as a single lighting control system.
- C. Lighting Control Panels:
 - 1. A single enclosure with incoming lighting branch circuits, control circuits, switching relays, and on-board timing and control unit.
 - 2. A vertical barrier separating branch circuits from control wiring.
- D. Main Control Unit: Installed in the main lighting control panel only; powered from the branch circuit of the standard control unit.
 - 1. Ethernet Communications: Comply with TCP/IP protocol. The main control unit shall provide for programming of all control functions of the main and all networked slave lighting control panels including timing, sequencing, and overriding.
 - 2. Web Server: Display information listed below over a standard Web-enabled server for displaying information over a standard browser.
 - a. A secure, password-protected login screen for modifying operational parameters, accessible to authorized users via Web page interface.
 - b. Panel summary showing the master and slave panels connected to the controller.
 - c. Controller diagnostic information.
 - d. Show front panel mimic screens for setting up controller parameters, input types, zones, and operating schedules. These mimic screens shall also allow direct breaker control and zone overrides.
 - 3. Timing Unit:
 - a. 365-day calendar, astronomical clock, and automatic adjustments for daylight savings and leap year.
 - b. Clock configurable for 12-hour (A.M./P.M.) or 24-hour format.
 - c. Four independent schedules, each having 24 time periods.
 - d. Schedule periods settable to the minute.
 - e. Day-of-week, day-of-month, day-of-year with one-time or repeating capability.
 - f. 16 special date periods.
 - 4. Time Synchronization: The timing unit shall be updated not less than every 24 hour(s) with the network time server.
 - 5. Sequencing Control with Override:

- a. Automatic sequenced on and off switching of selected relays at times set at the timing unit, allowing timed overrides from external switches.
- b. Sequencing control shall operate relays one at a time, completing the operation of all connected relays in not more than 10 seconds.
- c. Override control shall allow any relay connected to it to be switched on or off by a field-deployed manual switch or by an automatic switch, such as an occupancy sensor.
- d. Override control "blinking warning" shall warn occupants approximately five minutes before actuating the off sequence.
- e. Activity log, storing previous relay operation, including the time and cause of the change of status.
- f. Download firmware to the latest version offered by manufacturer.
- E. Standard Control Unit, Installed in All Lighting Control Panels: Contain electronic controls for programming the operation of the relays in the control panel, contain the status of relays, and contain communications link to enable the digital functions of the main control unit. Comply with UL 916.
 - 1. Electronic control for operating and monitoring individual relays, and display relay on-time.
 - 2. Nonvolatile memory shall retain all setup configurations. After a power failure, the controller shall automatically reboot and return to normal system operation.
 - 3. Integral keypad and digital-display front panel for local setup, including the following:
 - a. Blink notice, time adjustable from software.
 - b. Ability to log and display relay on-time.
 - c. Capability for accepting downloadable firmware so that the latest production features may be added in the future without replacing the module.
- F. Relays: Electrically operated, mechanically held single-pole switch, rated at 20 A at 120-V tungsten, 30 A at 277-V ballast, 1.5 hp at 120 V, and 3 hp at 277 V. Short-circuit current rating shall be not less than 14 kA.
- G. Power Supply: NFPA 70, Class 2, UL listed, sized for connected equipment, plus not less than 20 percent spare capacity. Powered from a dedicated branch circuit of the panelboard that supplies power to the line side of the relays, sized to provide control power for the local panel-mounted relays, bus system, low-voltage inputs, field-installed occupancy sensors, and low-voltage photo sensors.
- H. Operator Interface: At the main control unit, provide interface for a tethered connection of a portable PC running MS Windows for configuring all networked lighting control panels using setup software designed for the specified operating system. Include one portable device for initial programming of the system and training of Owner's personnel. That device shall remain the property of Owner.
- I. Software:
 - 1. Menu-driven data entry.
 - 2. Online and offline programming and editing.
 - 3. Provide for entry of the room or space designation for the load side of each relay.
 - 4. Monitor and control all relays, showing actual relay state and the name of the automatic actuating control, if any.
 - 5. Size the software appropriate to the system.

2.3 MANUAL SWITCHES AND PLATES

- A. Wall Plates: Single and multigang plates as specified in Section 262726 "Wiring Devices."
- B. Legend: Engraved or permanently silk-screened on wall plate where indicated. Use designations indicated on Drawings.

2.4 FIELD-MOUNTED SIGNAL SOURCES

- A. Daylight Harvesting Switching Controls: Comply with Section 260923 "Lighting Control Devices." Control power may be taken from the lighting control panel, and signal shall be compatible with the relays.
- B. Indoor Occupancy Sensors: Comply with Section 260923 "Lighting Control Devices." Control power may be taken from the lighting control panel, and signal shall be compatible with the relays.

2.5 CONDUCTORS AND CABLES

- A. Power Wiring to Supply Side of Class 2 Power Source: Not smaller than No. 12 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
- B. Classes 2 and 3 Control Cables: Multiconductor cable with copper conductors not smaller than No. 22 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

- C. Class 1 Control Cables: Multiconductor cable with copper conductors not smaller than No. 14 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
- D. Twisted-Pair Data Cable: Category 6. Comply with requirements for twisted pair cabling in Section 260523 "Control-Voltage Electrical Power Cables."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Receive, inspect, handle, and store panels according to NECA 407.
- B. Examine panels before installation. Reject panels that are damaged or rusted or have been subjected to water saturation.
- C. Examine elements and surfaces to receive panels for compliance with installation tolerances and other conditions affecting performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 WIRING INSTALLATION

- A. Comply with NECA 1.
- B. Wiring Method: Install cables in raceways and cable trays except within consoles, cabinets, desks, and counters. Conceal raceway and cables except in unfinished spaces.
 - 1. Install plenum cable in environmental airspaces, including plenum ceilings.
 - 2. Comply with requirements for cable trays specified in Section 260536 "Cable Trays for Electrical Systems."
 - 3. Comply with requirements for raceways and boxes specified in Section 260533 "Raceways and Boxes for Electrical Systems."
- C. Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.
- D. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.

3.3 PANEL INSTALLATION

- A. Comply with NECA 1.
- B. Install panels and accessories according to NECA 407.
- C. Mount top of trim 79 inches above finished floor unless otherwise indicated.
- D. Mount panel cabinet plumb and rigid without distortion of box.
- E. Install filler plates in unused spaces.

3.4 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
- B. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with Section 260553 "Identification for Electrical Systems."
- C. Create a directory to indicate loads served by each relay; incorporate Owner's final room designations. Obtain approval before installing. Use a PC or typewriter to create directory; handwritten directories are unacceptable.
- D. Lighting Control Panel Nameplates: Label each panel with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.5 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- B. Tests and Inspections:
 - 1. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
- C. Lighting control panel will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports, including a certified report that identifies lighting control panels and describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations made after remedial action.

3.6 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
 - 1. Complete installation and startup checks according to manufacturer's written instructions.
 - 2. Confirm correct communications wiring, initiate communications between panels, and program the lighting control system according to approved configuration schedules, time-of-day schedules, and input override assignments.

3.7 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

3.8 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain the control unit and operator interface.

SECTION 262726 - WIRING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Provide wiring devices as specified and indicated.
- B. Related Sections include the following:
 - 1. Division 27 Section "Communications Horizontal Cabling" for workstation outlets.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.
- C. Field quality-control test reports.
- D. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing label warnings and instruction manuals that include labeling conditions.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of wiring device and associated wall plate through one source from a single manufacturer. Insofar as they are available, obtain all wiring devices and associated wall plates from a single manufacturer and one source.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with NFPA 70.

1.5 COORDINATION

A. Receptacles for Owner-Furnished Equipment: Match plug configurations.
 1. Cord and Plug Sets: Match equipment requirements.

1.6 EXTRA MATERIALS

Furnish extra materials described in subparagraphs below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 Floor Service Outlet Assemblies: One for every 10, but no fewer than one.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:
 - 1. Hubbell Incorporated; Wiring Device-Kellems (Hubbell).
 - 2. Leviton Mfg. Company Inc. (Leviton).
 - 3. Pass & Seymour/Legrand; Wiring Devices & Accessories (Pass & Seymour).

2.2 STRAIGHT BLADE RECEPTACLES

- A. Duplex Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, and UL 498.
 - 1. Products: Subject to compliance with requirements, provide one of the following (The "X" in the following series numbers represents the amperage as specified):
 - a. Hubbell5X62
 - b. Leviton 5X62
 - c. Pass & Seymour 5X62
 - d. Hubbell; CR5X52.
 - e. Leviton; 5X52 CR5x32.
 - f. Pass & Seymour; BRX.

1.

4.

- Β. Isolated-Ground, Duplex Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, and UL 498.
 - Products: Subject to compliance with requirements, provide one of the following:
 - Hubbell; CR 5253IG. a.
 - Leviton; 5362-IG. b.
 - Pass & Seymour; IG6300. c.
 - 2. Description: Straight blade; equipment grounding contacts shall be connected only to the green grounding screw terminal of the device and with inherent electrical isolation from mounting strap. Isolation shall be integral to receptacle construction and not dependent on removable parts.

2.3 **GFCI RECEPTACLES**

- General Description: Straight blade, feed -through type. Comply with NEMA WD 1, NEMA WD 6, UL 498, Α. and UL 943, Class A, and include indicator light that is lighted when device is tripped.
- Duplex GFCI Convenience Receptacles, 125 V, 20 A: Β.
 - Provide "feed-through" type capable of protecting connected downstream receptacles on a single 1. circuit.
 - 2. Provide device with integral diagnostic indication for miswiring (i.e. line/load reversal) which prevents the receptacle from resetting.
 - Provide shallow depth design to permit installation in a 70-mm-deep (2-3/4-inch-deep) outlet box. 3.
 - Products: Subject to compliance with requirements, provide one of the following:
 - Pass & Seymour Inc.: Safe Lock series a.
 - b. Hubbell, Inc.: GF-5X52 series

2.4 **TWIST-LOCKING RECEPTACLES**

- Single Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration Α. L5-20R, and UL 498.
 - Products: Subject to compliance with requirements, provide one of the following: 1
 - a. Hubbell: 2310.
 - h Leviton: 2310.
 - Pass & Seymour; L520-R. С
- Isolated-Ground, Single Convenience Receptacles, 125 V, 20 A: Β. 1.
 - Products: Subject to compliance with requirements, provide one of the following:
 - Hubbell; IG2310. а
 - Leviton; 2310-IG. b.
 - 2. Description: Comply with NEMA WD 1, NEMA WD 6 configuration L5-20R, and UL 498. Equipment grounding contacts shall be connected only to the green grounding screw terminal of the device and with inherent electrical isolation from mounting strap. Isolation shall be integral to receptacle construction and not dependent on removable parts.

2.5 CORD AND PLUG SETS

- Description: Match voltage and current ratings and number of conductors to requirements of equipment Α. being connected.
 - 1. Cord: Rubber-insulated, stranded-copper conductors, with Type SOW-A jacket; with green-insulated grounding conductor and equipment-rating ampacity plus a minimum of 30 percent.
 - Plug: Nylon body and integral cable-clamping jaws. Match cord and receptacle type for 2. connection.

2.6 **SNAP SWITCHES**

- Description: Heavy-duty construction, totally enclosed, thermoset material, construction base and cover, Α. quiet type toggle handle, rated 120-277 volts AC and 20 amperes, silver alloy contacts, equipped with insulated mounting yoke, plaster ears, side and rear wiring terminals, and ground wire thermal.
- Β. Provide one-pole, two-pole, three-way, and four-way switches as indicated.
- Comply with NEMA WD 1 and UL 20. C.
 - Products: Subject to compliance with requirements, provide one of the following: 1.
 - Hubbell;122X series. a.
 - b. Leviton; 1221-2.
 - Pass & Seymour; PS20AC series. C.
- D. Pilot Light Switches, 20 A:

- 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Hubbell; HPL1221PL for 120 V and 277 V.
 - b. Leviton; 1221-PLR for 120 V, 1221-7PLR for 277 V.
 - c. Pass & Seymour; PS20AC1-PLR for 120 V.
- 2. Description: Single pole, with neon-lighted handle, illuminated when switch is "ON."
- E. Key-Operated Switches, 120/277 V, 20 A:
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Hubbell; 1221L.
 - b. Leviton; 1221-2L.
 - c. Pass & Seymour; PS20AC1-L.
 - 2. Description: Single pole, with factory-supplied key in lieu of switch handle.
- F. Single-Pole, Double-Throw, Momentary Contact, Center-Off Switches, 120/277 V, 20 A; for use with mechanically held lighting contactors.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Hubbell; 1557.
 - b. Leviton; 1257.
 - c. Pass & Seymour; 1251.
- G. Key-Operated, Single-Pole, Double-Throw, Momentary Contact, Center-Off Switches, 120/277 V, 20 A; for use with mechanically held lighting contactors, with factory-supplied key in lieu of switch handle.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Cooper; 1995L.
 - b. Hubbell; 1557L.
 - c. Leviton; 1257L.
 - d. Pass & Seymour; 1251L.

2.7 WALL-BOX DIMMERS

- A. Dimmer Switches: Modular, full-wave, solid-state units with integral, quiet on-off switches, with audible frequency and EMI/RFI suppression filters, with the following:
 - 1. Linear slide control functions as specified, utilizing a continuous square law dimming curve.
 - 2. Voltage regulated dimmer such that a plus or minus ten percent line voltage will not cause more than a plus or minus five percent variation in load voltage when dimmer is operating at five percent light output.
 - 3. Suitable for mounting in a single-gang outlet box.
 - 4. Gangable without the need to remove side sections (fins) or derating capacity.
 - 5. Snap-on faceplate with no visible means of attachment and no visible heat fins on front of device. At location with multiple devices provide a one-piece, seamless, multigang faceplate with manufacturer recommended back-box size.
 - 6. UL listed specifically for the type of load (i.e. incandescent, fluorescent, magnetic low voltage transformer, electronic low voltage transformer). Universal dimmers are not acceptable.
 - 7. Provide dimmer rated for the specified load and voltage, and suitable for operation with the specified lamps.

2.8 TELECOMMUNICATIONS OUTLETS

- A. Low Voltage Boxes
 - 1. 5-inch square telecommunications outlet boxes (5 in. square x 2.875 in. deep w/ cable management) shall be used for all low voltage applications. 5-square box shall support categories 5e, 6, augmented 6, 7, and optical fiber cables. Low voltage boxes shall support cable management by allowing slack cable to be wound internally while maintaining minimum bend radius requirements.
 - a. Plaster ring suitable for wall type and number of gangs as indicated.

2.9 WALL PLATES

- A. Single and combination types to match corresponding wiring devices.
 - 1. Plate-Securing Screws: Metal with head color to match plate finish.
 - 2. Material for Finished Spaces: Smooth, high-impact thermoplastic 0.035-inch- thick, satin-finished stainless steel.
 - 3. Material for Unfinished Spaces: Smooth, high-impact thermoplastic.
 - 4. Material for Damp Locations: Cast aluminum with spring-loaded lift cover, and listed and labeled for use in "wet locations."

B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with type 3R weather-resistant, die-cast aluminum with lockable cover.

2.10 FINISHES

- A. Color: Wiring device catalog numbers in Section Text do not designate device color.
 - 1. Wiring Devices Connected to Normal Power System: White, unless otherwise indicated or required by NFPA 70 or device listing.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with NECA 1, including the mounting heights listed in that standard, unless otherwise noted.
- B. Prior to installation of devices, verify wall openings are neatly cut and will be completely covered by wall plates, clean debris from outlet boxes and provide extension rings to bring outlet boxes flush with finished surface.
- C. Install devices and assemblies level, plumb, and square with building lines.
- D. Install wall dimmers to achieve full rating specified and indicated after derating for ganging according to manufacturer's written instructions.
- E. Coordination with Other Trades:
 - 1. Take steps to insure that devices and their boxes are protected. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of the boxes.
 - 2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
 - 3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
 - 4. Install wiring devices after all wall preparation, including painting, is complete.
- F. Conductors:
 - 1. Do not strip insulation from conductors until just before they are spliced or terminated on devices.
 - 2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
 - 3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
 - 4. Existing Conductors:
 - a. Cut back and pigtail, or replace all damaged conductors.
 - b. Straighten conductors that remain and remove corrosion and foreign matter.
 - c. Pigtailing existing conductors is permitted provided the outlet box is large enough.
- G. Device Installation:
 - 1. Replace all devices that have been in temporary use during construction or that show signs that they were installed before building finishing operations were complete.
 - 2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
 - 3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
 - 4. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
 - 5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, 2/3 to 3/4 of the way around terminal screw.
 - 6. Use a torque screwdriver when a torque is recommended or required by the manufacturer.
 - 7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
 - 8. Tighten unused terminal screws on the device.
 - 9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device mounting screws in yokes, allowing metal-to-metal contact.
- H. Device Orientation:
 - 1. Install ground pin of vertically mounted receptacles up, and on horizontally mounted receptacles to the right.
 - 2. Install switches with OFF position down.

- I. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.
- J. Dimmers:
 - 1. Install dimmers within terms of their listing.
 - 2. Verify that dimmers used for fan speed control are listed for that application.
 - 3. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' device listing conditions in the written instructions.
- K. Occupancy Sensors: Contractor shall install, and adjust timing and range for each sensor prior to project completion.
- L. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.
 - 1. Where multiple switches, dimmers, and/or occupancy sensors are adjacent to each other, provide a single cover plate. Custom fabricate, if required, for all combinations. Provide separate boxes or barriers as required for the application.
- M. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.
- N. Adjust devices and wall plates to be flush and level. Three corners of wall plates must be in contact with wall surfaces. Devices shall be solidly mounted against the box.
- O. Wall switches, unless noted otherwise, shall be mounted 48" above finished floor.
- P. Receptacles shall be mounted per A.D.A. height, above finished floor, except where heights are specifically called out on the Drawings. Receptacles above countertops in toilet rooms, dressing rooms, reception areas, and food service areas shall be mounted 6 inches (to center) above countertops or backsplashes, if not indicated otherwise on architectural details.
- Q. Where signal, communications, data and control outlets are indicated adjacent to 115 volt or 230 volt convenience outlets, mount these outlets in a symmetrical pattern.
- R. If the outlets are normally mounted adjacent to each other throughout this project, they shall be mounted on 10 inch centers with the tops of the boxes at the same elevation. If one outlet is mounted adjacent to the floor, and the second outlet mounted adjacent to the ceiling, these outlets shall be lined up vertically whether so shown or not, in order to form a symmetrical pattern on the wall.

3.2 IDENTIFICATION

- A. Comply with Division 26 Section "Identification for Electrical Systems."
 - 1. Wiring Devices (receptacles, switches, occupancy sensors, multioutlet assemblies, etc.): Identify panelboard and circuit number from which served. Use hot, stamped or engraved machine printing with black -filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

3.3 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.
 - 1. Inspect each wiring device for defects.
 - 2. Operate each wall switch with circuit energized and verify proper operation.
 - 3. After installing wiring devices and after electrical circuitry has been energized, test each receptacle for proper polarity, ground continuity, and compliance with requirements.
 - 4. Test each GFCI receptacle for proper operation with both local and remote fault simulations according to manufacturer's written instructions.
 - 5. Test Instruments: Use instruments that comply with UL 1436.
 - 6. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated LED indicators of measurement.
- B. Tests for Convenience Receptacles:
 - 1. Line Voltage: Acceptable range is 105 to 132 V.
 - 2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is not acceptable.
 - 3. Ground Impedance: Values of up to 2 ohms are acceptable.
 - 4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
 - 5. Using the test plug, verify that the device and its outlet box are securely mounted.

- 6. The tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.
- C. Remove malfunctioning units, replace with new units, and retest as specified above.

SECTION 262816 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 ACTION SUBMITTALS

A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include nameplate ratings, dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.

1.2 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single manufacturer.
- B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.
- D. Comply with NFPA 70.

2.2 MOLDED-CASE CIRCUIT BREAKERS

- A. Circuit breakers shall be constructed using glass-reinforced insulating material. Current carrying components shall be completely isolated from the handle and the accessory mounting area.
- B. Circuit breakers shall have a toggle operating mechanism with common tripping of all poles, which provides quick-make, quick-break contact action. The circuit-breaker handle shall be over center, be trip free, and reside in a tripped position between on and off to provide local trip indication. Circuit-breaker escutcheon shall be clearly marked on and off in addition to providing international I/O markings. Equip circuit breaker with a push-to-trip button, located on the face of the circuit breaker to mechanically operate the circuit-breaker tripping mechanism for maintenance and testing purposes.
- C. The maximum ampere rating and UL, IEC, or other certification standards with applicable voltage systems and corresponding interrupting ratings shall be clearly marked on face of circuit breaker. Circuit breakers shall be 100 percent rated or series rated to match existing
- D. MCCBs shall be equipped with a device for locking in the isolated position.
- E. Lugs shall be suitable for194 deg F rated wire, sized according to the 167 deg F temperature rating in NFPA 70.
- F. Standards: Comply with UL 489 and NEMA AB 3, with interrupting capacity to comply with available fault currents.
- G. Thermal-Magnetic Circuit Breakers: Inverse time-current thermal element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
- H. Adjustable, Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
- I. Electronic Trip Circuit Breakers: Field-replaceable rating plug, rms sensing, with the following field-adjustable settings:
 - 1. Long- and short-time pickup levels.
 - 2. Long- and short-time time adjustments.
 - 3. Ground-fault pickup level, time delay, and I-squared t response.
- J. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller, and let-through ratings less than NEMA FU 1, RK-5.
- K. Features and Accessories:
 - 1. Standard frame sizes, trip ratings, and number of poles.

- 2. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge lighting circuits.
- 3. Arc-Energy Reduction: For circuit breakers rated 1200A or greater, provide circuit breaker compliant with NFPA 70 article 240.87 requirements, with external display containing pushbutton and visual indicator for maintenance mode.

2.3 ENCLOSURES

A. Enclosed Switches and Circuit Breakers: UL 489, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:
 - 1. Notify Owner no fewer than seven days in advance of proposed interruption of electric service.
 - 2. Indicate method of providing temporary electric service.
 - 3. Do not proceed with interruption of electric service without owner's written permission.
 - 4. Comply with NFPA 70E.
- B. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
- C. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.
- D. Comply with mounting and anchoring requirements specified in Section 260548.16 "Seismic Controls for Electrical Systems."
- E. Temporary Lifting Provisions: Remove temporary lifting of eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
- F. Install fuses in fusible devices.
- G. Comply with NFPA 70 and NECA 1.
- H. Set field-adjustable circuit-breaker trip ranges as specified in Section 260573 "Overcurrent Protective Device Coordination Study."

3.2 IDENTIFICATION

- A. Comply with requirements in Section 260553 "Identification for Electrical Systems."
 - 1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
 - 2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- C. Perform tests and inspections.
- D. Tests and Inspections for Switches:
 - 1. Visual and Mechanical Inspection:
 - a. Inspect physical and mechanical condition.
 - b. Inspect anchorage, alignment, grounding, and clearances.
 - c. Verify that the unit is clean.
 - d. Verify blade alignment, blade penetration, travel stops, and mechanical operation.
 - e. Verify that fuse sizes and types match the Specifications and Drawings.
 - f. Verify that each fuse has adequate mechanical support and contact integrity.
 - g. Inspect bolted electrical connections for high resistance using one of the two following methods:
 - 1) Use a low-resistance ohmmeter.
 - a) Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of the lowest value.

- Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or NETA ATS Table 100.12.
 - a) Bolt-torque levels shall be in accordance with manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS Table 100.12.
- h. Verify that operation and sequencing of interlocking systems is as described in the Specifications and shown on the Drawings.
- i. Verify correct phase barrier installation.
- j. Verify lubrication of moving current-carrying parts and moving and sliding surfaces.
- 2. Electrical Tests:
 - a. Perform resistance measurements through bolted connections with a low-resistance ohmmeter. Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
 - b. Measure contact resistance across each switchblade fuseholder. Drop values shall not exceed the high level of the manufacturer's published data. If manufacturer's published data are not available, investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
 - c. Perform insulation-resistance tests for one minute on each pole, phase-to-phase and phase-to-ground with switch closed, and across each open pole. Apply voltage in accordance with manufacturer's published data. In the absence of manufacturer's published data, use Table 100.1 from the NETA ATS. Investigate values of insulation resistance less than those published in Table 100.1 or as recommended in manufacturer's published data.
 - d. Measure fuse resistance. Investigate fuse-resistance values that deviate from each other by more than 15 percent.
 - e. Perform ground fault test according to NETA ATS 7.14 "Ground Fault Protection Systems, Low-Voltage."
- E. Tests and Inspections for Molded Case Circuit Breakers:
 - 1. Visual and Mechanical Inspection:
 - a. Verify that equipment nameplate data are as described in the Specifications and shown on the Drawings.
 - b. Inspect physical and mechanical condition.
 - c. Inspect anchorage, alignment, grounding, and clearances.
 - d. Verify that the unit is clean.
 - e. Operate the circuit breaker to ensure smooth operation.
 - f. Inspect bolted electrical connections for high resistance using one of the two following methods:
 - 1) Use a low-resistance ohmmeter.
 - a) Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of the lowest value.
 - Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or NETA ATS Table 100.12.
 - a) Bolt-torque levels shall be in accordance with manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS
 - Table 100.12.
 - g. Inspect operating mechanism, contacts, and chutes in unsealed units.
 - h. Perform adjustments for final protective device settings in accordance with the coordination study.
 - 2. Electrical Tests:
 - a. Perform resistance measurements through bolted connections with a low-resistance ohmmeter. Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
 - b. Perform insulation-resistance tests for one minute on each pole, phase-to-phase and phase-to-ground with circuit breaker closed, and across each open pole. Apply voltage in accordance with manufacturer's published data. In the absence of manufacturer's published data, use Table 100.1 from the NETA ATS. Investigate values of insulation resistance less than those published in Table 100.1 or as recommended in manufacturer's published data.

- c. Perform a contact/pole resistance test. Drop values shall not exceed the high level of the manufacturer's published data. If manufacturer's published data are not available, investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
- d. Perform insulation resistance tests on all control wiring with respect to ground. Applied potential shall be 500-V dc for 300-V rated cable and 1000-V dc for 600-V rated cable. Test duration shall be one minute. For units with solid state components, follow manufacturer's recommendation. Insulation resistance values shall be no less than two megohms.
- 3. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
- 4. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.
- F. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.
- G. Prepare test and inspection reports.
 - 1. Test procedures used.
 - 2. Include identification of each enclosed switch and circuit breaker tested and describe test results.
 - 3. List deficiencies detected, remedial action taken, and observations after remedial action.

SECTION 27 00 10 GENERAL REQUIREMENTS FOR COMMUNICATIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. This section and the associated drawings identify the requirements, technical design, and specifications for Communications Systems at the UNT Jazz Lab in Denton, Texas ("Owner").
- B. Functionally complete Communications Systems shall be provided in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that may be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the indicated result shall be provided whether specifically called for or not, at no additional cost to Owner.
- C. The Communications Systems include the following:
 - 1. 271000 Structured Cabling System
 - 2. 274100 Audiovisual System

1.2 RELATED SECTIONS

- A. The Drawings, Specifications, General Conditions, Supplementary General Conditions, and other requirements of Division 1 apply to the work specified in Division 27 and shall be complied with in every respect. The Contractor shall examine all the items which make up the Contract Documents and shall coordinate them with the work on the project.
- B. Refer to Division 26 for Electrical System requirements.

1.3 CONFIDENTIALITY

A. Limit access to physical and electronic versions of these Division 27 specifications and associated Drawings to individuals directly involved in performing the Work.

1.4 ABBREVIATIONS

- A. ADA Americans with Disabilities Act
- B. AFF Above Finished Floor
- C. AHJ Authority Having Jurisdiction
- D. ANSI American National Standards Institute
- E. AV Audiovisual
- F. BOM Bill of Materials
- G. CAT Category
- H. CD Construction Document
- I. DAS Distributed Antenna System
- J. EMI Electromagnetic Interference

- K. EMT Electrical Metallic Tubing
- L. ERRCS Emergency Responder Radio Coverage Systems
- M. FACP Fire Alarm Control Panel
- N. FCC Federal Communications Commission
- O. F/UTP Foiled, Unshielded Twisted Pair
- P. GC General Contractor
- Q. GMP Guaranteed Maximum Price
- R. GUI Graphical User Interface
- S. HVAC Heating, Ventilation, and Air-Conditioning
- T. IBC International Building Code
- U. IDF Intermediate Distribution Frame; a secondary Telecommunications Room/Enclosure
- V. ISO International Organization for Standardization
- W. ISP Internet Service Provider
- X. IT Information Technology
- Y. LAN Local Area Network
- Z. MDF Main Distribution Frame; the main Telecommunications Room/Enclosure
- AA. MPOE Main Point of Entry
- BB. MTBF Mean Time Between Failures
- CC. NEC National Electric Code
- DD. NEMA National Electrical Manufacturers Association
- EE. NFPA National Fire Protection Association
- FF. NRTL Nationally Recognized Testing Laboratory
- GG. OEM Original Equipment Manufacturer
- HH. OSP Outside Plant
- II. PoE Power over Ethernet
- JJ. POS Point of Sale
- KK. POTS Plain Old Telephone Service
- LL. RF Radio Frequency
- MM. RFI Request for Information
- NN. RMC Rigid Metal Conduit

- OO. RU Rack Unit
- PP. ScTP Screened Twisted Pair
- QQ. STP Shielded Twisted Pair
- RR. TIA Telecommunications Industry Association
- SS. TR Telecommunications Room
- TT. U/FTP Unshielded Twisted-Pair Cable with Foil Screened Twisted-Pair Conductors
- UU. UL Underwriters Laboratory
- VV. UPS Uninterruptible Power Supply
- WW. UTP Unshielded Twisted Pair
- XX. VLAN Virtual LAN

1.5 DEFINITIONS

- A. Wherever used in the Division 27 specifications, or associated drawings, and printed with initial capital letters; the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof. If any of these terms are defined in the General Conditions in Division 1, those definitions shall take precedence.
 - 1. Addenda written or graphic instruments issued prior to the completion of initial bids, which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.
 - 2. Bidding Documents the Bidding Requirements and the proposed Contract Documents (including all Addenda).
 - 3. Bidding Requirements The advertisement or invitation to bid, Instructions to Bidders, Bid security of acceptable form, if any, and the Bid Form with any supplements.
 - 4. Change Order A document recommended by Design Consultant which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.
 - 5. Telecommunication(s) Room A generic term for a dedicated room for information technology equipment, frequently referred to as Telecommunications Room, Telecom Room, IDF, MDF, IT Room, or Equipment Room.
 - 6. Telecommunication(s) Enclosure A generic term for a dedicated enclosure for information technology equipment, frequently referred to as Telecommunications Enclosure.
 - 7. Contract The entire and integrated written agreement between the Owner and Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.
 - 8. Contract Documents Those items so designated in the agreement between Owner and Contractor covering the Work. The Contract Documents are complementary; what is required by one is as binding as if required by all.
 - 9. Contractor The individual or entity with whom Owner has entered into the Agreement.
 - 10. Design Consultant the design firm responsible for creation of these Division 27 specifications and associated Drawings Atlas Consulting.
 - 11. Drawings The part of the Contract Documents prepared or approved by Design Consultant which graphically shows the scope, extent, and character of the Work to be performed by Contractor. Shop Drawings and other Contractor submittals are not Drawings as so defined.
 - 12. General Requirements Sections of Division 1 of the Specifications.
 - 13. Laws and Regulations Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
 - 14. Owner the individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed.
 - 15. Project the total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.

- 16. Samples physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which established the standards by which such portion of the Work will be judged.
- 17. Shop Drawings all drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.
- 18. Site lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by Owner which are designated for the use of the Contractor.
- Specifications the part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards, and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto.
- 20. Subcontractor an individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.
- 21. Substantial Completion the time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of the Architect/Design Consultant, the Work is sufficiently complete, in accordance with the Contract Documents, so that the Work can be utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.
- 22. Supplementary Conditions the part of the Contract Documents which amends or supplements these General Conditions; Division 0 & Division 1 of these Contract Documents.
- 23. Supplier A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or Subcontractor.
- 24. Underground Facilities all underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
- 25. Work the entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.
- B. Terminology
 - 1. The words and terms below are not defined, but when used in Division 27 specifications and related Drawings, have the indicated meaning:
 - a. Intent of Certain Terms and Adjectives:
 - 1) The Contract Documents include the terms "as allowed," "as approved," "as directed" or terms of like effect or import to authorize an exercise of professional judgment by Design Consultant. In addition, the adjectives "reasonable," "suitable," "acceptable," "proper," "satisfactory," or adjectives of like effect or import are used to describe an action or determination of Design Consultant as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Design Consultant any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the following provisions or any other provision of the Contract Documents.
 - 2) Limitations on Design Consultant's Authority and Responsibilities
 - a) Design Consultant will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Design Consultant will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

- b) Design Consultant will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.
- b. Day the word "Day" means a calendar day of 24 hours measured from midnight to the next midnight. Typical "Day" is indicative of business hours, Monday-Friday.
- c. Defective the word "defective," when modifying the word "Work," refers to Work that is unsatisfactory, faulty, or deficient in that it:
 - 1) Does not conform to the Contract Documents; or
 - 2) Does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
 - 3) Has been damaged prior to Substantial Completion.
- d. Furnish the word "furnish," when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
- e. Install the word "install," when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.
- f. Provide the word "provide" and "perform," when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.
- g. When "furnish," "install," "perform," or "provide" is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, "provide" is implied, and those services, materials and equipment shall be furnished and installed.
- C. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contractor Documents in accordance with such recognized meaning.

1.6 **REFERENCE STANDARDS**

- A. Standards, Specifications, Codes, Laws, and Regulations
 - 1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids, except as may be otherwise specifically stated in the Contract Documents.
 - 2. For referenced standards and guidelines that have not been adopted into code or law, the most recent version / edition of the standard and guideline shall be followed, except for the following:
 - 3. Where the Contract Documents clearly establish size, quantity, and/or quality of services, materials, or equipment and/or the means, methods, techniques, sequences, or procedures of construction; in these instances, Contract Documents requirements shall take precedence.
 - 4. Whenever the Contract Documents details a requirement that violates an adopted code, law, or regulation, submit RFI to Architect/Design Consultant prior to Bid or performing the Work.
- B. Codes and Regulations
 - 1. The following codes, laws and regulations are known to have requirements that affect Communications Systems and are listed here for reference. Refer to Part 1 Coordination paragraph in this section for requirements when there are any discrepancies between these codes, laws and regulations and the Contract Documents. All codes shall meet the required 2021 City of Austin Adopted Codes.
 - a. 2010 ADA Standards for Accessible Design
 - b. ASCE 07 Minimum Design Loads and Associated Criteria for Buildings and Other Structures
 - c. FCC Rules and Regulations
 - d. National Electric Safety Code
 - e. NFPA 70 National Electric Code
 - f. NFPA 72 National Fire Alarm and Signaling Code
 - g. NFPA 101 Life Safety Code
 - h. NFPA 1225 Standard for Emergency Services Communications
 - i. 2012 Texas Accessibility Standards

- C. Standards
 - 1. Refer to individual sections for additional requirements.
- D. Guidelines
 - 1. Refer to individual sections for additional requirements.

1.7 QUALITY ASSURANCE

- A. Contractor Qualifications
 - 1. Refer to individual sections for requirements.
- B. Personnel Qualifications
 - 1. At all times during the progress of the Work, Contractor or Subcontractor shall assign a competent Project Manager who shall not be replaced without written notice to Owner and Design Consultant except under extraordinary circumstances.
 - 2. Refer to individual sections for additional requirements.
- C. Network and Cybersecurity Requirements
 - 1. Network integrity is critical to Owner's operation of the Facility. Refer to Software, Network, and Cybersecurity Requirements paragraph in Part 3 of this Section.

1.8 WARRANTY

- A. Contractor's General Warranty and Guarantee
 - 1. If the General Requirements do not establish Contractor's General Warranty and Guarantee, then the following requirements are in effect for Communications Systems Work:
 - a. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Design Consultant and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on representation of Contractor's warranty and guarantee.
 - b. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
 - Abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
 - 2) Normal wear and tear under normal usage.
 - c. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:
 - 1) Observations by Design Consultant.
 - 2) Recommendation by the Architect/Design Consultant or payment by Owner of any progress or final payment.
 - 3) The issuance of a certificate of Substantial Completion by Architect/Design Consultant or any payment related thereto by Owner.
 - 4) Use or occupancy of the Work or any part thereof by Owner.
 - 5) Any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by Design Consultant.
 - 6) Any inspection, test, or approval by others; or
 - 7) Any correction of defective Work by Owner.
- B. Manufacturer Warranty
 - 1. Refer to individual sections for additional requirements.
- C. Special Warranty
 - 1. Refer to individual sections for additional requirements.

1.9 SUBMITTALS

A. General Submittal Requirements:

- 1. Refer to General Requirements or Division 1 for general submittal requirements. Refer to individual sections in Division 27 for additional requirements.
- Submittals and Shop Drawings shall not utilize the Design Consultant's logo, stamp, or the title 2. block from the Construction Drawings; if either of these are submitted, the Submittal(s) will be rejected without review.
- Inadequate or Incomplete Submittals and/or Shop Drawings will not be reviewed and will be 3. returned to the Contractor.
- Β. Pre-Bid 1.
 - Pre-Bid submittals can generally include:
 - Clarifying questions. a.
 - Product Substitution requests. b.
 - Contractor and personnel qualification documentation. C.
 - 2. Refer to individual sections for specific Pre-Bid requirements.
- C. Bid
 - 1. Refer to individual sections for additional Division 27 requirements due with Bid, which may include – but is not limited to – the following:
 - Contractor and personnel qualification documentation a.
 - b. Unit Pricing
- **Pre-Construction** D.

a.

- Procedures: 1.
 - Before submitting Pre-Construction submittals, Contractor shall have:
 - Reviewed and coordinated each Shop Drawing with other Shop Drawings and with 1) the requirements of the Work and the Contract Documents.
 - Determined and verified all field measurements, quantities, dimensions, specified 2) performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto.
 - Determined and verified the suitability of all materials offered with respect to the 3) indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
 - 4) Determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.
 - With each submittal, Contractor shall give Design Consultant specific written notice of any b. variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both a written communication separates from the Shop Drawings or submittal; and, in addition, by a specific notation made on each Shop Drawing submitted to Design Consultant for review and approval of each such variation.
 - Design Consultant's review and approval shall not relieve Contractor from responsibility for C. any variation from the requirements of the Contract Documents.
 - d. Contractor shall not order, purchase, or install any equipment until pre-installation submittals have been accepted in writing by the Architect/Design Consultant.
 - Contractor shall ensure submittals are submitted in a timely manner to ensure all products e. can be ordered and received on site in order to not cause any delays. If there are any concerns with any products having long lead times, those products shall be clearly identified in writing so the review and approval can be expedited.
 - All submittals shall be submitted in the same sequence as they are listed in the f. specifications (i.e., product data in the sequence items are listed in the product data section, manufacturer product certifications for company, manufacturer product certifications for installers, etc.). Submittals not in the proper sequence will be returned unreviewed.
 - Each submittal shall be sub-divided by the corresponding specification section. Provide a g. line-by-line compliance statement for each section, identify the following per article and subsection:
 - Compliant Following the specification 1)
 - Non-Compliant Not following the specification with an explanation. If there is a 2) deviation from the specs, prior approval shall have been submitted and approved.
 - Contractor shall submit the following Pre-Construction Submittals: h. 1)
 - 271000 Structured Cabling System
 - 274100 Audiovisual System 2)
- Bill-of-Materials / Product Index 2.

- a. Provide a typed listed with each product/equipment being provided as part each Section. List shall include the following, in the exact same order as listed in Division 27 specifications:
 - 1) Product/Equipment specification name
 - 2) Manufacturer
 - 3) Model name
 - 4) Model number
- 3. Product Data
 - a. Provide product data sheet for each material, equipment, device, etc. listed in Part 2 of these specifications. Data sheet shall include manufacturer name, product name, part number and relevant product specifications in an 8.5"x11" PDF format.
 - b. For product data sheets containing more than one (1) part number or product, the Contractor shall clearly identify the specific part number or product being submitted. Product data sheets without the part number clearly identified may not be approved.
- 4. Shop Drawings
 - a. Shop Drawings shall include the following:
 - 1) Contractor or Subcontractor's Title Block; drawing size shall match Construction Drawings (i.e., 30" x 42"). Title Block shall include:
 - a) Project name and address
 - b) Contractor/Subcontractor company name and contact information.
 - c) Name and contact information of Contractor/Subcontractor's Project Manager.
 - 2) Legend page with all symbols defined.
 - 3) Floors plans (minimum scale of 1/8" = 1'-0") for all areas with Division 27 Work. Floor plans shall include north arrow, key plan, and indicate device/equipment locations, and associated pathway routing and size.
 - 4) Enlarged plans (minimum scale of 1/4" = 1'-0") and rack and wall elevations for Telecommunications Room/Enclosure, Equipment Rooms, etc., indicating exact location where equipment is intended to be installed. Enlarged plans shall include north arrow.
 - 5) Riser diagrams, details, coordination views, etc. to indicate Contractor has a full understanding of required Work and is coordinated with other trades.
 - b. Where installation location is critical such as in Telecommunications Room/Enclosure and Equipment Rooms, as well as outlet/device location height above finished floor indicate figured dimension on Shop Drawings.
 - Refer to individual sections for additional Shop Drawing requirements.
- c. Re 5. Samples
 - a. Refer to individual sections for requirements.
- 6. Certificates
 - a. Refer to individual sections for requirements.
- E. Refer to individual sections for additional Pre-Construction Submittal requirements.

1.10 PROJECT CLOSEOUT

- A. Bill-of-Materials / Product Index Update Bill-of-Materials that was included in the Pre-Construction Submittal with actual equipment installed. Include columns populated with the following information:
 - 1. Product Name (from Specifications)
 - 2. Manufacturer
 - 3. Model Number
 - 4. Quantity
 - 5. Manufacturer Warranty Period
- B. Product Data (Cutsheets)
 - 1. Shall be in the same order as listed in the Specifications and Bill-of-Materials.
- C. Operation and Maintenance Data
 - 1. Shall be in the same order as listed in the Specifications and Bill-of-Materials.
- D. Warranty Documentation
 - 1. Include PDF copy of any Warranty documentation and/or certifications that came with the installed products or required by these Specifications.

- 2. Shall be in the same order as listed in the Specifications and Bill-of-Materials.
- E. Test Results
 - 1. Include PDF copy of Functional Test Reports for each section.
 - 2. Refer to individual sections for testing requirements.
- F. Spare Parts and Tools
 - 1. At time of Owner Training, furnish any and all spare parts and tools to the Owner that are required by the Contract Documents.
 - 2. In the Project Closeout Submittal, include PDF copy of delivery receipt, indicating items and quantities that were furnished to the Owner, as well as the date, time, and Owner Representative that took possession of the items.
 - 3. Refer to individual sections for additional requirements.
- G. Record Drawings ("As Built")
 - 1. Maintain a copy of approved Submittals, Shop Drawings, and Change Orders on the Site (or the Project's Construction Administration website), and update with changes during construction. Any minor changes to the Drawings shall be updated on a weekly basis. These drawings shall be made available for inspection at any point during construction when requested by the Architect/Design Consultant.
 - 2. At the conclusion of the project, utilize AutoCAD or BIM software (such as Revit or Navisworks) to incorporate the changes to the Shop Drawings.
 - 3. PDF markups will not be acceptable.
 - 4. Include both PDF and AutoCAD (2022 .dwg file type) versions of every drawing in the Project Closeout Submittal.
 - 5. Refer to individual sections for additional requirements.
- H. Special Requirements Refer to individual sections for additional requirements.

1.11 COORDINATION

- A. Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Contractor shall promptly report in writing to the Architect/Design Consultant any conflict, error, ambiguity, or discrepancy which Contractor discovers, or has knowledge of, and shall obtain a written interpretation or clarification from the Architect/Design Consultant before proceeding with any Work affected thereby.
- B. If, during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) any standard, specification, manual, or code, or (c) any instruction of any Supplier, then Contractor shall promptly report it to the Architect/Design Consultant in writing. Contractor shall not proceed with the Work affected thereby until an amendment or supplement to the Contract Documents has been issued.
- C. Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with Contractor.
- D. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.
- E. Refer to General Requirements / Division 1 for Schedule requirements. Subcontractors for Division 27 Work shall coordinate with Contractor in establishing schedules and timetables to perform the Work and perform that Work per those established schedules.

- F. The Contractor/Subcontractor for each Division 27 Section shall maintain a Project Manager (per the Quality Assurance paragraph of that Section) that is on the jobsite whenever Work for that Section is being performed. This Project Manager shall coordinate the Work with other trades, such that Division 27 Work is installed per the Schedule, with the required clearances for all Divisions of Work, and meets the required codes and standards.
- G. Division 27 Work shall not impair, hinder, or delay work of other trades.
- H. Before starting Work, examine adjacent Work performed by other divisions (trades) to determine if there are any conditions that would be detrimental or prevent Division 27 Work from being a successful installation. Notify issues to Contractor for remediation prior to starting Work.
- I. Unless otherwise indicated with a figured dimension, Drawings are schematic indicating approximate location of devices and equipment. Communications devices and equipment may be figure-dimensioned on the Architectural Drawings, which take precedence over the approximate locations on the technology Drawings. Where neither Architectural or technology Drawings include a figured dimension, exact location shall be determined by scaled dimension and coordination with requirements of other trades. Errors that could have been avoided by proper coordination shall be corrected without additional costs to the Owner.
- J. Coordination with other Division(s):
 - 1. Division 21 Fire Suppression
 - a. Ensure no piping is routed overhead through a Telecommunications or Audiovisual Enclosure or Equipment Room, except where serving a Fire Suppression Device in the Communications/Equipment Room.
 - 2. Division 22 Plumbing
 - a. Ensure no piping is routed overhead through a Telecommunications or Audiovisual Enclosure or Equipment Room.
 - 3. Division 23 Mechanical
 - a. Ensure no piping or ductwork is routed overhead through a Telecommunications or Audiovisual Enclosure or Equipment Room, except where serving Mechanical equipment in the Communications/Equipment Room.
 - 4. Division 26 Electrical
 - a. Ensure no conduits are routed overhead through a Telecommunications or Audiovisual Enclosure or Equipment Room, except where serving an Electrical panelboard or receptacles in the Communications/Equipment Room.
 - b. Coordinate exact location of receptacles/ hard-wired circuits for Division 27 equipment with Division 26 Contractor prior to rough-in installation.
 - c. Prior to connecting Division 27 devices and equipment to an electrical receptacle, utilize a ground circuit impedance tester to detect any wiring errors and low equipment ground impedances. If any issues are detected, notify Division 26 Contractor for correction prior connecting Division 27 devices and equipment.

K. Preinstallation Meetings

- 1. Refer to individual sections for additional requirements.
- L. Sequencing / Scheduling
 - 1. Refer to individual sections for specific sequencing / scheduling requirements.

1.12 PERMITS AND TAXES

- A. Unless otherwise provided in the Supplementary Conditions, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.
- B. Unless otherwise provided in the Supplementary Conditions, Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

1.13 DELEGATION OF PROFESSIONAL DESIGN SERVICES

- A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable law.
- B. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of Contractor by the Contract Documents, Owner and Design Consultant will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Design Consultant.
- C. Owner and Design Consultant shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided Owner and Design Consultant have specified to Contractor all performance and design criteria that such services must satisfy.
- D. Pursuant to this Paragraph, Design Consultant's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents.

PART 2 - PRODUCTS

2.1 GENERAL PRODUCT REQUIREMENTS

- A. Materials and equipment incorporated into the Work shall be as specified and of good quality and new, except as otherwise noted in the Contractor Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by these specifications or when requested by the Owner or Design Consultant, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.
- B. Equipment and materials shall be consistent throughout the installation. Where multiple units of the same type of equipment and materials are required, these units shall be a standard product with the same manufacturer and model number.
- C. Performance Criteria
 - 1. Regulatory Requirements
 - a. Utilize products listed by a National Recognized Testing Laboratory (such as UL), except where no relevant standard exists. These products shall bear a permanent mark/label of the NRTL.
 - b. All equipment and material used in the installation shall be listed for the environment in which it is being installed. Examples plenum-rated were installed in a return air plenum; wet or outdoor listed where installed in Wet or Damp Locations.
 - c. Refer to individual sections and products for specific NRTL requirements.
 - 2. Sustainability Characteristics
 - a. Refer to General Requirements/Division 1 for general Project and Product Sustainability requirements.
 - b. Refer to individual Division 27 sections and products for specific Sustainability requirements.
- D. Lead Time Issues

- 1. Contractor shall review all products specified and required for this project to determine if there are any lead times for any products that may cause any delay. Contractor shall clearly identify any concerns with lead times in writing to the Architect/Design Consultant prior to submitting a Bid for this work. If the Contractor does not identify any concerns with products having long lead times, it will be understood there are no long lead time issues, and the Contractor will have all products onsite when needed to complete the Work as required.
- In the event a manufacturer's specified product or part number has changed or is no longer available. E. Contractor shall substitute the appropriate equivalent manufacturer's part number.
- F. In the event of a discrepancy between these Specifications and the Drawings, the greater quantity and/or better quality shall be assumed for Bidding purposes.

2.2 SUBSTITUTES AND "OR EQUALS"

- Whenever an item of material or equipment is specified or described in the Contract Documents by using Α. the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or-equal" item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to the Architect/Design Consultant for review under the circumstances described below.
 - "Or-Equal" Items: If, in the Design Consultant's approval, an item of material or equipment 1 proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Design Consultant as an "orequal" item, in which case review and approval of the proposed item may, in Engineer's sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this Paragraph, a proposed item of material or equipment will be considered functionally equal to an item so named if: а
 - In the exercise of reasonable judgment, the Design Consultant determines that:
 - It is at least equal in materials of construction, quality, durability, appearance. 1) strength, and design characteristics.
 - 2) It will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole.
 - 3) It has a proven record of performance and availability of responsive service.
 - 4) All "Or-Equal" items shall be submitted to the Consultant a minimum of 10 calendar days prior to bid date, with written approval from the Consultant in the form of an Addendum.
 - Contractor certifies that, if approved and incorporated into the Work b.
 - 1) 2) There will be no increase in cost to the Owner or increase in Contract Times: and
 - It will confirm substantially to the detailed requirements of the item named in the Contract Documents.
 - 2. Substitute Items:
 - If, in the Design Consultant's approval, an item of material or equipment proposed by а Contractor does not qualify as an "or-equal" item under the Paragraph above, it will be considered a proposed substitute item.
 - Contractor shall submit sufficient information as provided below to allow Design Consultant b. to determine if the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by the Design Consultant from anyone other than Contractor.
 - Contractor shall make written application to the Architect/Design Consultant for review of a C. proposed substitute item of material or equipment that Contractor seeks to furnish or use. Requests for substitution must be submitted ten calendar days prior to the bid date, any request received after that time period will be excluded from consideration. The application: Shall certify that the proposed substitute item will: 1)
 - Perform adequately the functions and achieve the results called for by the a) general design
 - Be similar in substance to that specified b)
 - Be suited to the same use as that specified C)
 - 2) Will state:

- a) The extent, if any, to which the use of the proposed substitute item will prejudice Contractor's achievement of Substantial Completion on time
- b) Whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item
- c) Whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty
- 3) Will identify:
 - a) All variations of the proposed substitute item from that specified, and
 - b) Available engineering, sales, maintenance, repair, and replacement services; and
- 4) Shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change.
- d. Cost Reimbursement: in certain situations, evaluating a proposed substitution will require additional time by the Design Consultant. These situations will either be described in subsequent Specification sections or conveyed in writing to the Contractor prior to evaluation by the Design Consultant. Design Consultant will record Design Consultant's costs in evaluating the proposed substitution. Whether or not Design Consultant approves the proposed substitution, Contractor shall reimburse Owner for the reasonable charges of Design Consultant for evaluating each proposed substitute. Contractor shall also reimburse Owner for the reasonable costs for Design Consultant, Architect, and Engineer(s) in making changes in the Contract Documents resulting from the acceptance of each proposed substitute.
- B. Proposed equivalent items shall be approved by Design Consultant prior to purchase or installation. Proposed equivalent items shall meet or exceed these specifications and the specifications of the specified item.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

- A. Verification of Conditions
 - 1. Underground Facilities
 - Shown or Indicated: The information and data shown or indicated in the Contract Documents with respect to existing Communications Underground Facilities at or contiguous to the Site is based on information and data furnished to Owner or Design Consultant by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:
 - 1) Owner and Design Consultant shall not be responsible for the accuracy or completeness of any such information or data provided by others; and
 - The cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:
 - a) Reviewing and checking all such information and data.
 - b) Locating all Underground Facilities shown or indicated in the Contract Documents.
 - c) Coordination of the Work with the owners of such Underground Facilities, including Owner, during construction; and
 - d) The safety and protection of all such Underground Facilities and repairing any damage.
 - e) Thereto resulting from the Work.
 - b. Not Shown or Indicated:

- 1) If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Architect/Design Consultant. Architect/Design Consultant will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.
- B. Preinstallation Testing
 - 1. Refer to individual sections for requirements.
- C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.
- D. No deviations from the Contract Documents shall be made without full consent in writing of the Architect/Design Consultant. The Contractor shall have written approval from the Architect/Design Consultant for any additional work beyond the Contract Documents prior to beginning such work. If the Contractor does not obtain written approval from the Architect/Design Contractor prior to proceeding with the work, the contractor shall not be reimbursed for the work.

E. Cleaning

- During the progress of the Work, Contractor shall keep the Site and other areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations. Contractor shall dispose of such items on a daily basis and return the site to the original state of cleanliness. The Contractor shall not use Owner's facilities for the disposal of excess or scrap materials.
- 2. Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

F. Protection

- 1. The Contractor shall protect Communications Work from damage by other trades and theft.
 - a. Any Division 27 cabling that has more than 2-inches of paint on the jacket shall be replaced without additional cost to the Owner.
- 2. Where owner-furnished or provided equipment is installed prior to Substantial Completion, access to that room or area shall be restricted/locked whenever unoccupied.

G. Temporary Power, HVAC, and Communications Systems

- 1. Where owner-furnished or provided active equipment is required to be installed prior to Substantial Completion in order for Communications Systems Work to be functional, the room or area where that network equipment is installed shall be equipped with permanent or temporary power and heating/cooling at no additional costs to the Owner. Acceptable temperature range is 60 to 80 degrees Fahrenheit.
- 2. When, through no fault of the Owner or Architect/Design Consultant, Communications Systems Work is not completed by Substantial Completion, temporary Communications Systems may be required while the Site is partially occupied by the Owner and shall remain installed until acceptance of permanent system(s); refer to individual sections for requirements.

3.2 INTEGRATION REQUIREMENTS

A. Refer to individual sections for integration requirements.

3.3 REPAIR / RESTORATION

- A. Contractor shall be responsible for the repair of any damage caused by the Contractor or Subcontractors during the installation.
- B. Selective demolition may be necessary to facilitate installation of Communications Systems equipment and pathways. The Contractor shall obtain written permission from the Architect/Design Consultant before proceeding with any work that would necessitate cutting into or through any part of the building structure such as, but not limited to girders, beams, floors, walls, roofs, or ceilings. After installation, Contractor shall restore floors, walls, roofs, and ceilings to their original condition.
 - 1. Avoid penetrations or installation of equipment onto or through waterproof assemblies such as roofs, exterior walls, and slab-on-grade floors. If installation cannot be avoided, install before waterproofing; protect installation area from weather/elements until sealing and waterproofing is complete.
 - a. Conduit and backboxes concealed or embedded in walls or floors may remain. Provide stainless steel cover over backbox openings that are not reused.
 - 2. Properly dispose of equipment and associated cabling, conduit, pathways and supports in compliance with local, state, and federal laws.

3.4 FUNCTIONAL AND PERFORMANCE TESTING

- A. After components have been installed, perform functional tests to ensure system components are installed and configured correctly in conformance with manufacturer's instruction and the Contract Documents. Correct any issues and retest. Include Test Report documentation in Preliminary and Final Project Closeout Submittals.
- B. Third-party testing or manufacturer onsite services may be necessary for certain Division 27 systems or sub-systems; refer to individual sections for exact requirements.
- C. Refer to individual sections for additional testing requirements.

3.5 FIELD OBSERVATIONS

- A. A minimum of two weeks in advance notify Design Consultant and Owner as to the readiness for a Field Observation for the following:
 - 1. Rough-In Observation after conduits have been installed, but before walls have been installed.
 - Above Ceiling Observation after cabling has been installed, but before ceilings have been installed.
 - 3. Final Site Observation a minimum of two weeks before Substantial Completion, to occur after Preliminary Project Closeout Submittal has been submitted.
- B. Non-Conforming Work
 - 1. After receipt of written notice of defective Work, Contractor shall correct all defective Work, or, if the Work has been rejected by the Architect/Design Consultant, remove it from the Project and replace it with Work that is not defective. Contractor shall pay all claims, costs, losses, and damages arising out of or relating to such correction or removal.

3.6 DEMONSTRATION, TRAINING, AND ADJUSTMENTS

- A. Conduct training sessions to Owner's personnel to demonstrate system operation and preventative maintenance procedures.
 - 1. Refer to individual sections for additional training requirements.
- B. After Owner has taken occupancy, Communications Systems equipment and components may require minor adjustments to be performed by the Contractor/Subcontractor to align with Owner's actual use of the systems. Refer to individual sections for specific adjustment requirements.

3.7 SOFTWARE, NETWORK, AND CYBERSECURITY REQUIREMENTS

- A. Software Requirements
 - 1. All firmware found in products furnished or provided by the Contractor shall be the latest and most up to date provided by the manufacturer.
 - 2. All equipment requiring users to log on using a password shall be configured with user/site-specific password(s). No system/product default passwords shall be allowed. Coordinate user logins and passwords with Owner prior to system setup.
 - 3. Refer to individual sections for additional software requirements.
- B. Network and Cybersecurity Requirements
 - For all Communications Systems that have Contractor-provided equipment with an Ethernet/LAN port, Contractor shall coordinate with Owner's IT staff regarding Owner's network and cyber security requirements.
 - 2. As a part of the pre-installation meetings, the Contractor (and/or Subcontractors for each Communications System) shall request an IT Coordination Kickoff Meeting with Owner's IT staff to ascertain and document Owner's requirements. Contractor shall document this meeting and send meeting minutes to all parties in attendance as well as Architect/Design Consultant.
 - 3. At a minimum, coordinate the following network requirements for Contractor-provided equipment with the Owner's IT staff:
 - a. IP address quantities and assignments for each equipment type and location, including subnets and subnet masks.
 - b. PoE quantities and power requirements (PoE, PoE+, high powered PoE, etc.) for each equipment type and location.
 - c. Bandwidth requirements, including any prioritization or unicast/multicast requirements.
 - d. VLAN use and assignment.
 - e. Encryption requirements
 - f. WAN connection requirements
 - g. Tunnel requests for access through an Owner's network
 - h. Planned approach for software upgrades and security patching.
 - i. Follow additional network requirements and procedures as directed by the Owner's IT staff.
 - 4. The Contractor shall take positive measures to prevent the introduction of cybersecurity threats to the Owner's technology infrastructure and network. These measures shall include but are not limited to:
 - a. The Contractor shall scan contractor-provided or furnished equipment for cyber threats such as viruses, malware, ransomware, etc., prior to connecting the equipment to the Owner's network.
 - b. Coordinate with the manufacturer to ensure newly procured equipment does not have any cybersecurity notices, bulletins, or alerts. Provide a letter to the Design Consultant with the submittal documents for that Specification section confirming there are no active or known cyber threats.
 - c. Ensure all installers/technicians installing or configuring equipment are trained on the prevention of introduction of cyber threats to electronics.
 - d. The Contractor shall assess whether there are any cyber threats / vulnerabilities associated with the specified equipment, prior to procurement/installation. If cyberthreats are discovered, notify the Design Consultant within one Day. Provide the make and model of the associated equipment and the vulnerability.
 - e. Follow additional cybersecurity requirements and procedures as directed by the Owner's IT staff.
 - 5. Refer to individual sections for additional Networking and Cybersecurity Requirements.

3.8 MAINTENANCE

- A. Warranty Service
 - 1. Pursuant to Contractor's General Warranty and Guarantee, Owner may request Warranty Service for a period of 1 year after Substantial Completion for Communications Systems components due to faulty material or installation.
 - 2. Upon written notice from Owner, promptly perform remedial / corrective Work to bring the associated system(s) to compliance with the Contract Documents and satisfaction of the Owner.
 - a. In this context, "promptly" means within 7 Days, unless a quicker response and remediation time is specified in the associated Division 27 specification section.

- 3. Refer to individual sections for additional Warranty Service requirements.
- B. One Year Warranty Check
 - 1. Fifty weeks after Substantial Completion, Contractor or Subcontractor for each Division 27 section shall conduct a site visit with Owner's facility personnel to ensure systems and components are still operating as intended / required by the Contract Documents. Promptly perform corrective Work while on site or within 7 Days.
 - a. Pursuant to Contractor's General Warranty and Guarantee, corrective Work is not required if system / component is deficient due to:
 - 1) Abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
 - 2) Normal wear and tear under normal usage.

3.9 DRAWINGS AND SPECIFICATIONS AFTER SUBSTANTIAL COMPLETION

- A. Contractor and any Subcontractor or Supplier shall not:
 - 1. Have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by Atlas Consulting, including electronic media editions; or
 - 2. Reuse any such Drawings, Specifications, other documents, or copies thereof on any other project without written consent of Atlas Consulting.
- B. The prohibitions in the paragraph above survive final payment, or termination of Contract. Nothing herein shall preclude Contractor or Owner from retaining copies of the Contract Documents for record purposes.
- C. Physical paper copies of Drawings and Specifications shall be properly destroyed (shredded) when no longer needed to perform the Work.

END OF SECTION 270010

SECTION 271000 STRUCTURED CABLING SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section, and the associated T-Drawings and Contract Documents, identify the requirements, technical design, and specifications for the Structured Cabling System for the UNT Jazz Lab in Denton, Texas ("Owner").
- B. A functionally complete Structured Cabling System and supporting equipment shall be provided in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that may be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the indicated result shall be provided whether or not specifically called for, at no additional cost to Owner.
- C. The Structured Cabling System cabling and terminations shall be covered by a minimum twenty five-year Advanced System Warranty. This warranty shall cover material and performance of the cabling system for the duration of the warranty period. Any valid warranty claims shall be corrected promptly at the manufacturer's expense (for both material replacement and installation labor), with no additional costs to the owner. The Advanced System Warranty shall be provided through a Certified Contractor.

1.2 RELATED SECTIONS

- A. Work required by this Section shall meet the requirements of Division 0 & 1
- B. Division 26
- C. 270010 General Requirements for Communications
- D. 274100 Audiovisual System

1.3 DEFINITIONS

- A. Advanced System Warranty an extended warranty of at least twenty-five years offered by the Structured Cabling System manufacturer that covers the material, installation, and performance of the cabling system.
- B. Cable ID the outlet and cable labeling scheme, coordinated with the Owner and compliant with TIA-606 Standard.
- C. Certified Contractor a local contractor with an office within one-hundred miles of the Project Site that is certified with the manufacturer that will be providing the Advanced System Warranty.
- D. ScTP screened twisted pair
- E. STP shielded twisted pair
- F. UTP unshielded twisted pair
- G. Refer to Section 27 00 10 for additional definitions.

1.4 **REFERENCE STANDARDS**

A. Codes and Regulations

- 1. Refer to Section 27 00 10 for additional codes and regulations.
- B. Standards
 - 1. BICSI N1 Installation Practices for Telecommunications and ICT Cabling and Related Cabling Infrastructure
 - 2. IEEE 83 –Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System
 - 3. IEEE 802 Standards
 - 4. IEEE 1100 Recommended Practice for Powering and Grounding Electronic Equipment
 - 5. NECA 1 Standard for Good Workmanship in Electrical Construction
 - 6. NECA 331 Building and Service Entrance Grounding and Bonding
 - 7. NECA/BICSI 607 Standard for Telecommunications Bonding and Grounding Planning and Installation Methods for Commercial Buildings
 - 8. TIA 568.0-D Generic Telecommunications Cabling for Customer Premises
 - 9. TIA 568.1-D Commercial Building Telecommunications Cabling Standard
 - 10. TIA 568.2-D Balanced Twisted-Pair Telecommunications Cabling and Components Standard
 - 11. TIA 568.3-D Optical Fiber Cabling Components
 - 12. TIA 569 Telecommunications Pathways and Spaces
 - 13. TIA 606 Administration Standard for Telecommunications Infrastructure
 - 14. TIA 607 Generic Telecommunications Bonding and Grounding for Customer Premises
- C. Additional Standards
 - 1. BICSI 005 Electronic Safety and Security System Design and Implementation Best Practices
 - 2. TIA 758 Customer-Owned Outside Plant Telecommunications Infrastructure Standard
- D. Guidelines
 - 1. BICSI Telecommunications Distribution Methods Manual
 - 2. BICSI Outside Plant Design Reference Manual
 - 3. BICSI Information Technology Systems Installation Methods Manual

1.5 QUALITY ASSURANCE

- A. Contractor Qualifications
 - 1. The Contractor shall possess all relevant Manufacturer Certifications (i.e., structured cable systems, testing equipment, etc.) for both the company and individual technicians prior to submitting a bid for the work.
 - 2. The Contractor shall have been in business for a minimum of five (5) years.
 - 3. The Contractor shall have a local office with local technicians and an adequate workforce to complete this project within a one-hundred-mile radius of the project site.
 - 4. The Contractor shall have completed a minimum of five (5) projects similar in size and scope to the Owner's installation, where the systems have been in continuous satisfactory operation for at least one (1) year.
 - 5. Contractor shall be a Certified Contractor of the manufacturer providing the Advanced System Warranty prior to submitting a Bid for the Work.
 - 6. Subcontractors shall be identified at the time of bid and comply with the requirements and intentions of these specifications, associated drawings, and related contract documents.
- B. Personnel Qualifications
 - 1. Project Manager/Quality Control Manager At all times during the progress of the Work, Contractor (or Subcontractor) responsible for the Work of this Section shall assign a competent full-time employee (who shall be available for all on-site coordination meetings) with the following current qualifications / credentials:
 - a. RCDD certification
 - 2. Fiber Termination and Testing those responsible for terminating and testing fiber optic cabling shall have the following qualifications:
 - a. BICSI Installer 2, Optical Fiber
 - b. Or equivalent from Advanced System Warranty manufacturer
 - 3. Copper Testing those responsible for testing copper cabling shall have the following qualifications:
 - a. BICSI Installer 2, Copper

- b. Or equivalent from Advanced System Warranty manufacturer
- 4. Cabling Technicians those responsible for installing fiber and copper cabling shall have the following qualifications:
 - a. BICSI Installer 1
 - b. Or equivalent from Advanced System Warranty manufacturer
- 5. Include certificates of the above personnel per Submittal requirements or when requested by Owner or Design Consultant.

1.6 WARRANTY

- A. Manufacturer Warranty
 - 1. Fiber Optic and Copper cabling and terminations shall be covered by the Advanced System Warranty.
 - 2. All other equipment and components required by this Section shall be covered by a manufacturer's warranty for a period of at least one year.

1.7 SUBMITTALS

- A. Pre-Bid
 - 1. Refer to Division 270010 for all specification deviation requests.
 - 2. Submit Contractor and Personnel Qualifications documentation indicating that the requirements of the Quality Assurance paragraph of this Section and Section 270010 are met.

B. Bid

- 1. Unit Pricing
 - a. Provide unit cost to add/delete a single plenum Category 6 drop, assumed to be at distance of 300' with all associated cabling, pathways, and other work.
- 2. Contractor and Personnel Qualifications
 - a. Submit Contractor and Personnel Qualifications documentation indicating that the requirements of the Quality Assurance paragraph of this Section are met. Indicate quantity of full-time local technicians within one-hundred-mile radius of Project Site.
 - b. Also include list of three Contractor-installed projects of a similar size and scope that have been in operation for at least one year. Provide the following information for each project:
 - 1) Project Name and Location
 - 2) Project Start and Completion Dates
 - 3) Project Start and Completion Costs
 - 4) Brief Description of Project
 - 5) Client Point of Contact Name and Phone Number
- C. Pre-Construction
 - 1. Pre-Construction Submittal for this Section shall include the following:
 - a. Contractor Qualifications -
 - 1) Certifications for Project Manager and all technicians expected to work on the Project.
 - 2) Documentation Contractor has been in business for at least five years.
 - 3) Address of Contractor's local office within one-hundred-mile radius of Project Site.
 - 4) Subcontractors list sub-contractors performing any Work specified in this Section. List shall clearly identify the sub-contractor's legal name and address, the scope of work to be performed by the sub-contractor and the overall percentage of the Work being provided by the subcontractor. If there are no sub-contractors performing any Work, submit statement on company letterhead clearly indicating no sub-contractors will be performing any Work specified in this Section.
 - b. Advanced System Warranty sample certificate
 - c. Bill-of-Materials
 - d. Product Data
 - e. Test Equipment Calibration documentation
 - f. Shop Drawings
 - g. Structural Submittal required for equipment over 200 pounds attached to overhead structure.

1.

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1.8 PROJECT CLOSEOUT

- A. Preliminary Project Closeout submittal:
 - Submit the following a minimum of two weeks before Substantial Completion:
 - a. Memo/letter indicating that the Structured Cabling Work is nearing completion and ready for the Final Site Observation by the Design Consultant.
 - b. Approved Shop Drawings or field Drawings with actual outlet locations and Cable IDs in PDF format. BIM/CAD-produced drawings converted to PDF format. Cable IDs shall match Test Reports. Provide 30"x42" laminated shop drawings, for each telecom room serving a given area.
 - c. For all Access Point Shop Drawings provide Overall Floor Plans with the following indicated:
 1) MAC Address
 - 2) Termination Port
 - 3) AP ID
 - 4) Picture of AP within PDF
 - d. Cable Test Reports, in both PDF and original tester format.
 - Final Project Closeout submittal for this Section shall include the following:
 - 1. Bill-of-Materials / Product Index include column indicating any materials or equipment with a manufacturer's warranty longer than one year.
 - 2. Product Data
 - 3. Operation and Maintenance Data
 - 4. Warranty Documentation
 - a. Provide Advanced System Warranty certificate from the manufacturer, which shall cover the performance and product warranty requirements of the Warranty paragraph above.
 - b. For any materials or equipment provided by the Contractor with a manufacturer's warranty longer than one year, include manufacturer documentation.
 - 5. Test Results
 - 6. Training and Spare Parts
 - a. Signed acceptance letter or form indicated Owner has been properly trained in operation of the system and has taken possession of the specified Spare Parts and Tools (items listed as "Furnish to Owner").
 - 7. Record Drawings ("As-Builts")

1.9 COORDINATION

1.

A. Coordination with other Divisions and Sections

- Division 26 Electrical
 - a. Coordinate data outlet faceplate color to match adjacent wiring device (receptacle) faceplate. Coordinate exact color with Architect and Division 26 Contractor prior to Pre-Construction Submittals.
 - b. Coordinate Equipment Rack and Cabinet power requirements and locations with Division 26 Contractor.
- 2. Section 27 41 00 Audiovisual System
 - a. As required by these specifications, furnish patch cords and station cords for data outlets supporting equipment. Coordinate with Division 274100 Contractor on the development of Shop Drawings indicating pathways required for the Structured Cabling System.
- B. Preinstallation Meeting / Coordination with Owner
 - 1. After Bid and before Pre-Construction Submittals, request a Preinstallation Meeting with General Contractor, Design Consultant, and Owner regarding Work specified in this Section.
 - 2. This meeting is meant to:
 - a. Review Scope of work, schedule, and escalation procedures.
 - b. Establish Owner's preferences and expectations and provide direction for items noted as "Coordinate with Owner."
 - 3. Contractor shall document the meeting and send Meeting Minutes to Owner and Design Consultant for sign-off.

PART 2 - PRODUCTS

2.1 **GENERAL REQUIREMENTS**

- Α. For devices and equipment with no part number specified, submit product cutsheet for a product that meets the performance requirements of these specifications, industry standard practices, and intended application.
- Β. For cabling and terminations, provide manufacturer documentation that certifies performance characteristics and compliance with ANSI/TIA 568 standards.

SINGLE-MODE FIBER OPTIC CABLING 2.2

- General Requirements: A.
 - 1. Attenuation: Maximum of 1.0dB/km at 1310 nm and 1550 nm
 - Cable shall meet the physical and performance specifications of ANSI/TIA-568 2. 3.
 - Cable Jacket marking shall be legible and contain the following:
 - Manufacturer's name a.
 - b. Fiber type, size, and quantity of strands
 - UL listing (suitable for the installed location) C.
 - Sequential length (in feet) d.
- Β. Vertical Backbone
 - Plenum-Rated 1.
 - 2. Indoor/Outdoor Rated
 - 3. **Tight-Buffered**
 - 4. Non-Armored
 - 5. Jacket Color: Black
 - 6. 12-Strand
 - 7. Manufacturers:
 - CommScope Systimax a.
 - b. Panduit
 - C. Or Approved Equal

2.3 HORIZONTAL CABLE

- A. Horizontal Cabling
 - Shall meet or exceed Category 6A requirements of TIA-568-2.D 1.
 - 2. Shall be comprised of 4-pair, 23 AWG conductors with an unshielded jacket
 - 3. Plenum/CMP listed
 - 4. Color:

5.

- Black а
- Manufacturers:
 - CommScope Systimax а.
 - b. Panduit
 - C. Or Approved Equal
- Β. In-Slab Horizontal Cabling
 - Shall meet or exceed Category 6 requirements of TIA-568-2.D 1.
 - 2. Shall be comprised of 4-pair, 23 AWG conductors with an unshielded jacket
 - Plenum/CMP listed 3.
 - Color: 4.
 - Black a. 5.
 - Manufacturers:
 - CommScope Systimax a.
 - Panduit b.
 - Or Approved Equal C.

2.4 HORIZONTAL COPPER TERMINATION

- Α. 4-Port Faceplate
 - 1. Thermoplastic - color to match Division 26 Wiring Devices
 - Shall accept Category Jack / Module specified above 2. 3.
 - Manufacturers:
 - а. CommScope Systimax
 - Panduit b.
 - Or Approved Equal C.
- Β. 2-port Surface Mount Box
 - Small thermoplastic box that will accept Category Jacks specified above. 1.
 - 2. Color:
 - Black a.
 - 3. Manufacturers:
 - CommScope Systimax a.
 - b. Panduit
 - Or Approved Equal c.
- C. Fiber Connectors
 - Shall meet or exceed requirements of TIA-568-B.3. 1.
 - Shall match corresponding Fiber Type. 2.
 - Shall be fusion splice type connection. 3.
 - 4. Shall be pre-polished
 - 5. Front connection: LC
 - Manufacturers: 6.
 - CommScope Systimax a.
 - b. Panduit
 - Or Approved Equal C.
- D. UTP Category 6A Jack / Module
 - Shall meet or exceed Category 6A requirements of TIA-5682.D 1.
 - Shall accept 4-pair, 23 AWG conductors from a UTP cable 2.
 - Front connection: female RJ45 / 8P8C 3.
 - 4. Jack Color on the Workstation Side:
 - a. Serving Network - Blue
 - Serving Dante Network Yellow b.
 - Serving Audiovisual Red C.
 - Serving Access Points Green d.
 - 5. Manufacturers:
 - CommScope Systimax a.
 - Panduit b.
 - Or Approved Equal C.
- E. **Blank Inserts**
 - 1. To be populated into any unused jack openings in faceplates or surface mount boxes.
 - Color shall match faceplate 2.
 - Manufacturers: 3.
 - CommScope Systimax a.
 - b. Panduit
 - Or Approved Equal C.
- 24/48-Port Patch Panel: F.
 - Modular 1.
 - 2. Flat
 - 3. Steel construction
 - 4. Manufacturer:
 - CommScope Systimax a.
 - b. Panduit
 - Or Approved Equal c.

2.5 PATCH CABLES

- Copper Patch Cables Head-End Α.
 - For All Horizontal Termination Locations 1.
 - a. Furnish one Category 6A patch cable in original packaging to Owner for 100% of the terminated ports in each MDF/IDF Location
 - b. Patch Cable Color:
 - Serving Network Blue 1)
 - 2) Serving Dante Network - Yellow
 - Serving Audiovisual Red 3)
 - 4) Serving Access Points - Green
 - 110% of these patch cables shall be 1-foot in length C.
 - All provided patch cables shall be 24AWG d.
 - Manufacturer: e.
 - CommScope Systimax 1)
 - 2) Panduit
 - 3) Or Approved Equal
- Β. Copper Station Cables - for Installation at Devices / Work Area Outlets
 - For All Horizontal Termination Locations Wireless 1.
 - Furnish one Category 6A patch cable in original packaging to Owner for 100% of the a. terminated ports in each MDF/IDF Location
 - b. Patch Cable Color:
 - Serving Network Blue 1)
 - 2) Serving Dante Network - Yellow
 - Serving Audiovisual Red 3)
 - Serving Access Points Green 4)
 - 25% of these patch cables shall be 5-feet in length C.
 - d. 25% of these patch cables shall be 7-feet in length
 - 50% of these patch cables shall be 10-feet in length e. f.
 - All provided patch cables shall be 24AWG
 - Manufacturer: g.
 - CommScope Systimax 1)
 - 2) Panduit
 - 3) Or Approved Equal

LABELING 2.6

- Α. Cable Labeling
 - For Horizontal Cables and Inside-Plant Backbone Cables 1.
 - Laser/Ink Jet Self Laminating Labels a.
 - b. Manufacturer:
 - Panduit S100X Series 1)
 - 2) Or equal from Brady
 - Or equal from Dymo 3)
 - 4) Or Approved Equal
 - For Outside-Plant Backbone Cables and Innerduct 2.
 - Self-laminating cable marker tag, tie on (with zip ties) a.
 - Manufacturer: b.
 - 1) Fiber Optic - Panduit PST-FO, Mooseline F1-0095
 - 2) Copper – Mooseline F1-0095
- Β. Rack and Patch Panel Labeling
 - 1. Vinvl cloth label
 - 2. Lettering/numbering text height 3/8" to 1/2"
 - 3. Manufacturer:
 - Brady PTL series a.
 - Panduit PCL037 series b.
 - Or Approved Equal C.

2.7 TESTING EQUIPMENT

- A. Optical Loss Test Set (OLTS)
- B. OTDR Tester
- C. Copper Tester
 - 1. Level IV accuracy
 - 2. Manufacturer:
 - a. Fluke designer to insert part number and calibration
 - b. Ideal Networks designer to insert part number and calibration
 - c. Or Approved Equal

PART 3 - EXECUTION

1

3.1 GENERAL INSTALLATION REQUIREMENTS

- A. Labeling Scheme
 - Coordinate with Owner to develop TIA-606 standard-compliant cable and Outlet ID labeling scheme for the Project.
 - 2. Labeling for cabling for Video Surveillance Cameras
 - a. Cable labels shall contain the device number as indicated in the technology drawings, wire origin room number, wire destination room number, and wire type (i.e., C01/122-210/CAT6A). In instances where no origin room number exists, utilize the device number as indicated in the technology drawings, wire destination room number, and wire type (i.e., C01/210/CAT6A).
 - 3. Indicate proposed cable and Outlet ID identifiers on the Shop Drawings.

3.2 GENERAL CABLE INSTALLATION REQUIREMENTS

- A. Test all cables prior to installation. By failing to perform this testing operation, the Contractor shall accept the cable as compliant and assume all liability for the replacement of the cable at no cost to the Owner should it be found defective at a later date.
- B. Cables shall be properly supported in accordance with the Contract Documents, NEC, and industry standards at all times. Improperly supported cables shall be corrected by the Contractor at no cost to the Owner.
- C. Outside of Communications Rooms, cables shall be installed in the following manner:
 - Supported by J-hooks above accessible ceiling at the following locations/intervals:
 - a. J-hooks shall be independently supported to structure and shall not utilize grid wire.
 - b. J-hooks shall be furnished with closure clips.
 - c. J-hooks shall be provided every 3-feet to 5-feet and at every change in direction or elevation.
 - d. Maximum sag between supports shall be 12-inches.
 - e. No higher than 3-feet above accessible ceiling.
 - f. Neatly bundle and wrap cables with Hook and Loop Straps at ten-foot intervals.
- D. Cables routed in conduit shall have a maximum fill ratio of 40%.
- E. Cables routed in cable tray shall have a maximum fill ratio of 50%.
- F. Cables shall be routed parallel and perpendicular to building structure, except where specifically noted on the Drawings.
- G. Cables shall not be routed in conduits or sleeves without nylon bushings. Cables installed through conduits or sleeves without nylon bushings shall be temporarily removed and reinstalled after nylon bushings are installed, without additional cost to the Owner.

- H. Cables shall be installed continuous, with no splices except where specifically indicated on the Drawings.
- I. Cables shall be installed without kinks, paint, or other visible sign of damage. Replace cables damaged during installation or construction without additional costs to the owner.
 - 1. Painted cables are not allowed, even with passing test results. Replace all painted cables without additional costs to the owner.
- J. Use of zip / nylon cable ties to bundle or support cable is prohibited.
- K. For all cabling routing within the slab on the first floor, provide in-slab cabling, as specified.

3.3 FIBER OPTIC CABLE INSTALLATION REQUIREMENTS

- A. Provide a 10-foot service loop at the ends of each cable to be coiled, mounted, and stored on the wall above the ladder rack.
- B. At each end, splice all fiber strands to factory-terminated pigtail connectors, connect directly to support audiovisual equipment. Include all required accessories such as splice trays to support all fiber/strands.
- C. Label front panel of Fiber with Cable ID and far-end destination of cable.

3.4 OWNER PROVIDED EQUIPMENT INSTALLATION REQUIREMENTS

- A. All shown wireless access point locations shall be provided by Owner and installed by contractor. All labor to mount shall be part of the base contract. Locations to be verified with Owner prior to installation completion.
- B. A quarter-inch label shall be placed on the face of each wireless access point. Label to be provided by contractor with coordination of naming convention from Owner.
- C. Any wireless access point that is installed within open ceiling shall have a provided junction box and conduit from the nearest non-continuous pathway.
- D. Any wireless access point that is installed within hard-lid ceiling shall have a provided junction box and conduit from the nearest accessible ceiling.

3.5 HORIZONTAL CABLE INSTALLATION REQUIREMENTS

- A. No horizontal cable shall be longer than two hundred ninety-five (295) feet. If any horizontal cable will be longer than two hundred ninety-five (295) feet, Contractor shall stop installation of the cable and immediately notify Architect/Design Consultant in writing. If Contractor fails to notify the Architect/Design Consultant in writing, Contractor shall replace cable at no cost to the Owner.
- B. Provide horizontal cables within each serving area from the respective Communications Room to each outlet location as indicated on the Drawings.
- C. Provide a 10-foot service loop of horizontal cable bundles in each Communications Room, to be neatly stored in overhead ladder rack.
- D. Provide a 5-foot service loop of each horizontal cable coiled and supported on J-hook equipment side of the permanent link or where conduit from outlet stubs into nearest accessible ceiling space.
- E. All wireless access points shall get a 30' service loop provided on the equipment side of the permanent link or where conduit from outlet stubs into nearest accessible ceiling space.
- F. Provide 6" to 12" of cable slack in each backbox, where possible. Cover/mask each outlet box prior to painting.

- G. Terminate cables with TIA 568-B sequence.
- H. Provide in-line surge suppression at exterior devices (such as cameras and wireless access points) that are susceptible to lightning strikes (outside the building's "Zone of Protection").
- I. For Wireless Access Point locations provide black grid label, with white lettering directly below.

3.6 FACEPLATE INSTALLATION REQUIREMENTS

- A. Provide faceplates or surface-mounted boxes to house modular jacks as indicated in the Drawings.
- B. Coordinate color of faceplate prior to Submittals. Color shall match adjacent electrical devices.
- C. Install faceplates level and plum (bottom parallel to floor/countertop). Remove protective film after installation.
- D. Install faceplate label with Cable ID that matches Record Drawings and Test Results.
- E. Fill any unused jack openings with blank inserts.
- F. Properly protect information outlets from damage by other trades during construction. Correct any damaged or painted outlets at no cost to the Owner.

3.7 LABELING

- A. Contractor shall verify room numbers and confirm the final room numbering scheme prior to generating any labels.
- B. Horizontal Cables shall be labeled within (12) inches from the termination point inside the Equipment Room/Telecommunications Rooms.
- C. Horizontal Cables shall be labeled within (6) inches from the termination point at the workstation end.
- D. Cables shall be labeled identically at both ends.
- E. Horizontal Cable
 - 1. Inside Equipment Rooms
 - a. Horizontal cables shall be labeled at each end with the destination end and origin room number, patch panel number, and port number. (i.e., B126-B127-A01).
 - b. Patch panels in each closet shall be labeled sequentially starting with the first Patch Panel in the top of the first relay rack (A, B, C, D, E, etc.).
 - c. All patch panels will indicate the room number along with the patch panel port designation. The labels shall be mechanical labels that are neatly printed with uniform font and evenly spaced across the patch panel. Room numbers will be in sequential order throughout the panels as indicated on the drawings.
- F. Workstation Faceplates
 - 1. Cables and wall plates shall be labeled denoting origin, Equipment Room/Telecommunications Room Number, Patch Panel, 110-type termination block, and Port Number. (i.e., B127-A01).

3.8 FUNCTIONAL AND PERFORMANCE TESTING

- A. The following additional testing requirements shall be provided:
 - 1. Fiber Optic Testing
 - a. Installed strands shall be tested and certified in accordance with industry standards.
 - b. Only Manufacturer or BICSI Certified Technicians shall perform testing.

- c. Test and certify all fiber optic cable strands with approved field tester(s) that are within their calibration period. The Contractor shall be liable for all re-testing required in the event tests are performed with non-approved test equipment or tester(s) that are not within their calibration period.
- d. Provide calibration results from the manufacturer showing the current calibration of the testers.
- e. Notify the Architect/Design Consultant a minimum of five (5) days in advance to observe cable testing.
- f. The Architect/Design Consultant may randomly select 5% of the installed strands for test verification purposes. The Contractor shall re-test these strands in the presence of the Architect/Design Consultant and the results shall be compared to the previously Contractor submitted test results. In the event that any of the verification tests differ in results from the previously submitted test results, all testing shall be declared a failure and the Contractor shall re-test 100% of the installed strands at no cost to the Owner.
- 2. Category Cable Testing
 - a. Cable links shall be tested in accordance with industry standards.
 - b. Only Manufacturer Certified Technicians shall perform testing.
 - c. Test and certify the structured cable system with approved field tester(s) that are within their calibration period. The Contractor shall be liable for all re-testing required in the event tests are performed with non-approved test equipment or tester(s) that are not within their calibration period.
 - d. No Fail or *Pass results will be accepted.
 - e. Notify the Architect/Design Consultant a minimum of five (5) days in advance to observe field testing.
 - f. The Architect/Design Consultant may randomly select 5% of the installed links for test verification purposes. The Contractor shall re-test these links in the presence of the Architect/ Design Consultant and the results shall be compared to the previously Contractor submitted test results. In the event that any of the verification tests differ in results from the previously submitted test results, all testing shall be declared a failure and the Contractor shall re-test 100% of the installed links at no cost to the Owner.
- 3. Test Documentation
 - a. Test Results shall be provided in both PDF and original tester format.
 - b. Test Results shall be organized in the following main sections, and alphabetically by Communications Room name/number and then alphabetically Cable ID within each section:
 - 1) Tester(s) Calibration Certificate(s)
 - 2) Inter-Building Backbone Fiber Optic Cable
 - 3) Inter-Building Backbone Copper Cable
 - 4) Intra-Building Backbone Fiber Optic Cable
 - 5) Intra-Building Backbone Count Copper
 - 6) Horizontal Category 3 Cable
 - 7) Horizontal Category 5e Cable
 - 8) Horizontal Category 6 Cable
 - 9) Horizontal Category 6A Cable
 - 10) Main Building Ground
 - 11) Two-Point Ground/Continuity Test for the TMGB and then each TGB.

3.9 FIELD OBSERVATIONS

A. Prior to the Final Site Observation by the Consultant, submit the Preliminary Project Closeout documentation. Refer to Part 1 of this Section for requirements.

3.10 DEMONSTRATION, TRAINING, AND ADJUSTMENTS

- A. At the time of Owner Training, furnish the following to the Owner:
 - 1. Patch Cords
 - 2. Station Cords
 - 3. Termination tool
 - 4. Paper copy of O&M (Operation and Maintenance) manuals and associated warranty information supplied for each type of equipment. Place each copy into a plastic sleeve in a three-ring binder; do not provide duplicates unless there is a serial number.

END OF SECTION 271000

SECTION 274100 – AUDIOVISUAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section, and the associated T-Drawings, identify the requirements, technical design, and specifications for the Audiovisual Systems for the UNT Jazz Lab Renovations in Denton, Texas ("Owner").
- B. Contractor shall include materials, equipment, and labor necessary to provide a complete and functional Audiovisual Systems regardless of any items not listed or described in this specification or associated drawings.

1.2 RELATED REQUIREMENTS

- A. The Drawings, Specifications, General Conditions, and Supplementary General Conditions apply to the work specified in Division 27 and shall be complied with every respect. The Contractor shall examine all the items which make up the Contract Documents and shall coordinate them with the work on the project.
- B. Contractor Experience Requirements
 - 1. The Contractor shall possess all relevant Manufacturer Certifications for both the company and individual technicians prior to submitting a bid for the work.
 - 2. The Contractor's Project Manager shall have a minimum of five (5) years' experience installing and/or project management experience for Audio-Visual Systems. This Project Manager shall have a current CTS certification from AVIXA. This Project Manager shall be available for all onsite coordination meetings.
 - 3. The Contractor shall have been in business for a minimum of five (5) years.
 - 4. The Contractor shall have completed a minimum of five (5) projects similar in size and scope to the Owner's installation, where the systems have been in continuous satisfactory operation for at least one (1) year.
- C. Subcontractors shall be identified at the time of bid and comply with the requirements and intentions of these specifications, associated drawings, and related contract documents.

1.3 SUBMITTAL REQUIREMENTS

- A. Pre-Installation Submittal
 - 1. General requirements:
 - a. Contractor shall not order, purchase, or install any equipment until pre-installation submittals have been accepted in writing by the Owner/Design Consultant.
 - b. Contractor shall ensure submittals are submitted in a timely manner to ensure all products can be ordered and received on site in order to not cause any delays. If there are any concerns with any products having long lead times, those products shall be clearly identified in writing so the review and approval can be expedited.
 - c. All submittals shall be submitted in the same sequence as they are listed in the specifications (i.e., product data in the sequence items are listed in the product data section, manufacturer product certifications for company, manufacturer product certifications for installers, etc.). Submittals not in the proper sequence will not be approved.
 - 2. Contractor Qualifications:
 - a. Manufacturer Product Certifications for Company.
 - b. Manufacturer Product Certifications for Installers.
 - c. Manufacturer Certifications for testing equipment technicians.
 - d. Manufacturer Certifications for testing equipment calibration.
 - e. Resume and copy of CTS' certification for Contractor's Project Manager.
 - f. Documentation indicating that Contractor has been in business for (5) years.
 - g. Quantity of full-time local technicians within a one-hundred-mile radius of the project site.

- h. List of five (5) contractor-installed projects of a similar size and scope that have been in operation for at least (1) year. The Contractor shall provide the following information for each project: Project Name, Project Location, Project Start Date, Project Completion Date, Project Start Cost, Project Completion Cost, Brief Description of Project, Client Point of Contact Name and Phone Number.
- i. List of completed and ongoing projects with the Owner. The Contractor shall provide the following information for each project: Project Name, Project Location, Project Start Date, Project Completion Date, Project Start Cost, Project Completion Cost, and Brief Description of Project.
- 3. List of subcontractors performing any work on the project. List shall clearly identify the subcontractor's legal name and address, the scope of work to be performed by the subcontractors and the overall percentage of the project being provided by the subcontractor. If there are no subcontractors performing any work on the project, submit a statement on company letterhead clearly indicating no subcontractors will be performing any work on this project.
- 4. Bill-of-Materials / Equipment List
- 5. EASE Model of Space with Submitted Product
- 6. Product Cutsheets
 - a. Submit Product Data / Cutsheets only. Do not submit a user or operator's manual in lieu of a specification sheet. If a specification sheet is not available from the manufacturer, submit a catalog page or the specification appendix (only) from the operation manual. The last resort acceptable submittal is a pdf of the specification section of the product from the manufacturer's website.
 - b. Product data must be in the same order as listed in the specification.
- 7. Shop Drawings
 - a. General Requirements:
 - 1) Shop drawings shall be provided clearly depicting any proposed modification to the project drawings. Any modifications shall be highlighted on the shop drawings.
 - Shop drawings shall include system line diagrams, floor plans, rack elevations, and/or detail drawings of sufficient quality to convey understanding and specific installation requirements of the Project.
- 8. Custom Programmed Control System Submittal
 - a. Provide the control system submittal prior to initiating any substantial programming work and/or production of custom produced keys/labeling. Do not proceed with custom work until the proposed work product is approved in writing.
- 9. Contractor shall maintain a set of shop drawings on site at all times and shall update the shop drawings on a weekly basis. Shop drawings shall be made available for inspection at the request of the Owner/Design Consultant.
- B. Project Closeout Submittal
 - The Contractor shall provide comprehensive drawings accurately depicting the "as-built" condition of the Audiovisual systems as it was installed to the Owner/Consultant at the time of substantial completion. Final payment will not be made until these as-built documents are received and approved by the Owner/Consultant.
 - a. As-built drawings must be provided in digital format on a USB flash drive, other memory device(s) and/or delivered electronically.
 - Documentation shall include but not be limited to:
 - a. Equipment O & M manuals
 - b. Installed equipment list (manufacturer model numbers, serial numbers, installed locations, etc.)
 - c. Configuration information in Microsoft Excel format (IP addresses, Passwords and Usernames etc.)
 - d. Warranty support information
 - e. Documentation shall be bound, sectioned and tabbed in the following order (when applicable):
 - 1) Equipment O&M Manuals (Bound Separately)
 - 2) Installed Equipment List
 - 3) Configuration Information
 - 4) Warranty Support Information
 - f. All custom programming files (control systems, audio DSP's etc.) shall be delivered to the Owner. The Programmer shall transfer all source code/files related to the system. All

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programming shall be delivered in both compiled and un-compiled form. Upon system acceptance, ownership of the programmed system files shall be transferred to the Owner for their future use or modification. No claim shall be made by the programmer for continued licensing or other ongoing fees for continued usage of the system(s).

1.4 COORDINATION

- A. Preinstallation Meeting / Coordination with Owner:
 - 1. After Bid and before Preconstruction Submittals, request a Preinstallation Meeting with General Contractor, Design Consultant, and Owner regarding Work specified in this Section.
 - 2. This meeting is meant to establish Owner's preferences and expectations and provide direction for items noted as "Coordinate with Owner".
 - 3. Any derivations from the specified product shall be accounted for in a pre-submittal meeting and reviewed with the Owner prior to purchase.
 - 4. Contractor shall document the meeting and send Meeting Minutes to Owner and Design Consultant for sign-off.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. Owner/Design Consultant will have final determination of acceptability of all proposed equipment and must approve submitted equipment prior to purchase or installation.
- B. Proposed equivalent items must be approved in writing by the Owner/Design Consultant prior to purchase or installation. Proposed equivalent items must meet or exceed these specifications and the specifications of the specified item.
- C. In the event a manufacturer's specified product or part number has changed or is no longer available, Contractor shall substitute the appropriate equivalent manufacturer's part number.
- D. In the event of a discrepancy between the specifications and the drawings, the greater quantity and/or better quality will be furnished.
- E. For listed products with no part number specified, Contractor shall provide a product that meets the performance requirements of these specifications, industry standard practices, and intended application.
- F. All wiring, equipment, and installation materials shall be new and of the highest quality.
- G. Labels on all cabling, materials, and equipment must indicate a nationally recognized testing laboratory.
- H. Contractor shall provide the most current version of the specified product, at no additional cost to the Owner. The most current version shall meet the performance requirements of the current product, anything less than will not be accepted.
- I. Contractor shall review all products specified and required for this project to determine if there are any lead times for any products that may cause any delay. Contractor shall clearly identify any concerns with lead times in writing to the Owner/Design Consultant prior to submitting a proposal for this work. If the Contractor does not identify any concerns with products having long lead times, it will be understood there are no long lead time issues, and the Contractor will have all products on-site when needed to complete the job as required.

2.2 AUDIOVISUAL EQUIPMENT LIST

A. The attached Audiovisual Equipment list is to be treated as a basis of design. Products specified are to be the minimum performance specifications, with the equivalent from the approved manufacturers in Section 2.3.

B. Yamaha and NEXO Devices were used as the basis of design. Equivalents by Meyer Sound shall be acceptable.

2.3 APPROVED MANUFACTURERS

- A. Audio Systems
 - 1. Speaker Systems
 - a. Mid & High Range Speakers
 - 1) Minimum of 85Hz to 19kHz frequency response
 - 2) Minimum overall dispersion of 90°x 40°
 - 3) Powered at the Equipment Rack
 - 4) Approved Manufacturers:
 - a) NEXO ID84
 - b) Approved Equal by Meyer Sound
 - b. Practice & Monitor Speakers
 - 1) Minimum of 95Hz to 20kHz frequency response
 - 2) Minimum overall dispersion of 120°x 60°
 - 3) Powered at the Equipment Rack
 - 4) Approved Manufacturers:
 - a) NEXO ID24
 - b) Approved Equal by Meyer Sound
 - c. Low Range Speakers
 - 1) Minimum of 45Hz to 150kHz frequency response
 - 2) Minimum overall dispersion of 120°x 60°
 - 3) Powered at the Equipment Rack
 - 4) Approved Manufacturers:
 - a) NEXO ELS4500
 - b) Approved Equal by Meyer Sound
- B. Speaker Amplification Systems 1. Performance Amplifie
 - Performance Amplifier and Controller
 - a. Integral Dante Network Card
 - b. Rack Mounted
 - c. Integral NL4 Speaker Connectors
 - d. Approved Manufacturers:
 - 1) NEXO NXAMP4X1MK2
 - 2) Approved Equal by Meyer Sound
 - 2. Practice & Monitor Controller
 - a. Integral Dante Network Card
 - b. Rack Mounted
 - c. Approved Manufacturers:
 - 1) NEXO DTD-T
 - 2) Approved Equal by Meyer Sound
 - 3. Practice & Monitor Amplifier
 - a. Integral Dante Network Card
 - b. Rack Mounted
 - c. Approved Manufacturers:
 - 1) NEXO DTDAMP4x0.7
 - 2) Approved Equal by Meyer Sound
- C. Head-End Equipment Audio Systems
 - Equipment Rack Wall Mounted
 - a. Minimum of 40RU
 - b. Integral Fan and Filter Kit
 - c. Plexiglass Front Door
 - d. Approved Manufacturers:
 - 1) Middle Atlantic DWR Series

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- 2) Or Approved Equal
- Equipment Rack Floor Mounted
- a. Minimum of 21RU
 - b. Integral Fan and Filter Kit
 - c. Integral Casters
 - d. Plexiglass Front Door
 - e. Equipment Rack Accessories
 - 1) 1RU Fan Kit
 - 2) 1RU Perforated Filler Panels
 - 3) 2RU/3RU Drawers
 - 4) Approved Manufacturers:
 - a) Middle Atlantic DWR Series
 - b) Or Approved Equal
- 3. Microphone Mixer
 - a. Rack Mounted
 - b. Minimum of 8-Channel with Automatic Mixing
 - c. Phantom Power
 - d. Approved Manufacturers:
 - 1) Shure SCM-810
 - 2) Or Approved Equal
- 4. Media Player
 - a. Rack Mounted
 - b. Integral CD Player
 - c. Integral Bluetooth Radio
 - d. Approved Manufacturers:
 - 1) Denon DN-300Z
 - 2) Or Approved Equal
- 5. Audio Mixing Console
 - a. Integral Dante Network Card
 - b. Minimum of 24 Integral Bus Channels
 - c. Minimum of 1 Integral Output Meter.
 - d. Provide with Streaming Adapter
 - e. Approved Manufacturers:
 - 1) Yamaha CL5
 - 2) Or Approved Equal
- 6. Handheld Microphones
 - a. Cardioid Pickup Pattern
 - b. Integral Spherical Wind and Pop Filter
 - c. Approved Manufacturers:
 - 1) Shure SM58
 - Or Approved Equal
 - Ceiling Mounted Microphones
 - a. Cardioid Pickup Pattern
 - b. Integral Windscreen
 - c. Shall be Black

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- d. Approved Manufacturers:
 - 1) Shure CVO
 - 2) Or Approved Equal
- 8. Analog to Dante Adapter
 - a. Minimum of Four Analog Inputs
 - b. Connection Shall Be by Block Connector
 - c. Approved Manufacturers:
 - 1) Shure ANI4IN
 - 2) Or Approved Equal
- 9. Rack Mounted Power:
 - a. Input Voltage:120V
 - b. Minimum of eight 5-15R Connections

7.

- Approved Manufacturers: C. 1)
 - Furman
 - 2) Or Approved Equal
- Rack Mounted Power Distribution: 10.
 - Input Voltage:120V a.
 - Minimum of sixteen 5-15R Connections b.
 - Approved Manufacturers: C.
 - 1) Furman
 - Or Approved Equal 2)

2.4 PROJECTOR, PROJECTOR SCREEN, AND ACCESSORIES

- A. Ceiling Mounted Projector
 - Shall Have a Laser Light Source 1.
 - 2. Shall Have a Minimum of 6000 Lumens
 - Shall Have a Minimum of One HDMI and One RS-232 Port 3.
 - Shall be Black 4.
 - 5. Approved Manufacturers
 - Panasonic a.
 - Epson b.
 - Or Approved Equal C.
- B. Ceiling Hung Projector Screen
 - Shall Have Motorized Tab Tension Drop 1
 - 2. Shall be a 159" Screen Size with a 16:9 Aspect Ratio
 - 3. Shall Have Enough Drop to be 7' Above Finished Floor
 - Shall Have Integral Low Voltage Controller 4.
 - Shall Have Ambient Light Rejection 5.
 - 6. Minimum of an 85° Viewing Angle
 - Shall be Black 7.
 - 8. Approved Manufacturers
 - a. Da-Lite
 - b. Draper
 - Or Approved Equal C.
- C. Projector Ceiling Mount
 - Shall be Mounted from the Structure 1.
 - 2. Shall Have a Minimum Drop of 9'-12'
 - 3. Shall Have Integral Projector Mount
 - Shall be Black 4.
 - 5. **Approved Manufacturers**
 - a. Chief
 - Or Approved Equal b.

2.5 HDMI SIGNAL EXTENSION & CONTROL

- A. HDBaseT (HDMI) Transmitter
 - Shall Support a Minimum Resolution of 4K 1.
 - 2. Shall be Powered by Power-Over-HDBaseT
 - 3. Shall Have a Minimum of One HDMI Input
 - Approved Manufacturers 4.
 - Atlona a.
 - Hall Technologies b.
 - Or Approved Equal C.
- B. HDBaseT (HDMI) Receiver
 - Shall Support a Minimum Resolution of 4K 1.

- 2. Shall be Powered by Power-Over-HDBaseT
- 3. Shall Have a Minimum of One HDMI Output
- 4. Shall Have a Minimum of One RS-232 Output
- 5. Approved Manufacturers
 - a. Atlona
 - b. Hall Technologies
 - c. Or Approved Equal
- C. HDBaseT (HDMI) Matrix Switcher
 - 1. Shall Support a Minimum Resolution of 4K
 - 2. Shall Have a Minimum of One HDBaseT Output
 - 3. Shall Connect to Control Network
 - 4. Approved Manufacturers
 - a. Atlona
 - b. Hall Technologies
 - c. Or Approved Equal
- D. Audiovisual Control Gateway
 - 1. Minimum of Two Ethernet Ports
 - 2. Shall be Rack Mounted
 - 3. Shall Have a Minimum of One RS-232 Output
 - 4. Approved Manufacturers
 - a. Atlona
 - b. Hall Technologies
 - c. Or Approved Equal
- E. Audiovisual Control Touch Screen
 - 1. Minimum of 10" Screen Size
 - 2. Should be Rack Mounted
 - 3. Shall be Powered by PoE
 - 4. Approved Manufacturers
 - a. Atlona
 - b. Hall Technologies
 - c. Or Approved Equal

2.6 BULK CABLE AND CONNECTORS

- A. Category 6A Cable F/UTP
 - 1. Shielded, 4-pair, 23AWG cable designed to meet or exceed the TIA-568 standard for Category 6A applications and IEEE 802.3 Type 4 Power-over-Ethernet
 - 2. Approved for point-to-point AV distribution over twisted-pair applications
 - 3. Plenum-rated
 - 4. Approved Manufacturers:
 - a. Belden
 - b. CommScope
 - c. Panduit
- B. Category 6A Connector Shielded
 - 1. Shielded 4-pair connector designed to meet or exceed the TIA-568 standard for Category 6A applications and IEEE 802.3 Type 4 Power-over-Ethernet
 - 2. Female Connector (for patch panel and faceplate installation):
 - 3. Approved Manufacturers:
 - a. Belden
 - b. CommScope
 - c. Panduit
- C. RG6 SDI Connections
 - Plenum Rated

1.

- 2. Quad Shield RG-6 Coaxial
- 3. BNC Barrel Connectors
- 4. Approved Manufacturers:
 - a. Belden
 - b. CommScope
 - c. Carol

2.7 CABLING ACCESSORIES

- A. J-Hooks
 - 1. To be utilized to support AV cabling above accessible ceiling every 5 feet or less.
 - 2. Shall be listed as meeting UL 2239 requirements
 - 3. Shall be designed and equipped with accessories (if needed) to be supported by the following methods:
 - a. Threaded rod from structure
 - b. Wall-mounted to concrete/CMU walls or wood or metal studs
 - c. Beam clamps
 - 4. Equipped with retainer or strap over top of J-hook once cables are installed
 - 5. Sized to support quantity of installed cables, plus 25% spare capacity
 - 6. Manufacturer:
 - a. Erico Caddy CAT Links
 - b. Panduit J-Mod Cable Supports
 - c. Or Approved Equal
- B. Hook & Loop Straps
 - 1. Velcro construction with hook/loop strap
 - 2. Color: black
 - 3. Manufacturer:
 - a. Panduit Tak-Ty Ties
 - b. VELCRO ONE-WRAP
 - c. Or Approved Equal

2.8 LABELING & TESTING

- A. Cable Labeling
 - 1. Laser/Ink Jet Self Laminating Labels
 - 2. Manufacturer:
 - a. Panduit S100X Series
 - b. Brady
 - c. Dymo
 - d. Hellermann Tyton
 - e. Or Approved Equal

PART 3 - EXECUTION

3.1 CODES, STANDARDS, REGULATIONS

- A. American National Standards Institute (ANSI)
- B. American Society for Testing and Materials (ASTM)
- C. ASTM B 1 (2001; R 2007) Standard Specification for Hard-Drawn Copper Wire

- D. ASTM B 8 (2004) Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
- E. ASTM D 1557 (2007) Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3) (2700 kN-m/m3)
- F. ASTM D 709 (2001; R 2007) Laminated Thermosetting Materials
- G. Alliance for Telecommunications Industry Solutions (ATIS)
- H. Building Industry Consulting Service International (BICSI)
- I. Telecommunications Distribution Methods Manual 14th Edition
- J. Outside Plant Design Reference Manual 5th Edition
- K. ANSI/BICSI 002-2011, Data Center Design and Implementation Best Practices
- L. NECA/BICSI 568-2006 Standard for Installing Commercial Building Telecommunications Cabling
- M. NECA/BICSI 607-2011, Standard for Telecommunications Bonding and Grounding Planning and Installation Methods for Commercial Buildings
- N. Electronics Industry Alliance (EIA)
- O. Federal Communications Commission (FCC)
- P. FCC Part 15, Radiated Emissions Limits, revised 1998
- Q. FCC Part 68, Connection of Terminal Equipment to the Telephone Network, revised 1998
- R. FCC Part 76, Cable Television Service, revised 1998
- S. Insulated Cable Design Consultants Association (ICEA)
- T. ICEA S-87-640 (2006) Fiber Optic Outside Plant Communications Cable
- U. ICEA S-98-688 (2006) Broadband Twisted Pair, Telecommunications Cable Aircore, Polyolefin Insulated Copper Conductors
- V. ICEA S-99-689 (2006) Broadband Twisted Pair Telecommunications Cable Filled, Polyolefin Insulated Copper Conductors
- W. International Electrotechnical Commission (IEC)
- X. Institute of Electrical and Electronics Design Consultants, Inc. (IEEE)
- Y. IEEE Standard 81-1983, IEEE Guide for Measuring Earth Resistance, Ground Impedance, and Earth Surface Potential of a Ground System
- Z. IEEE Standard 1100-1999, Recommended for practice for Powering and Grounding Sensitive
- AA. Electronic Equipment in Industrial and Commercial Power Systems (IEEE Emerald Book)
- BB. IEEE C2 (2007; Errata 2007; INT 2008) National Electrical Safety Code
- CC. IEEE Std 100 (2000) The Authoritative Dictionary of IEEE Standards Terms

- DD. International Organization for Standardization (ISO)
- EE. International Organization of Standardization/International Electrotechnical Commission (ISO/IEC)
- FF. ISO/IEC 11801, Information Technology-Generic Cabling for Customer Premises, 1995
- GG.ISO/IEC 14763-1, Information Technology-Implementation and Operation of Customer Premises Cabling-Administration, 1999
- HH. ISO/IEC 11801, Information Technology-Generic Cabling for Customer Premises, 1995
- II. ISO/IEC 14763-1, Information Technology-Implementation and Operation of Customer Premises Cabling-Administration, 1999
- JJ. National Cable Television Association (NCTA)
- KK. National Electrical Manufacturers Association (NEMA)
- LL. NEMA C62.61 (1993) Gas Tube Surge Arresters on Wire Line Telephone Circuits
- MM. National Fire Protection Association (NFPA)
- NN. NFPA-70, National Electrical Code
- OO.NFPA-75, Protection of Electronic Computer Data Processing Equipment.
- PP. NFPA-101, Life Safety Code
- QQ.NFPA-297, Guide on Principles and Practices for Telecommunications Systems
- RR. NFPA-780, Standard for the Installation of Lightning Protection Systems.
- SS. National Institute Standards and Technology (NIST)
- TT. Occupational Safety and Health Administration (OSHA)
- UU. Telecommunications Industry Association (TIA)
- VV. ANSI/TIA-568.0-D-1, Generic Telecommunications Cabling for Customer Premises.
- WW. ANSI/TIA-568.1-D, Commercial Building Telecommunications Cabling Standard.
- XX. ANSI/TIA -568.0-D.2, Balanced Twisted-Pair Telecommunications Cabling and Components Standard.
- YY. ANSI/TIA-568.3-D-1, Optical Fiber Cabling Components Standard.
- ZZ. ANSI/TIA–569-E Commercial Building Standard for Telecommunications Pathways and Spaces.
- AAA. ANSI/TIA-606-C, Administration Standard for the Telecommunications Infrastructure.
- BBB. ANSI/TIA-607-D, Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises.
- CCC. ANSI/TIA-758-D, Customer-Owned Outside Plant Telecommunications Infrastructure Standard.
- DDD. Underwriters Laboratories, Inc. (UL)
- EEE. UL 510 (2005; Rev thru Aug 2005) Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape

FFF. UL 910 (NFPA 262 1990) Applicable Flame Test

3.2 GENERAL REQUIREMENTS

- A. In the event of any conflicts between documents referenced herein and the contents of this specification, the Contractor shall notify the Owner/Design Consultant in writing of any such occurrences before purchasing or installing any equipment or materials. The Owner/Design Consultant will notify the Contractor of any actions required to resolve these conflicts. Such actions may include but are not limited to design changes, equipment, materials and/or installation changes. In any event Contractor shall not supersede specifications and standards from the latest NFPA and NEC publications. In the event of any conflicts between Standards and Codes the more stringent shall take precedence.
- B. Contractor shall comply with the requirements of local Authority Having Jurisdiction (AHJ), State of California, the National Fire Protection Association (NFPA), and the National Electrical Code (NEC). If the Contractor identifies any item in the plans or specifications that will not strictly comply with the aforementioned laws, ordinances, and rules, the matter shall be referred to the Owner/Design Consultant for direction before proceeding with that part of the work.
- C. The Contractor shall be responsible for coordination with other trades to ensure any conflicts or potential conflicts are resolved prior to any work beginning on the project.
- D. The Contractor shall install the materials in accordance with these specifications and the manufacturer's installation guidelines.
- E. No deviations from the plans or specifications shall be made without full consent in writing of the Owner/Design Consultant. The Contractor shall have written approval from the Owner/Design Consultant for any additional work beyond the Contract Documents prior to beginning such work. If the Contractor does not obtain written approval from the Owner/Design Consultant prior to proceeding with the work, the contractor shall not be reimbursed for the work.
- F. The Contractor shall obtain written permission from the Owner/Design Consultant before proceeding with any work that would necessitate cutting into or through any part of the building structure such as, but not limited to girders, beams, floors, walls, roofs, or ceilings.
- G. Contractor shall notify the Owner/Design Consultant a minimum of (2) weeks prior to beginning work and will participate in a pre-construction meeting with the Owner/Design Consultant to perform a walkthrough, review the scope of work, schedule, and escalation procedures.
- H. The Contractor shall maintain a work area free of debris, trash, empty cable reels, scrap cable, etc., and dispose of such items on a daily basis and return the site to the original state of cleanliness. The Contractor shall not use Owner's facilities for the disposal of excess or scrap materials.
- I. Equipment and materials installed by the Contractor shall be free of defects and damage.
- J. Contractor shall be responsible for the repair of any damage caused by the contractor during the installation.
- K. Contractor shall test all cables prior to installation. By failing to perform this testing operation, the Contractor shall accept the cable as compliant and assume all liability for the replacement of the cable at no cost to the Owner should it be found defective at a later date.
- L. Contractor shall maintain a set of working specifications, design drawings, and record drawings to be kept on site at all times and shall update the record drawings with any changes on a weekly basis. Record drawings shall be made available for inspection at the request of the Owner/Design Consultant.
- M. Equipment and materials shall be consistent throughout the installation. Where multiple units of the same type of equipment and materials are required, these units shall be a standard product with the same manufacturer and model number.

- N. Equipment and materials shall be delivered and stored in accordance with the manufacturer's guidelines at the Contractor's expense.
- O. Contractor shall make all stored equipment and materials available for inspection at the request of the Owner/Design Consultant.
- P. All equipment and material used in the installation shall be approved by the manufacturer for the environment in which it is being installed.
- Q. Cables shall be properly supported in accordance with industry standards at all times. Improperly supported cables shall be corrected by the Contractor at no cost to the Owner.
- R. Contractor shall be responsible to properly protect information outlets from damage by other trades during construction.
- S. Cables shall be routed at 90-degree angles to the building structure. At no time shall a diagonal pull be installed.
- T. Prior to connecting any Audio-Visual equipment to a power receptacle, use a ground circuit impedance tester to confirm AC wiring and grounding has been installed correctly; confirm voltage and neutral-to-ground wiring are correct prior to energizing equipment. If not correct, notify Division 26 Contractor of the issue.

3.3 GENERAL CABLE INSTALLATION REQUIREMENTS

- A. Test all cables prior to installation. By failing to perform this testing operation, the Contractor shall accept the cable as compliant and assume all liability for the replacement of the cable at no cost to the Owner should it be found defective at a later date.
- B. Cables shall be properly supported in accordance with the Contract Documents, NEC, and industry standards at all times. Improperly supported cables shall be corrected by the Contractor at no cost to the Owner.
- C. Outside of Communications Rooms, cables shall be installed in the following manner:
- D. Within continuous concealed or underground conduit.
- E. Within cable tray.
- F. Supported by J-hooks above accessible ceiling at the following locations/intervals:
 - 1. J-hooks shall be independently supported to structure and shall not utilize grid wire.
 - 2. J-hooks shall be furnished with closure clips.
 - 3. J-hooks shall be provided every 3-feet to 5-feet and at every change in direction or elevation.
 - 4. Maximum sag between supports shall be 12-inches.
 - 5. No higher than 3-feet above accessible ceiling.
 - 6. Neatly bundle and wrap cables with Hook and Loop Straps at ten-foot intervals.
- G. Cables routed in conduit shall have a maximum fill ratio of 40%.
- H. Cables shall be routed parallel and perpendicular to building structure, except where specifically noted on the Drawings.
- I. Cables shall not be routed in conduits or sleeves without nylon bushings. Cables installed through conduits or sleeves without nylon bushings shall be temporarily removed and reinstalled after nylon bushings are installed, without additional cost to the Owner.
- J. Cables shall be installed continuous, with no splices except where specifically indicated on the Drawings.
- K. Cables shall be installed without kinks, paint, or other visible sign of damage. Replace cables damaged during installation or construction without additional costs to the owner.

- L. Painted cables are not allowed, even with passing test results. Replace all painted cables without additional costs to the owner.
- M. Use of zip / nylon cable ties to bundle or support cable is prohibited.
- N. Equipment Racks, cabling within the rack, and labeling shall be installed per AVIXA's Rack Building for Audiovisual Systems (F502.01:2018) publication/standard.

3.4 IDENTIFICATION

- A. Permanently affix labels to each cable. Labels shall be affixed at a distance of 3" from the end of each cable end. If label cannot be easily viewed from this placement, cable shall be placed 1" from the cable end. Cable label shall include unique cable number, source system name, source termination point, and destination system name and destination termination point. Cable labels shall be identical on each cable end. Contact Design Consultant for additional information, if necessary.
- B. Provide equipment labeling for each device front and back according to the system name used in the shop drawings. Use laminated labels (white print on black labels in front, black print on yellow in back) or equivalent.
- C. Provide engraved plastic laminate labels for all racks. Rack labels to be 1" x 2" with white lettering (Arial font) on black matte finish, plastic.

3.5 AV CONTROL SYSTEM AND AV TRANSPORT

- A. Contractor shall furnish, install and configure a complete audio/video switching, transport and control system as specified and indicated on the technology drawings.
- B. Contractor is responsible for all ancillary AV switching or active components necessary to provide a complete and functional AV system.
- C. Contractor is responsible for all AV specific cabling, interconnects, patch cords and other ancillary devices required to provide a complete system.
- D. Once the system programming has been completed and implemented, the Contractor shall allow a minimum 3-month evaluation period for the Owner to use the system and provide feedback.
- E. After the evaluation period, the Contractor shall coordinate with the Owner to gain feedback on the system operation. The Contractor shall record the Owner's feedback and provide programming adjustments to resolve any items as directed by the Owner up to 16 additional hours of programming, per the feedback.
- F. Contractor shall install the entire control system as specified in accordance with manufactures guidelines and industry best practices.
- G. Control processor(s) shall be connected to an un-switched power outlet. Control processor(s) shall be connected to UPS outlet(s) if available.
- H. All Audio Control and Routing shall be ran over the existing UNT College of Music Dante Network.
- I. Control functions include (but are not limited to) the following:
 - 1. System/Device Power On/Off.
 - 2. Projector On/Off
 - 3. Projector Screen Up/Down
 - 4. Program Volume Adjustment.
 - 5. Audio DSP Control.
- J. All control system programming shall be delivered to the Owner. The Programmer shall transfer all source code/files related to the system. All programming shall be delivered in both compiled and non-compiled

form. Upon system acceptance, ownership of the control programming shall be transferred to the Owner for their future use or modification. No claim shall be made by the programmer for continued licensing or other ongoing fees for continued usage of the control system program.

3.6 FUNCTIONAL NARRATIVES

- A. Head-End Equipment
 - 1. Wall Mounted Rack EQ1
 - a. There will be a wall mounted rack within Room 263A. Rack shall host all streaming, video, and audio processing and amplification equipment.
 - b. Relocate existing streaming equipment from existing floor cabinet, into rack.
 - 2. Rolling Equipment Rack EQ2
 - a. Equipment rack shall support both Performance and Practice systems.
 - b. EQ2 will plug into the existing floor box. With new cabling being pulled from the EQ1 and the nearest Telecommunications Room.
- B. Video
 - 1. All video is to be driven by the HDBaseT Distribution System. There shall be a transmitter in the Rolling Equipment Rack and within the Wall Mounted Rack.
 - 2. All signal and control shall route to the ceiling mounted projector. Mount HDBaseT Receiver from the structure and route video/control cabling into the provided projector.

C. Audio

- 1. There shall be two separately used sound systems:
 - a. Performance System A
 - b. Practice/Jazz Lab System B
- 2. Performance Sound System A
 - a. High-Mid Range Sound is to come from the speakers within the wall mounted lobes. Speakers shall be rigged to be hung from the structure, within the lobe.
 - b. Ceiling mounted speakers facing performers shall be used as stage monitors, during Performances.
 - c. Low Range Sound is to come from the ceiling mounted subwoofer.
 - d. Rolling Rack patchbay to be used for any instrument amplification during performance.
 - e. Mixing Console or iPad based Control shall be used for any required in-room adjustments.
- 3. Practice/Jazz Lab System B
 - a. High-Mid Range Sound is to come from the that are mounted to the ceiling.
 - b. Low Range Sound is to come from the ceiling mounted subwoofer.
 - c. Media Player is to be used.
 - 1) iPad based Control shall be used for any required in-room adjustments.
 - 2) Handheld microphones are to be used and stored within EQ2, shall plug into the rack mounted patch bay.
- 4. Streaming
 - a. All existing cameras are to be removed and stored during construction.
 - b. Reinstall streaming cameras in all locations shown. Fiber cabling by Division 271000 contractor.
 - c. Ceiling mounted microphones shall be tied into the streaming equipment, for audience capture.
 - 1) Provide faceplates above the ceiling, with XLR connections for mounting of ceiling microphones. Route back to microphone mixer in EQ1
 - d. Dante based audio system output shall be provided into the streaming equipment, for sharing of sound.
- D. Once the system programming has been completed and implemented, the Contractor shall allow a minimum 3-month evaluation period for the Owner to use the system and provide feedback.
- E. After the evaluation period, the Contractor shall coordinate with the Owner to gain feedback on the system operation. The Contractor shall record the Owner's feedback and provide programming adjustments to resolve any items as directed by the Owner up to 4 additional hours of programming, per the feedback.

3.7 FUNCTIONAL AND PERFORMANCE TESTING

- A. The following additional testing requirements shall be provided:
- B. Contractor shall un-pack and pre-test equipment prior to installation into the production environment. All configurations shall be re-verified prior to the units being placed into service.
- C. Contractor shall test and commission each component per the specifications and manufacture's installation instructions.
- D. Contractor shall test and verify for full operational and network support control functionalities and connections per the specifications and manufacturer's installation instructions.
- E. All network devices shall be verified for link and auto negotiation to the highest connection rate.
- F. Contractor shall test and verify all functionalities as installed per the specifications and manufacturer's installation instructions.
- G. Test each video display system with test signal generating equipment capable of outputting the following resolutions. (Ultra HD and 4K resolutions required only when testing 4K systems)
 - 1. 4:3 640x480, 800x600, 1024x768
 - 2. 16:9 1280x720 (720p), 1366x768, 1600x900, 1920x1080 (1080p), 3840x2160 (Ultra HD), 4096x2160 (DCI 4K).
 - 3. 16:10 1280x800, 1440x900, 1680x1050, 1920x1200
- H. Test signal generator must be capable of outputting the correct signal protocol using the applicable connectivity (RCA/BNC, S-Video, VGA, DVI, HDMI, Displayport, Etc.).
- I. The test signal generator must be capable of outputting a standard set of color bars, grid pattern, grayscale, checkerboard and multi-burst.
- J. Shielded Category 6A Cabling
 - 1. Cable links shall be tested in accordance with industry standards by Level IV copper tester from Fluke or Ideal Networks by properly trained personnel. Utilize Modified Permanent Link Test.
 - 2. Test and certify the structured cable system with approved field tester(s) that are within their calibration period. The Contractor shall be liable for all re-testing required in the event tests are performed with non-approved test equipment or tester(s) that are not within their calibration period.
 - 3. No Fail or *Pass results will be accepted. Re-terminate and/or replace cable and retest until cable passes Category 6A test.
 - 4. Cable IDs shall include Room Number, source, destination, and additional designator as needed. (i.e., AV Rack to NW Floor box, etc.)
 - 5. Provide Category 6A Test Results with Cable IDs in both PDF and original tester format as part of Project Closeout Submittal.

3.8 FIELD OBSERVATIONS

- A. A minimum of two weeks in advance, notify Design Consultant and Owner as to the readiness for a Field Observation for the following:
 - 1. Rough-In Observation after conduits have been installed, but before walls have been installed.
 - 2. Above Ceiling Observation after cabling has been installed, but before ceilings have been installed.
 - 3. Final Site Observation a minimum of two weeks before Substantial Completion.
- B. During Design Consultant's Final Site Observation of the AV Systems, provide a minimum of one technician fully trained on the operation of all installed AV systems for up to (1) 8-hour day to assist with Design Consultant's functional testing.

- C. Non-Conforming Work:
 - After receipt of written notice of defective Work, Contractor shall correct all defective Work, or, if the Work has been rejected by the Owner/Design Consultant, remove it from the Project and replace it with Work that is not defective. Contractor shall pay all claims, costs, losses, and damages arising out of or relating to such correction or removal.

3.9 DEMONSTRATION, TRAINING, AND ADJUSTMENTS

- A. Conduct training sessions to Owner's personnel to demonstrate system operation and preventative maintenance procedures.
- B. For AV systems, account for (4) one-hour training sessions:
- C. For AV Systems: After Owner has taken occupancy, Audio-Visual equipment and components may require minor adjustments to be performed by the Contractor/Subcontractor to align with Owner's actual use of the systems. Include costs in Bid to account for the following adjustments after Substantial Completion:
- D. One 3-hour on-site meeting with Owner Staff to discuss requested changes.
- E. Up to 40 hours of additional programming and in-field testing time to adjust Control System programming to the Owner's satisfaction.

3.10 PROJECT CLOSEOUT DOCUMENTATION

- A. As-Built Drawings
 - 1. Drawings shall be provided to the Owner/Design Consultant at the time of substantial completion. Final payment will not be recommended until drawings are received and approved by the Owner/Design Consultant.
 - 2. As-Built drawings shall be produced in AutoCAD 2022 or higher and provided in hardcopy and electronically in .dwg and PDF format.
 - 3. Hardcopy drawings shall be provided in the original size as issued by the Owner/Design Consultant.
 - 4. Drawings shall retain the formatting and title block of the original drawings as issued by the Owner/Design Consultant.
 - 5. Drawings shall be provided utilizing the original scale and shall include the exact dimensions and locations of all equipment room/telecommunication room layouts, wall elevations, equipment rack elevations, ladder racks, cable tray, sleeves, backbone and horizontal cable pathways, workstation locations, and labeling scheme.
- B. Test Documentation
 - 1. Test documentation shall be provided to the Owner/Design Consultant at the time of substantial completion. Final payment will not be recommended until these test results are received and approved by the Owner/Design Consultant.
 - 2. Test results shall be provided in hard copy and electronic format (i.e., manufacturer's proprietary testing software along with applicable reader software) and PDF electronic format.
- C. Manufacturer's Product Warranty
 - 1. Certificate of product warranty shall be provided to the Owner/Design Consultant at the time of final system acceptance. Final payment will not be recommended until this certificate of product warranty is received and approved by the Owner/Design Consultant.
 - 2. The manufacturer of the solution shall furnish a product warranty as per the specifications starting at final system acceptance.
 - 3. One original and two copies of the Manufacturer's product warranty shall be provided.
- D. Contactor's Statement of Warranty
 - 1. Statement of warranty shall be provided to the Owner/Design Consultant at the time of substantial completion. Final payment will not be recommended until statement of warranty is received and approved by the Owner/Design Consultant.
 - 2. Contractor shall furnish a minimum of a one (1) year warranty on all materials

- 3. And (5) years on labor and workmanship starting at final system acceptance.
- 4. One original and two copies of Contractor's warranty terms and conditions to include contact information (i.e., Contractor name, Point of Contact, address, phone number and email address) and start and end date for warranty call outs.
- 5. Contractor shall provide the owner with an Audiovisual Systems Rep, positive point of contact for trouble calls during the (5) year warranty period.
- 6. Contractor shall provide a trouble call response by phone or in person from the Contractors Audio Visual Systems Rep within (4) hours of receiving the owner's request.

Equipment	Qty	Manufacturer	Model	Location	Drawing Tag	Notes	Price	Total
Performance	4	Yamaha	NEXO IDS84	Lobe	52	S2 Shall be a 90x40 Dispersion Pattern		
Speakers Practice								
Speakers	2	Yamaha NEXO IDS24		Ceiling	S1	Shall be a 90x40 Dispersion Pattern		
Subwoofer	1	Yamaha	Yamaha ELS400		S3			
Mixing Console	1	Yamaha	CL5	Ceiling Mixing	Mixing Console			
Performance Amplifier	1	Yamaha	NXAMP4X1MK2	EQ1		Add Dante Card		
Practice Controller	1	Yamaha	DTD-T-N	EQ1				
Practice Amplifier	1	Yamaha	DTDAMP4x0.7	EQ1				
Patchbay	1	Yamaha	RIO1608	EQ1				
CD Player	1	Denon	DN -300Z	EQ2				
Mic Mixer	2	Shure	SCM-810	EQ1/EQ2				
Dante Adapter	1	Shure	ANI4IN	EQ2				
Equipment Rack	1	Middle Atlantic	DWR-40-22PD	Room 263A	EQ1			
Rolling Rack	1	Middle Atlantic	PTRK-2126	Floor	EQ2			
Console to Streaming	1	Yamaha	HY144-D	Console				
Handheld Microphones	2	Shure	SM58	EQ2		Provide each with 50' XLR Cable		
Rack Mounted XLR Plate	1	Shure	RKC800	EQ2				
Power Distribution Unit - EQ1	1	Furman	VT-EXT16	EQ.1		Plug into Conditioner		
Power Conditioner	2	Furman	M-85	EQ1/EQ2				
Equipment Drawer	1	Middle Atlantic	D2	EQ2				
Equpment Drawer	1	Middle Atlantic	D3	EQ1				
Rack Mounted Fan Kit	2	Middle Atlantic	QFP2	EQ1/EQ2				
Rack Mounted Filler Plates	29	Middle Atlantic	VT1	EQ1/EQ2				
Ceiling Mounted Microphones	5	Shure	сvо	Jazz Lab 282				
Materials Total								\$ -
Labor								\$ - \$ -
OH/P								ə -
Room Total	\vdash							\$ -

Audio System(s)

Equipment	Qty	Manufacturer	Model	Location	Drawing Tag	Notes	Price	To	tal
Projector			Ceiling	PROJECTOR	6000 Lumen/Laser				
159" Projection Screen	tion 1 Da-Lite Tab Tensioned Deluxe			Wall	PROJECTOR SCREEN	Progressive .6			
Mount	1	Chief	KITPD09012	Ceiling					
Presentation Switcher	1	Atlona	AT-OME-MH21	EQ1					
HDBaseT Transmiter	1	Atlona	AT-OME-EX-TX	EQ2					
HDBaseT Receiver	2	Atlona	AT-OME-EX-RX	EQ1					
Control Gateway	1	Atlona	AT-VGW-HW	EQ1					
Control Touch Screen	1	Atlona	AT-VTP-800	EQ1					
Materials Total								\$	-
Labor								\$	-
OH/P								\$	-
Room Total								\$	-

Projection System

 		Equipment	 	 	
	1		 		
		Rack Patchbay	 	 	
 	2	511	 	 	
 	3	Filler	 	 	
 	4	Performance amp	 	 	
	5				
 	6	Filler			
 	7	Practice Amp	 		
 	8	Practice Controller			
	9	Filler			
	10	Rack Mounted Microphone Mixe			
	11	Filler			
	12	Filler			
	13	Filler			
	14	Filler			
	15	Rack Fan			
	16	Filler			
	17	Streaming Switch #1			
 	18	Filler			
	19	Streaming Switch #2			
 	20	Filler		 	
	21	Streaming Switch #3			
	22	Filler		 	
 	22	Power	 	 	
 	23	Filler	 	 	
 	24	Focusrite	 	 	
	25	Filler	 	 	
		Focusrite	 	 	
 	27	Filler	 	 	
 	28	Focusrite	 	 	
 	29		 	 	
	30	Filler		 	
 	31	Focusrite	 	 	
 	32	Filler	 	 	
	33	Grace Box			
 	34		 	 	
	35	Filler			
	36	Power			
	37	Filler			
	38				
	39	Drawer			
	40				
					<u> </u>

Equipment Rack Riser

	1		Filler	
	2	Rack Patchbay		
	3	ка	ck Patchbay	
	4		Filler	
	5	Rack Mount	ed Microphone Mixer	
	6		Filler	
	7		Fan Kit	
	 8		Filler	
	9		Shelf	
	 10		Filler	
	11	CD Playe	er with Bluetooth	
	12		Filler	
	13		Power	
	14		Filler	
	15		Filler	
	16		Filler	
	17		Filler	
	18		Power	
	 19		Filler	
	20			
	21		Drawer	
L				
L				

FoH Mixing Console

END OF SECTION 274100

SECTION 280413 - COMMON SUBMITTAL REQUIREMENTS FOR ELECTRONIC SAFETY AND SECURITY

PART1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Supplementary administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals specific to the work of this Division.
- B. Related Requirements:
 - 1. Division 01 submittal requirements.

1.3 DEFINITIONS

- A. Contractor: Refers to an entity in direct Contract with the Owner to furnish and/or perform any portion of the Work of the Contract, including but not limited to a Construction Manager.
 - 1. Contractor shall review and approve Product Submittals prior to fowarding them to the Architect.
- B. Product Submittals: In general, Product Submittals show characteristics of the proposed construction in one of the following forms:
 - 1. Shop Drawings.
 - 2. Product Data.
 - 3. Samples.
- C. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- D. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."
- E. Submittal Review Sheet: Specific form required to accompany each submittal. Obtain Submittal Review Sheet from the SmithGroup Project Manager.

1.4 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Requirements specified for submittals are intended to provide efficient handling, while permitting review responsibilities to be carried out.
- B. Avoidable Resubmittals: The first two reviews of each specified submittal will be processed without cost to the Contractor. After the second review, the Owner may charge the Contractor for the cost of such additional processing, unless the processing results from approved Change Orders causing revisions to previously approved submittals.
- C. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 - 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 - 4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architectreserve the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- D. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

- 1. Initial Review: Allow 10 business days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required.
- 2. When a large volume of submittal materials is scheduled, additional review time may be required. Similarly, a particular submittal may require review completion in less than the agreed normal time. Due to variations in submittal volume and processing needs, agreed review time is not intended to apply to extreme conditions.
- 3. Resubmittal Review: Allow 10 business days for review of each resubmittal.
- 4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 15 business days for initial review of each submittal.
- E. Maintain at the Project Site ready access to the latest reviewed Shop Drawings and Product Data, and one set of samples.

1.5 DELEGATED-DESIGN SERVICES

- A. Definitions:
 - 1. Delegated Design: A portion or component of the Work identified by the Contract Documents to be designed by the Contractor, or an entity assigned by the Contractor, to satisfy performance and design criteria specified in the Contract Documents for that portion or component.
 - 2. Registered Design Professional: Design professional, assigned by the Contractor, who is responsible for providing the delegated design work, and for certifying that the work is in compliance with the specified performance requirements and design criteria. Design professional shall be legally qualified to practice in jurisdiction where Project is located and shall be experienced in providing delegated design services of the kind indicated. Delegated design services are defined as those performed for installation of the system, assembly or product that are similar in material, design, and extent to those indicated for this Project.
- B. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- C. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Combine with Submittal Review Sheet before submitting to Architect .
- B. Project Closeout and Maintenance Material Submittals: See requirements in Division 01.
- C. Be responsible for quantities, weights, and dimensions to be confirmed and correlated at the site; for information that pertains solely to the fabrication processes and to the means, methods, techniques, sequences, and procedures of construction; and for coordination of the work of every trade, supplier, and subcontractor.
- D. Be responsible for each submittal to be in conformance with information given and the design intent expressed in the Contract Documents.
- E. Provide with each submittal specific written notice of any variation from the requirements of the Contract Documents by causing a specific notation to be made on the Submittal Review Sheet and Submittal Transmittal.

3.2 ARCHITECT'S AND GENERAL CONTRACTOR'S ACTION

A. General: Architect will not review submittals that do not include the Submittal Review Sheet.

- B. Action Submittals: Architect's staff and consultants will review the submittal, and mark the Submittal Review Sheet with an action code. The code meanings are described below.
- C. Additional codes may be provided within comments or as an electronic submittal review stamp and shall be used in help indicating return of partial submittals.
- D. The Final Review Code on the Submittal Review Sheet prevails and governs the action of the overall submittal.
- E. Review Code meanings are as follows:
 - 1. Action Codes Permitting Use:
 - a. When an action code permitting use is assigned to a submittal, it does not authorize work that does not comply with the requirements of the Contract Documents. Acceptance of the Work will depend on compliance.
 - b. Code AP Approved: The Work covered by the submittal item may proceed, provided it complies with Contract Document requirements.
 - c. Code AN Approved as Noted: The Work covered by the submittal item may proceed, provided it complies with the Architect's notations and Contract Document requirements.
 - d. Code AN-R Approved as Noted Resubmit: Do not deliver or install the related work until the resubmittal has received Code AP or AN. However, fabrication and other off-site work covered by the submittal item may proceed, at the Contractor's risk, provided it complies with the Architect's notations and Contract Document requirements.
 - 2. Action Code Prohibiting Use:
 - a. Action Code REJ Not Approved: The Work covered by the submittal item, including purchasing, fabrication, delivery, and other activity, shall not proceed. Revise the submittal item or prepare a new item in accordance with the Architect's notations. Resubmit the corrected or new item without delay; do not permit submittal items marked "Not Approved" to be used. Work incorporating such items will be rejected.
 - 3. Action Code for Items Not Required:
 - a. Action Code X Not Requested by Contract Documents: The submittal item is not called for by the Contract Documents and is being returned unreviewed by the Architect except to the extent necessary to determine its status.
- F. Informational Submittals: For Architect's information only. Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
 - 1. Action Code for Information Only:
 - a. Action Code INF Information Only Received: The submittal item is not called for a return with a reviewed action code by the Contract Documents and is being returned un-reviewed by the Architect except to the extent necessary to determine its status.
- G. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- H. Incomplete submittals are not acceptable, will be considered non-responsive, and will be returned without review.
- I. Architect will return without review or discard submittals received from sources other than the Contractor.
- J. Submittals not required by the Contract Documents may be returned by the Architect without action.
 1. Do not submit Material Safety Data Sheets. They will be returned without review.

3.3 SUBMITTAL TRANSMITTAL REQUIREMENTS

- A. Submittal Transmittal shall be a PDF file in electronic format. It is recommended, to expedite the submittal review, the electronic form be emailed for review to the Architect as early as possible.
 - 1. Submittal Numbering: See below.
 - 2. Contact Information: Full Name, Phone Number and Email Address.
- B. Submittal Definition
 - 1. Each submittal consists of items from only ONE Specifications section.
 - 2. Complete Submittal: If ALL the items required by the Specifications section are listed on one Submittal Form (including continuation sheet), it is a complete submittal.
 - 3. Partial Submittals: If it is necessary to divide the required items of a given Specifications section into two or more submittals to meet schedule or handling requirements, the separate submittals are partial submittals. All partial submittals have the same submittal number, and are differentiated by sequential P-numbers (see below).

- 4. All items in each submittal, whether complete or partial, will be processed together: Individual items will not be 'broken out' for special handling. Arrange submittals accordingly.
- C. Submittal Numbering
 - 1. Number submittals as described below to assist tracking.
 - 2. Number each submittal in the format nnnnn-nn.
 - a. The 6-digit number is the number of the section that requires the submittal. For example, 044200.
 - b. The 2-digit number is based on the numerical sequence of submittals from that section. In other words, for each section, the first submittal is 01, the second is 02, and so on. The 2-digit number does not change for partial or re-submittals, so that the submittal can be tracked.
 - c. P-Number for Partial Submittals: Number each partial submittal in the pee space, beginning with P1, and increasing by one for each partial submittal of that submittal. If the submittal is a complete submittal, leave the P space blank.
 - d. R-Number for Re-submittals: Number each re-submittal in the arr space, beginning with R1, and increasing by one for each re-submittal of that submittal. Do not include an R-Number for the initial submittal.
 - e. Examples:
 - 1) Initial Complete Submittal: 044200-01. First Re-Submittal: 044200-01-R1.
 - 2) Initial Partial Submittal: 044200-01-P1. Second Partial Submittal: 0044200-01-P2. First Re-submittal of Second Partial Submittal: 044200-R1-P2.

3.4 SUBMITTAL REVIEW SHEET REQUIREMENTS

- A. Provide Submittal Review Sheet in PDF format. Submit as the page after the Submittal Transmittal.
- B. When attached, the Submittal Review Sheet shall not obscure information contained in the submittal.
- C. Do not edit any of the information contained within the Submittal Review Sheet except as follows:
- 1. Submittal Number: See Submittal Numbering in Submittal Transmittal Requirements paragraph.
- D. The Contractor shall submit the PDF file in a manner that will allow editing of the Submittal Review Sheet fields by SmithGroup and its consultants.

END OF SECTION

SECTION 283100 - FIRE ALARM SYSTEM

PART1- GENERAL

1.1 GENERAL REQUIREMENTS

- A. The requirements of Division 1, General Requirements and other provisions of the contract documents apply to this work.
- B. Scope of work includes modification of the existing fire alarm system in all areas being renovated. Fire alarm system shall be modified to meet the requirements of NFPA 72, and NFPA 101.
- C. This Section intends to describe an integrated fire alarm system to be intelligent device addressable, analog detecting, low voltage and modular with multiplex communication techniques, in full compliance with all applicable codes and standards. The features described in this specification are a requirement for this project and shall be furnished by the successful contractor. The contractor is responsible for the modification of the existing building fire alarm system in the work areas. A fire alarm design is not shown on the plans. The system shall be designed by the fire alarm contractor to meet the requirements of the latest edition of NFPA 72, 90A, 101, International Building Code, ASME A17.1, ADA/TDLA and any other local and state codes. Refer to mechanical, plumbing and security plans for coordination of those systems with the fire alarm system.
 - 1. The system as described shall be installed, tested, and delivered in full operating condition. The system shall include all required hardware, raceways, interconnecting wiring and software to accomplish the requirements of this specification and the contract drawings, whether itemized or not.
 - 2. All equipment furnished shall be new and the latest state of the art products of a single manufacturer, engaged in the manufacturing and sale of analog fire detection devices for over ten years. The equipment manufacturer shall have an installed base of analog systems as a reference. In the interest of job coordination, the installing contractor shall contract with a single source for supplying job materials, services, and programming, including final inspection/test services for the fire alarm system.
 - 3. The equipment, space requirements, expansion capabilities and features specified were selected to meet the requirement for this project
 - a. The fire alarm devices & appliances in the protected areas shall meet the requirements for Group A-3 and Group B buildings without sprinkler systems per IBC and NFPA 101. Corridor areas and normally unoccupied areas shall be provided with smoke detection consistent with the other existing building areas. Notification shall be provided in all areas.
 - b. Jazz Lab performance space
 - 1) Concealite FA 900 assemblies shall be used for appliances located in the jazz lab and the normally exposed face (in a non-alarm condition) shall be painted to match the surrounding finishes..
 - c. Manufacturers:
 - 1) Notifier NFS2-3030, no exception. Panel shall be campus standard and include:
 - a) Notifier embedded gateway (NFN-GW-EM-3)
 - b) Notifier high speed network communications module (HS-NEM-W)
 - c) Digital Voice Communication EM
 - d) DAA Series digital Audio amplifiers

1.2 MATERIALS AND SERVICES

- A. The system shall include, but not be limited to the following elements:
 - 1. Power supplies, batteries and battery chargers (if existing panels do not have adequate capacity).
 - 2. Equipment enclosures.
 - 3. Intelligent addressable manual pull stations, heat detectors, analog smoke detectors, alarm monitoring modules, and supervised control modules.
 - 4. Voice/Audible and visual evacuation signals.
 - 5. Wiring and raceway.
 - 6. Installation, testing and certification and training.
 - 7. Interface with security system per Paragraph 1.10.
 - 8. Interface with air handling units.

1.3 REFERENCE STANDARDS

- A. The publications listed below form a part of this publication to the extent referenced. The publications are referenced in the text by the basic designation only. The latest version of each listed publication shall be used as a guide unless the authority having jurisdiction has adopted an earlier version.
 - 1. Texas Department of Insurance (TDI) State Fire Marshal's Office
 - 2. Factory Mutual (FM). FM AG Approval Guide.
 - 3. National Fire Protection Association (NFPA).
 - a. NFPA 70 National Electrical Code.
 - b. NFPA 72 Standard for the Installation, Maintenance and use of Protective Signaling Systems.
 - c. NFPA 90A Standard for the Installation of Air Conditioning and Ventilating Systems.
 - d. NFPA 101 Life Safety Code.
 - 4. Underwriter's Laboratories, Inc. (UL).
 - a. Appropriate UL Standards.
 - b. UL FPED.
 - 5. Texas Department of Licensing and Regulation.
 - 6. Americans with Disabilities Act.
 - 7. Texas Accessibility Standards (TAS)
 - 8. International Building Code (IBC).

1.4 QUALIFICATIONS OF THE INSTALLER

A. Before commencing work, submit data showing that the contractor has successfully installed fire alarm systems of the same type and design as specified, or that they have a firm contractual agreement with a subcontractor having the required manufacturers' training and experience. The contractor shall include the names and locations of at least two installations where the contractor, or the subcontractor above, has installed such systems. Specify the type and design for each system and furnish documentation that the system has performed satisfactorily for the preceding 18 months.

1.5 SUBMITTAL

- A. The contracting firm shall be submit copies of its Texas Department of Insurance (TDI) Fire Alarm Contractor Registration (ACR), Fire Alarm Planning Superintendent License (APS) and the required TDI's Liability Insurance Certificate, signed by a Texas Insurance Agent.
- B. The contractor shall include the following information in the equipment submittal:
 - 1. Power calculations.
 - a. Battery capacity calculations. Battery size shall be a minimum of 150% of the calculated requirement.
 - b. Supervisory power requirements for all equipment.
 - c. Alarm power requirements for all equipment.
 - d. Power supply rating justification showing power requirements for each of the system power supplies. Power supplies shall be sized to furnish the total connected load in a worst case condition.
 - e. Justification showing power requirements of the system amplifiers.
 - f. Voltage drop calculations for wiring runs demonstrating worst case condition.
 - 2. Complete manufacturer's catalog data including supervisory power usage, alarm power usage, physical dimensions, finish and mounting requirements.
 - 3. Submit panel configuration and interconnection of modules and all other data as required to make an informed judgment regarding product suitability. At a minimum, data shall be submitted on the following:
 - a. Master system CPU including all fire detection, voice/audio and visual evacuation alarm control modules, and supervised power amplifiers with the required back up modules.
 - b. Circuit interface panels including all modules.
 - c. Power supplies, batteries and battery chargers.
 - d. Pre-amplifiers, amplifiers, tone generators, master microphone and master telephone.
 - e. Equipment enclosures, including dimensions and weights of completed units.
 - f. Intelligent addressable manual pull stations, heat detectors, analog smoke detectors, alarm monitoring modules, and supervised control modules.
 - g. Annunciator panel and printer.
 - h. Audible and visual evacuation signals and devices.
 - i. Software and firmware as required to provide a complete functioning system.

- j. Circuiting, including conduit and wire sizes.
- 4. Data describing more than one type of item shall be clearly marked to indicate the type the contractor intends to provide for options not crossed out in submittal material will be furnished for the project. All submittal material shall be complete. Partial submittal will not be evaluated and will be rejected without comment. The contractor shall submit copies of UL listing or FM approval data showing compatibility of the proposed device or appliance and the panel being provided.
- 5. Complete drawings covering the following shall be submitted by the contractor for the proposed system:
 - a. Floor plans showing all communicating, initiating, end of line, supervisory, indicating appliances, and output control devices; including circuit interface panels, message digitizers, amplifiers, annunciators, printers, video display terminals, color graphic displays, transponders and the main CPU locations. Raceways shall be shown, marked for size, conductor count with type and size, showing the percentage of allowable National Electric Code fill used. Drawings shall indicate ambient sound levels used by the system installer for sound level calculations and mathematical justification for signal placement to meet the code required 15dBA above ambient for audible warning signals.
 - b. Wiring diagrams showing points of connection and terminals used for all electrical connections to the system devices and panels.
- 6. A complete proposed system database including a description of all logic strings, control by event programming and point identification labels on a 3.5" high density floppy disk or CD ROM and in a formatted printed form, as required for offsite editing, uploading and downloading shall be submitted for evaluation by the owner. A programming manual shall accompany the submitted program and shall be adequate to allow understanding, operation and editing by the system owner.
- 7. Statements shall be included, with copies of required licensing, verifying the qualifications of the installer as specified.
- 8. The fire alarm system subcontractor or manufacturer shall offer, for the owner's consideration at the time of system submittal, a priced inspection, maintenance, testing and repair contract in full compliance with the requirements of NFPA 72.
- C. For use in system test, a complete operation and maintenance manual with two sets of proposed installation drawings shall be submitted.
 - 1. The following information shall be inscribed on the cover:
 - a. "OPERATION AND MAINTENANCE MANUAL"
 - b. Building location.
 - c. The name of the contractor, system manufacturer and system subcontractor.
 - d. The name and phone number of the fire department required to respond to alarms at the project location.
 - 2. The manual shall be legible and easily read with large drawings folded and contained in pockets. Included in the manual shall be circuit drawings, wiring and control diagrams with data to explain detailed operation and control of each item of equipment and a control sequence describing start up instructions. Included shall be installation instructions, maintenance instructions, safety precautions, test procedures, performance data, and software documentation.
- D. Upon completion of the installation, record drawings shall be submitted on each system before final acceptance of the work. The contractor shall furnish to the Owner a set of record drawings including system diagrams for each system. The record drawings masters shall be on reproducible mylar film, uniformly sized as required for legibility and reproduction and on high density floppy disks or CD ROM in an AutoCAD DXF format.

1.6 SYSTEM FUNCTION

- A. The system shall be a complete, electrically supervised multiplex style fire detection and voice evacuation system with intelligent analog alarm initiation, to be device addressable and annunciated as described and shown on the drawings.
 - 1. The maximum number of devices on a single signaling circuit shall not exceed 60, in order to avoid catastrophic loss of device communications in the event of a raceway destruction, with a capacity of 60 reporting system inputs and 60 system control outputs. Systems capable of serving in excess of 60 devices to be addressed on as single analog communications network shall be wired and controlled in a Style 7 configuration including isolation circuitry limiting any short circuit fault to a maximum of 60 addresses and/or a single smoke zone, whichever is less. Device wiring in the Style 7 configuration shall be installed in a manner eliminating the possibility of exiting wiring sharing the same raceway as the entry wiring for any device.

- a. Devices attached to the signaling circuit shall be individually identifiable at the control panel for alarm and trouble indication. Smoke detectors shall be interrogated for sensitivity settings from the control panel, logged for sensitivity changes indicating the requirement for cleaning, and tested by a single technician using the panel field test routine.
- b. Sensitivity settings of individual detectors shall be automatically or manually adjustable from the control panel to reduce the incidence of false alarms caused by environmental conditions.
- c. The analog signaling circuits shall be installed in the fire alarm control panel enclosure or in remote circuit interface panel enclosures.
- d. Analog signaling circuits shall support selectable Style 4 or Style 7 wiring using loop isolator modules.
- 2. The system shall support intelligent analog smoke detection, manual station, water flow, supervisory, security, and status monitoring devices. Fire alarm, supervisory, trouble, security and status shall each be treated as a separate level of alarm, each with its own level of priority. The system shall also support amplifiers, voice/visual circuits, telephone system and smoke control fans and dampers.
- 3. The panel shall be UL listed as a test instrument for the measurement and logging of the sensitivity of connected intelligent analog ionization and photoelectric smoke detectors connected to the control panel or any remote circuit interface panel to comply with the bi-annual sensitivity logging requirements of NFPA 72E.
 - a. The measurements shall be discrete voltage readings, accurate to .01 VDC. The readings shall be dynamic, providing a constant display of voltage shifts of the device being tested when in the sensitivity voltage list mode.
 - b. The control panel shall provide a display and a printed list of these sensitivity measurements as a permanent record of the required sensitivity testing. An output shall be provided, together with a Windows XP based utility program to allow the data acquired in the sensitivity testing mode to be downloaded into a laptop computer and utilized in a data base program to formulate a complete system history.
 - c. When programmed, any system connected light refraction style smoke detector shall be capable of self adjustment to compensate for the accumulation of contaminates that would change the detector sensitivity in either a more or less sensitive direction. This adjustment shall keep the relationship between the sensing chamber voltage and the programmed alarm threshold voltage constant to prevent false indications or failure to alarm in the presence of smoke. Data contained in a memory bank on each detector so programmed, shall maintain an average of the chamber voltage in determining the threshold setting for the device. The threshold setting installed in memory within each device shall maintain programmed operation in all cases, including default and default alarm modes. All devices programmed with this feature shall be automatically tested by the control panel once every twenty four hours to assure their ability to detect and report an alarm condition. This test shall be done as a background routine and shall remain transparent to the user. In the event of a test failure, the control panel shall report a trouble message for the failed device.
 - d. Trouble messages displayed by the system LCD displays and logged to system printers and memory shall be programmed with a custom label as selected by the owner to identify the origin by cabinet, room number or other information meaningful to assist maintenance employees.
- 4. The system shall annunciate a pre-clean trouble condition when any smoke detector reaches 80% of the allowable threshold movement within the prescribed UL window due to gradual contamination, signaling the need for service, and eliminating unwanted alarms. Upon reaching 100% of the allowable movement, a second "Detector Dirty" message with a trouble condition shall be displayed.
 - a. The trouble report shall annunciate the specific location of the smoke detector requiring service. All analog smoke detectors installed in the system shall include this feature.
 - b. Upon completion of the cleaning of the device, the system shall reestablish the average chamber voltage file, determining if the detector sensitivity falls within the required window, and display a "Detector Cleaned" message. The detector cleaning shall be logged to the system history file.
- 5. Any intelligent analog smoke detector shall include a selectable alarm verification capability. This feature shall provide automatic verification of smoke detector alarms as described by NFPA 72. The system shall have the capability of logging to historical memory, the time and date of all unverified alarm events in order to track activity and generate reports indicating maintenance requirements prior to failures within the system.

- 6. All external circuits shall be listed as power limited circuits per the National Electric Code. Power limitation shall be provided using on board, self-restoring solid state thermal devices. Units using fuses or manually restorable circuit breakers for this purpose or requiring board replacement or exchange will not be acceptable.
- 7. The system shall recognize initiating of an alarm and indicate the alarm condition in a degraded mode of operation, in the event of processor failure or the loss of system communications to the circuit interface panels.
 - a. Each circuit interface panel shall be capable of operation in its own degrade mode. In this mode, the system shall receive an alarm from any intelligent analog or conventional initiating device. It shall activate local indicating appliances and remote or auxiliary connect circuits.
 - b. The system shall indicate a trouble condition during degrade mode operation and shall give a visual indication of an alarm condition.
 - c. Detector operation in the degrade mode shall continue at the alarm threshold previously programmed. Systems returning detectors to a common default value in degrade mode shall not be acceptable.
- 8. The system shall provide a default operation program to allow reporting of alarms from installed devices before loading of custom system software.
- 9. The system shall report alarms from installed devices but not yet added to the system custom program. Alarm reports from these devices shall activate indicating appliance circuits.
- 10. The system shall perform time based control functions including automatic changes of specified smoke detector sensitivity settings. Time based functions shall be controlled by specifying time periods or actual dates. It also shall provide the ability to control these functions on an exception basis using a holiday schedule.
- 11. The system shall provide a one person field test initiated from the control panel of either the complete system or a specified area supported from either the master control panel or any remote circuit interface panel, maintaining full function of areas not under test.
 - a. Field test shall be usable in a silent or audible mode. When in the audible mode, the signals shall audibly annunciate alarms, troubles and device types, each in a way identifiable by the testing technician.
 - b. All field test activity shall be logged to the system printer and historical memory. It shall be possible to download historic memory to a data base program prior to, and subsequent to the walk test in order to establish a continuous system history. Historic memory shall accommodate a minimum of 800 events to prevent overflow during testing.
- 12. The system shall be provided with eight levels of password protection with up to forty passwords. In addition the system shall provide for up to sixty four password protected sublevels protecting functions or groups of functions under operator control. Passwords and functions shall be field programmable.
- 13. The system shall be programmed in the field via a laptop computer. All programmed information shall be stored in nonvolatile memory after loading into the control panel. No special programming terminal or prom burning shall be required and the system shall continue in service during reprogramming. Systems requiring on line terminal programming or not capable of mass reading of panel software for offsite documentation or editing will not be considered acceptable.
 - a. During program reading or loading, the system shall retain the capability for alarm reporting.
 - b. The system shall read to a PC for program editing. System program shall be stored on a floppy disk or CD ROM and all programming shall be multilevel password protected.
 - c. A U.L. recognized programming utility shall be furnished to compare all altered functions, and input or output addresses, listing all related functions, inputs and output addresses that are effected by the program changes. These items shall constitute a minimum for required certification re-testing of the system in addition to the system device percentage mandated by the codes. Systems not providing this utility shall not be acceptable due to the expense related to complete re- testing for re-certification after program changes. The system shall consist of a central or distributed multiplex architecture using a centrally located control unit with interconnection to remote circuit interface panels containing any combination of pluggable intelligent analog signaling circuits and plug in relays.
 - d. The remote circuit interface panels shall as a minimum, provide a power supply, microprocessor controlled bus structure, battery and automatic charger, and communication link to the main CPU through a high speed 19.2K baud RS-485 network.

- 1) The high speed communications network shall be capable of Style 7 configuration, and when wired in this configuration, both outgoing and incoming paths shall be used for system activity as a means of assuring system response in the event of a loss of wiring continuity.
- 2) The high speed communications network shall support the use of fiber optics transmission techniques for the elimination of all electrostatic and electromagnetic induced electrical interference configured as a star loop.
- e. The network communications format shall include error checking of the installation location of each module address to verify the agreement between programmed software and installed hardware as a protection against card installation in incorrect plug in slots. Module printed circuit cards shall be configured within each cabinet to physically prevent the installation of a card in an incorrect slot in that cabinet.
- 14. The system shall support a UL listed supervised printer at any designated alpha-numeric annunciator.
- 15. The system shall provide status indicators and control switches for all of the following functions: a. Audible and visual evacuation alarm circuit zone control.
 - b. Status indicators for sprinkling system waterflow and valve supervisory devices.
- 16. The system as installed shall be expandable to its predetermined maximum capacity of 200 initiation devices and/or 200 combined zones of speakers, and visual devices using installed software, with no chip changes or additions required for expansion.
- 17. The system shall support a UL listed supervised printer. Multiple unsupervised ancillary printers also shall be supported as approved or required by the authority having jurisdiction.
- 18. The system shall be listed by the UL for configuration as an approved NFPA 13 fire sprinkler system deluge and pre-action releasing system.

1.7 SYSTEM ZONING

A. Each intelligent addressable device on the system shall be displayed at the fire alarm control panel by a unique alpha numeric label identifying its location.

1.8 SYSTEM OPERATION

- A. Activation of any fire alarm initiating device shall cause the following actions and indications, unless otherwise noted below:
 - 1. Display a custom message, describing the device originating the alarm condition at the main fire alarm control panel and remote annunciator.
 - 2. Report to the UNT Police via dialer. Two telephone lines shall be provided. Coordinate requirements with UNT and telecom plans.
 - 3. Sound an alarm tone for a maximum of five seconds followed by an automatic digital voice message over all alarm circuits. At the end of the voice message, the alarm tone shall resume. The audio alarm signals shall sound alternately until the signal silence switch is operated.
 - a. All audio operations (speaker circuit selection and alarm tone/voice messages and timing variations) shall be activated by the system software, so that future changes can be implemented without rewiring or hardware additions. Audible signals shall be silenceable from the fire alarm control panel by an alarm silence switch. The alarm indication shall be transferred to a visual indicator on the control panel and the alarm signals shall resound for a subsequent alarm condition, reported by a different device. Visual signals shall be programmable to flash until system reset or alarm silencing, as required.
 - b. A signal dedicated to sprinkler system water flow alarm shall not be silenced while the sprinkler system is flowing at a rate of flow greater than or equal to a single head.
 - c. Status lights next to speaker selection switches on the control panel shall indicate which of the three messages each speaker circuit is distributing.
 - d. Provisions for total building paging shall be accomplished by an 'All circuits switch'.
 - 4. Record within the non-volatile system historical memory, the occurrence of the event, the time and date of occurrence and the device initiating the event. In addition, all operator actions shall be logged to system history with time and date.
 - 5. Activation of an AHU duct detector shall shutdown that AHU only and shall not sound a general alarm.

- B. Activation of any alarm verified smoke detector in a single elevator lobby or an elevator equipment room shall, in addition to the actions described in 1.9A above, cause the recall of that bank of elevators to the terminal floor and the lockout of controls. In the event of recall initiation by a detector in the terminal floor lobby, the recall shall be to the alternate floor. Activation of any heat detector in the elevator machine room/pit shall shunt trip the circuit breaker serving the associated elevators.
- C. Activation of any air duct detectors shall shutdown that unit.
- D. Activation of any supervisory circuit; i.e., supervised valve closure, air pressure abnormal, low temperature, fire pump trouble shall cause the following actions and indications:
 - 1. Display the origin of the supervisory condition report at the main fire alarm panel and remote annunciator alphanumeric LCD display.
 - 2. Activate supervisory audible and visual signals as indicated on the drawings. Audible signals shall be silenced from the fire alarm control panel by an alarm acknowledge switch. The supervisory indication shall be transferred to a visual indicator on the control panel and the supervisory signals shall resound for a subsequent supervisory condition, reported by a different device.
 - 3. Record within system history the occurrence of the event, the time of occurrence and the device initiating the event.
- E. Receipt of a trouble report; i.e., primary power loss, open or grounded initiating or signaling circuit wiring, open, grounded or shorted indication system wiring, device communication failure, battery disconnect at the fire alarm control panel shall cause the following actions and alarms.
 - 1. Display at the main fire alarm panel and remote annunciator alphanumeric LCD display, the origin of the trouble condition report.
 - 2. Activate trouble audible and visual signals at the control panel and as indicated on the drawings.
 - a. Audible signals shall be silenced from the fire alarm control panel and remote annunciator by a trouble acknowledge switch. The trouble indication shall be transferred to a visual indicator on the control panel and the trouble signals shall resound for a subsequent trouble condition reported by a different device.
 - b. Trouble conditions which have been restored to normal shall be automatically removed from the trouble display queue and not require operator intervention. This feature shall be software selectable and shall not preclude the logging of trouble events to the historical file.
 - Record within system history, the occurrence of the event, the time of occurrence and the device initiating the event.

1.9 SECURITY SYSTEM INTERFACE

- A. Automatic Unlock of Electric Locking Mechanisms.
 - 1. Fail-safe security electric locking mechanisms as indicated on the security plans shall be automatically unlocked by the security system upon a fire alarm condition.
 - 2. To provide for automatic unlocking, the fire alarm contractor shall provide a normally closed auxiliary dry output contact from the fire alarm system. Upon a fire alarm condition the contact shall open and the security system shall unlock the electric locking mechanisms. The contact shall remain open until the fire alarm system is manually reset.
- B. Manual Release of Electric Locking Mechanisms.
 - 1. Security electric locking mechanisms as indicated on the security plans shall be manually unlocked from a switch at the main fire alarm control panel.
 - 2. To provide for manual unlocking the fire alarm contractor shall provide a toggle switch in the main fire alarm control panel. Upon activation of the switch a normally closed dry contact shall open and the security system shall unlock the electric locking mechanisms. The contact shall remain open until the switch is returned to the locked position.
 - 3. The fire alarm contractor shall provide an additional normally closed dry contact from the switch for security system monitoring of the position status of the switch.
- C. Automatic Bypass of Card Reader Control of Elevators.
 - 1. The card reader control of elevators shall be automatically bypassed by the security system upon a fire alarm condition.
 - 2. To provide for automatic bypass the fire alarm contractor shall provide a normally closed dry output contact from the fire alarm system. Upon a fire alarm condition the contact shall open and the security system shall bypass the card reader control of elevators. The contact shall remain open until the fire alarm system is manually reset.

- D. Submittal.
 - 1. Submit product specifications, fabrication shop drawing, and wiring diagrams for the following:
 - a. Interface terminal box
 - b. Manual unlock switch

PART 2 - PRODUCTS

2.1 FIRE ALARM SYSTEM POWER SUPPLIES

- A. System primary power. Primary power for the FACP and the secondary power battery chargers shall each be obtained from the nearest 120V emergency panel. See plans for the exact location of the 120V power panel.
- B. Secondary power supply. Provide sealed gelled electrolyte batteries as the secondary power supply for the fire alarm control panel and each system circuit interface panel. The battery supply shall be calculated to operate its load in a supervisory mode for twenty four hours with no primary power applied and, after that time, operate its alarm mode for two hours. Batteries shall be sized at no larger than 80% of the calculated size to compensate for deterioration and aging during the battery life cycle. Battery calculations shall be submitted to justify the battery size. Batteries shall be housed in the control cabinet or a separate cabinet with adequate cell separation to prevent accidental discharge.

2.2 SPARE BOX

A. Provide a separate box located adjacent to the main fire alarm panel. The box shall be sufficiently sized (16" X 16" C 6" minimum) to hold all spare detectors and paperwork. This box shall match the main fire alarm panel in appearance and be keyed the same.

2.3 REMOTE CIRCUIT INTERFACE PANELS

- A. Remote circuit interface panels shall consist of an enclosure, a remote power supply, digital communications circuitry, mother boards, batteries and hardware, modules and circuitry described for inclusion in the fire alarm control panel as required to function as specified.
 - 1. Circuit interface panels, when required, include conventional zone module, analog loop drivers, indicating appliance circuits, output circuitry to perform actions, speaker supervisory and distribution circuits. All fire detection, alarm and indicating devices supported by the circuit interface panel shall function as a self standing system in the failsafe mode upon loss of the central fire alarm control panel processing, communications or the communications wiring between them.
 - 2. Smoke detectors shall alarm at their programmed sensitivity settings and shall not revert to a common default setting when their operating system segment is in the default mode.
 - 3. Circuit interface panels shall support remote system displays, annunciators and printers. Test procedures shall be capable of initiation at the main fire control panel, any remote LCD annunciator or any remote interface panel equipped with a keypad.

2.4 DETECTOR BASES

A. Detector Bases - Detector bases shall be low profile, surface or flush mounted in a standard 4" square by 2-1/8" deep box. Bases shall be able to accept photoelectric, ionization or heat detectors.

2.5 SMOKE DETECTORS-PHOTOELECTRIC

- Furnish and install where indicated on the drawings, intelligent analog smoke detectors
 Manufacturers:
 - System Sensor, no exception, equipped as follows:
 - 1) have an LED that flashed during normal operation;
 - 2) be self-adjusting for airborne contaminants;
 - 3) have clear, distinct visual alarm indication;
 - 4) be programmed to have alarm verification.

2.6 DUCT DETECTORS-PHOTOELECTRIC

- A. Furnish and install where indicated on the drawings, intelligent analog smoke detectors
 - 1. Manufacturers:

a.

- a. System Sensor, no exception. Detectors shall be campus standard System Sensor equipped as follows:
 - 1) have clear, distinct visual power and alarm indications;
 - 2) be programmed to have alarm verification;

3) if mounted where not readily accessible or not within normal view, have extended visual indicators and capability of re-setting the duct detector.

2.7 HEAT DETECTORS, INTELLIGENT RATE COMPENSATED

- A. Furnish and install where indicated on the drawings, intelligent analog smoke detectors
 - 1. Manufacturers:
 - a. System Sensor, no exception. Detectors shall be campus standard System Sensor equipped as follows:
 - 1) shall be of the dual element, self-restoring type;
 - 2) have a flashing LED for normal operation;
 - 3) have clear, distinct alarm visual indication.
 - 2. The detectors furnished shall have a listed spacing for coverage up to 2,500 square feet for use in environments as covered by Factory Mutual and UL (UQGS) and shall be installed according to the requirements of NFPA 72E for open area coverage.

2.8 MANUAL STATIONS, INTELLIGENT

- A. Provide single action intelligent manual stations where shown on the drawings, to be flush or surface mounted as required.
 - 1. Shall be high impact plastic, red in color.
 - 2. Provide a clear indication when activated.
 - 3. Station shall be equipped with terminal strip and pressure style screw terminals for the connection of field wiring.
 - 4. The manual stations shall be addressable and identifiable by the master fire alarm control panel. Address assignments shall be set electronically and reside within the station in non-volatile memory. Devices using rotary switches, pins, jumpers or staples are not acceptable.
 - 5. Surface mounted stations where indicated on the drawings shall be mounted using a manufacturer's prescribed matching baked red enamel outlet box.

2.9 MAGNETIC HOLD OPEN DEVICE

A. Provide 120VAC magnetic hold open devices where indicated in architectural door hardware specification and where required by Code. Devices shall close on an alarm.

2.10 INTELLIGENT SYSTEM INTERFACE MODULE

- A. Furnish and install, for the monitoring of contact type initiation devices and for the control of electrical devices where required, intelligent analog signaling circuit interface module. Modules shall be supplied to meet the project requirements as follows:
 - 1. A single circuit intelligent signaling circuit interface module for monitoring alarm, trouble, supervisory security or status contact type devices.
 - 2. Unit as above with form C software programmable control contacts for the management of specified electrical loads as required by this specification.
- B. The module shall be addressed, tested and programmed prior to installation using a UL listed programmer/tester.
- C. The module shall be suitable for two wire, two way communications on the intelligent analog signaling circuit. The module shall display a steady LED for each circuit, in the normal power or standby power condition, when in the alarm state or during control circuit activation.
- D. Modules shall incorporate triple technology microprocessor chips including analog, digital and EEROM technologies on the single device. Address assignments shall be set electronically and devices requiring dip switches, rotary switches, staples or jumpers are not acceptable.

2.11 INTELLIGENT SUPERVISED CONTROL MODULE

- A. Furnish and install for the control of supervised relays, contactors, audible signal circuits, visual signal circuits, distributed speaker circuits and two way fire fighters communication circuits, intelligent supervisory and control modules including features as follows:
 - 1. The modules shall be suitable for two wire operation and communications on intelligent analog alarm detection loops. Address assignments shall be accomplished electronically. Devices requiring dip switches, rotary switches, staples and/or jumpers are not acceptable.
 - 2. The module shall display a steady LED in the normal power or standby power condition, when in the activated state.

- 3. The module shall be suitable for semi-flush or surface mounting in a 2" deep, 4" square or double gang electrical outlet box having a depth of 3 1/2".
- B. Modules shall be available to supervise reverse polarity supervised indicating circuits utilizing 24VDC, two way supervised fireman's communication circuits or audio circuits utilizing 25VRMS or 70.7VRMS. It shall be possible to configure the module for control of motor contactors and AC voltages to 115VAC.
 - 1. All connected field wiring shall be supervised for opens, short circuits and grounded circuits.
 - 2. All controlled circuits shall be power limited at 1.5A, produced by self restoring thermal components. Units requiring circuit replacement for restoration of outputs are not acceptable.
 - a. Signal outputs shall be supported in either Style "Y" or Style "Z" configuration.b. The module shall report a trouble condition in the event of loss of the 24VDC signal

operating supply voltage.

2.12 EVACUATION SIGNALS

- A. Speakers: Shall be of the polarized 24-Vdc type. Speaker shall be UL listed for fire alarm voice evacuation use. Speakers shall be designed to be mounted on a wall, ceiling or other suitable rigid surface and shall be capable of being surface, semi flush, or flush mounted. Speakers shall be multi-tap. Settings shall be 1/16, 1/8, 1/4, 1/2, 1, 2 or 4 watts.
- B. Strobe Light: ADA visual notification appliances shall be compromised of a xenon flashtube and be entirely solid state. These devices shall be UL listed and be capable of either ceiling or wall mounting. Provide a unit that is ADA compliant with an output no less than 15 candela. The Lexan lens shall be pyramidal in shape to allow better visibility. Provide a red lens on selected strobes where indicated on plans. Strobe light candela ratings have been shown on the plans. However, contractor is responsible for sizing strobes per NFPA 72 based on room size and device location. Units shall be installed 80" above finished floor. All strobes within the same line of site shall be synchronized. Candela ratings have been shown on the plans. These ratings shall be verified based on the room size and NFPA requirements. Where there are discrepancies The NFPA requirements for candela rating shall take precedence over the values shown on the plans. Provide multi-tap strobes to allow for a full range of candela settings. Settings shall be 15/75, 30/75, 75 or 110 candela. Circuits for strobes shall allow for capacity to increase strobe intensities one setting for all strobes. Provide spare devices equal to 1% of the total number of new devices provided for this project.
- C. Speaker/Strobe combination: Standard, ADA Audio/Visual units shall provide a common enclosure for the fire alarm audible and visual alarm devices. The housing shall be designed to accommodate either horns, bells, chimes or speakers. The unit shall be complete with a tamper resistant, Pyramidal shaped lexan lens with Fire lettering visible from a 180-degree field of view. The front panel or bezel that is constructed of UL Listed Noryl, may be inverted so that the lens is below the audible device. Integral Xenon strobe shall provide 8000 peak candlepower and be adjustable from 1 to 3 flashes per second. Provide a unit approved for ADA compliance. Strobe shall be multi-tap type to allow for a full range of candela settings as indicated in paragraph G. Xenon strobe shall provide 4-wire connection to insure properly supervised in/out system connection. Unit shall be complete with all mounting hardware including backbox. Audio/visual unit shall be UL listed for its intended purpose. Speaker shall be multi-tap type to allow for different audio settings as indicated in paragraph F. Provide spare devices equal to 1% of the total number of new devices provided for this project.
- D. The evacuation signals shall be available in flush, semi-flush, or surface versions as required for signal locations shown on the contract documents. Signals shall be mounted using a listed outlet box, and as required, tile bridges. Signals shall be available in visual only and combination to satisfy all required project applications. Visual only and combination audio/visual alarms shall be white with red "FIRE" lettering.
- E. Evacuation signals in jazz lab areas shall be concealite FA 900 assemblies or approved equal. The normally exposed face of this assembly (in a non-alarm condition) shall be painted to match the surrounding finishes.

2.13 SECURITY INTERFACE TERMINAL BOX

- A. The interface terminal box shall be a lockable continuous hinge cover NEMA Type 4 enclosure. The cover of the enclosure shall be labeled to identify it's function.
- B. Dual screw barrier type terminal strips shall be provided within the interface terminal box. Terminals shall be provided for each interface output from the fire alarm system and the manual unlock keyswitch. All terminals shall be labeled to identify their function.
- C. The output contacts from the fire alarm system shall be rated for 1A at 120V.

PART 3 - EXECUTION

3.1 DESIGN AND INSTALLATION DRAWINGS

- A. Show a general layout of the complete system including equipment arrangement. It shall be the responsibility of the fire alarm contractor to verify dimensions and assure compatibility with all other systems interfacing with the fire alarm system.
 - 1. Identify on the drawings, conduit and conductor sizes and types with number of conductors in each conduit. Provide each conduit and device with a unique identification. For addressable alarm initiation devices, the system identifier shall be the system address for that device. Signals shall be sequentially numbered as the address of the controlling module.
 - 2. Indicate on the point to point wiring diagrams, interconnecting wiring within the panel between modules, and connecting wiring to the field device terminals.
 - 3. Provide mounting details of FACP and other boxes to building structure, showing fastener type, sizes, material and embedded depth where applicable.

3.2 INSTALLATION

- A. Perform work in accordance with the requirements of NEC, NFPA 70, and NFPA 72.
- B. Fasten equipment to structural members of building or metal supports attached to structure, or to concrete surfaces.
 - 1. Use clamping devices for attaching to structural steel, or when clamping is impractical, obtain written authority to weld or to drill.
 - 2. Fasten equipment to concrete or masonry with expansion anchors.
 - 3. Fasten equipment to drywall by screws into studs, and to metal wall panels by weld studs, bolts or self-taping metal screws.
 - 4. Do not install conduit raceways and boxes in positions that interfere with the work of other trades.
 - 5. Attach nameplates on panels or other components as specified.

3.3 CONDUIT

A. All wiring shall be installed in conduit, minimum ³/₄" EMT. Plenum rated cable with J-hooks may be used above ceilings.

3.4 BOXES, ENCLOSURES AND WIRING DEVICES

- A. Boxes shall be installed plumb and firmly in position.
 - 1. Extension rings with blank covers shall be installed on junction boxes where required.
 - 2. Junction boxes served by concealed conduit shall be flush mounted
 - 3. Upon initial installation, all wiring outlets, junction, pull and outlet boxes shall have dust covers installed. Dust covers shall not be removed until wiring installation when permanent dust covers or devices are installed.
 - 4. "Fire alarm system" decal or silk-screened label shall be applied to all junction box covers. All boxes shall be red.
 - 5. The normally exposed face of this assembly (in a non-alarm condition) shall be painted to match the surrounding finishes.

3.5 CONDUCTORS

- A. Each conductor shall be identified as shown on the shop drawings with wire markers at every splice and terminal point. Attach permanent wire markers within 2 inches of each wire termination. Marker legends shall be visible.
 - 1. All wiring shall be supplied and installed in compliance with the requirements of the National Electric Code, NFPA 70, Article 760, and that of the manufacturer.
 - 2. Wiring for analog loop circuits and speaker circuits shall be 18 AWG twisted. Wiring for strobe circuits shall be a minimum 14 AWG.
 - 3. Splices shall be made using solderless connectors. All connectors shall be installed in conformance with the manufacturer's recommendations.
 - 4. Crimp-on type spade lugs shall be used for terminations of stranded conductors to binder screw or stud type terminals. Spade lugs shall have upset legs and insulation sleeves sized for the conductors.
- B. Permanently label or mark each conductor at both ends with permanent alphanumeric wire markers.

C. Provide Type CI, 2 hour rated circuit integrity cable for riser wiring and wherever else required per code.

3.6 CERTIFICATE OF COMPLIANCE

A. Complete and submit to the Owner in accordance with NFPA 72.

3.7 FIELD QUALITY CONTROL

- A. Testing, General.
 - 1. All intelligent analog devices shall be tested and logged for correct address and sensitivity using test equipment specifically designed for that purpose. These devices and their bases shall be tagged with adhesive tags located in an area not visible when installed, showing the system address, initials of the installing technician and date.
 - 2. Wiring runs shall be tested for continuity, short circuits and grounds before system is energized. Resistance, current and voltage readings shall be made as work progresses.
 - a. A systematic record shall be maintained of all readings using schedules or charts of tests and measurements. Areas shall be provided on the logging form for readings, dates and witnesses.
 - b. The acceptance inspector shall be notified before the start of the required tests. All items found at variance with the drawings or this specification during testing or inspection by the acceptance inspector, shall be corrected.
 - c. Test reports shall be delivered to the acceptance inspector as completed.
 - 3. All test equipment, instruments, tools and labor required to conduct the system tests shall be made available by the installing contractor. The following equipment shall be a minimum for conducting the tests:
 - a. Ladders and scaffolds as required to access all installed equipment.
 - b. Multimeter for reading voltage, current and resistance.
 - c. Intelligent device programmer/tester.
 - d. Laptop computer with programming software for any required program revisions.
 - e. Two way radios, flashlights, smoke generation devices and supplies.
 - f. Spare printer paper.
 - g. A manufacturer recommended device for measuring air flow through air duct smoke detector sampling assemblies.
 - h. Decibel meter.
 - 4. In addition to the testing specified to be performed by the installing contractor, the installation shall be subject to test by the acceptance inspector.
 - 5. System wiring: fire alarm circuits shall be tested for continuity, grounds, and short circuits.
- B. Acceptance testing.
 - 1. A written acceptance test procedure (ATP) for testing the fire alarm system components and installation will be prepared by the Acceptance Inspector in accordance with NFPA 72, and this specification. The contractor shall be responsible for the performance of the ATP, demonstrating the function of the system and verifying the correct operation of all system components, circuits, and programming.
 - 2. A program matrix shall be prepared by the installing contractor referencing each alarm input to every output function affected as a result of an alarm condition on that input. In the case of outputs programmed using more complex logic functions involving "any", "or", "not", "count", "time", and "timer" statements; the complete output equation shall be referenced in the matrix.
 - 3. A complete listing of all device labels for alpha numeric annunciator displays and logging printers shall be prepared by the installing contractor prior to the ATP.
 - 4. The acceptance inspector shall use the system record drawings in combination with the documents specified under Paragraph 3.1 during the testing procedure to verify operation as programmed. In conducting the ATP, the acceptance inspector shall request demonstration of any or all input and output functions. The items tested shall include but not be limited to the following:
 - a. System wiring shall be tested to demonstrate correct system response and correct subsequent system operation in the event of:
 - 1) Open, shorted and grounded intelligent analog signaling circuit.
 - 2) Open, shorted and grounded network signaling circuit.
 - 3) Open, shorted and grounded conventional zone circuits.
 - 4) Open, shorted and grounded speaker, telephone circuits.
 - 5) Intelligent device removal.
 - 6) Primary power or battery disconnected.

- 7) Incorrect device at address.
- 8) Printer trouble, off line or out of paper.
- b. System evacuation alarm indicating appliances shall be demonstrated as follows:
 - 1) All alarm notification appliances actuate as programmed
 - 2) Audibility and visibility at required levels.
- c. System indications shall be demonstrated as follows:
 - 1) Correct message display for each alarm input at the control panel, each remote alphanumeric display and each CRT terminal.
 - 2) Correct annunciator light for each alarm input at each annunciator and color graphic terminal as shown on the drawings.
 - 3) Correct printer logging for all system activity.
- d. Secondary power capabilities shall be demonstrated as follows:
 - System primary power shall be disconnected for a period of time as specified herein. At the end of that period, an alarm condition shall be created and the system shall perform as specified for a period as specified.
 - 2) System primary power shall be restored for forty-eight hours and system charging current shall be normal trickle charge for a fully charged battery bank.
 - System battery voltages and charging currents shall be checked at the fire alarm control panel using the test codes and displayed on the LCD display.
- 5. In the event of system failure to perform as specified and programmed during the ATP procedure, at the discretion of the acceptance inspector, the test shall be terminated.
 - a. The installing contractor shall retest the system, correcting all deficiencies and providing test documentation to the acceptance inspector.
 - b. In the event that software changes are required during the ATP, a utility program shall be furnished by the system manufacturer to compare the edited program with the original. This utility shall yield a printed list of the changes and all system functions, inputs and outputs effected by the changes. The items listed by this program shall be the minimum acceptable to be re-tested before calling for resumption of the ATP. The printed list and the printer log of the retesting shall be submitted before scheduling of the ATP.
 - c. The acceptance inspector may elect to require the complete ATP to be performed again if, in his opinion, modifications to the system hardware or software warrant complete re-testing.

3.8 DOCUMENTATION

2.

- A. System documentation shall be furnished to the owner and shall include but not be limited to the following:
 1. System record drawings and wiring details including one set of reproducible masters and drawings
 - on 3-1/2 inch floppy disks or CD ROM in a DXF format suitable for use in a CAD drafting program. System operation, installation and maintenance manuals
 - 3. Written documentation for all logic modules as programmed for system operation with a matrix showing interaction of all input signals with output commands.
 - 4. Documentation of system voltage, current and resistance readings taken during the installation, testing and ATP phases of the system installation.
 - 5. System program showing system functions, controls and labeling of equipment and devices. Also provide a 3.5" floppy or CD ROM diskette with system file.

3.9 TEST EQUIPMENT

- A. Refer to Division 01 91 13 for General commissioning requirements.
- B. The Contractor shall furnish all test equipment as required to program devices and test the system, specifically an intelligent device tester and programmer.

3.10 INTERFACE TERMINAL BOX

- A. The fire alarm system contractor shall install the interface terminal box at the main fire alarm control panel in a readily accessible location no more than 8'-0" A.F.F.
- B. The fire alarm contractor shall wire from the fire alarm system to the interface terminal box.
- C. The security contractor shall wire from the security system to the interface terminal box.

3.11 INTERFACE CONDUIT, POWER AND WIRING

- A. The fire alarm contractor shall provide all conduit, power and wiring required for the installation of the terminal box, manual unlock switch and interfacing to the fire alarm system. All wiring shall be UL listed for the fire alarm applications.
- B. The security contractor shall provide all wiring from the interface terminal box to the security system. All wiring shall be UL listed for fire alarm applications.

3.12 WARRANTY AND SERVICES

- A. The contractor shall warrant the entire system against mechanical and electrical defects for a period of 18 months. This period shall begin upon completed certification and test of the system.
- B. During the warranty period, the fire alarm system subcontractor or manufacturer shall provide at no additional charge the inspection, parts, maintenance, testing and repair in full compliance with the requirements of NFPA 72.
 - 1. The installation contractor shall furnish training as follows for a minimum of four employees of the system user:
 - 2. Training in the receipt, handling and acknowledgement of alarms.
 - 3. Training in the system operation including manual control of output functions from the system control panel.
 - 4. Training in the testing of the system including logging of detector sensitivity, field test of devices and response to common troubles.
 - 5. The total training requirement shall be a minimum of 6 hours but shall be sufficient to cover all items specified.

END OF SECTION

SECTION 320413 - COMMON SUBMITTAL REQUIREMENTS FOR EXTERIOR IMPROVEMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes supplementary administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals specific to the work of this Division.
- B. Related Requirements:
 - 1. Division 01 submittal requirements.

1.2 DEFINITIONS

- A. Contractor: Refers to an entity in direct Contract with the Owner to furnish and/or perform any portion of the Work of the Contract, including but not limited to a Construction Manager.
 - 1. Contractor shall review and approve Product Submittals prior to fowarding them to the Architect.
- B. Product Submittals: In general, Product Submittals show characteristics of the proposed construction in one of the following forms:
 - 1. Shop Drawings.
 - 2. Product Data.
 - 3. Samples.
- C. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- D. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."
- E. Submittal Review Sheet: Specific form required to accompany each submittal. Obtain Submittal Review Sheet from the SmithGroup Project Manager.

1.3 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Requirements specified for submittals are intended to provide efficient handling, while permitting review responsibilities to be carried out.
- B. Avoidable Resubmittals: The first two reviews of each specified submittal will be processed without cost to the Contractor. After the second review, the Owner may charge the Contractor for the cost of such additional processing, unless the processing results from approved Change Orders causing revisions to previously approved submittals.
- C. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 - 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 - 4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architectreserve the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- D. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
 - 1. Initial Review: Allow 10 business days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required.

- 2. When a large volume of submittal materials is scheduled, additional review time may be required. Similarly, a particular submittal may require review completion in less than the agreed normal time. Due to variations in submittal volume and processing needs, agreed review time is not intended to apply to extreme conditions.
- 3. Resubmittal Review: Allow 10 business days for review of each resubmittal.
- 4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 15 business days for initial review of each submittal.
- E. Maintain at the Project Site ready access to the latest reviewed Shop Drawings and Product Data, and one set of samples.

1.4 DELEGATED-DESIGN SERVICES

A. Definitions:

- 1. Delegated Design: A portion or component of the Work identified by the Contract Documents to be designed by the Contractor, or an entity assigned by the Contractor, to satisfy performance and design criteria specified in the Contract Documents for that portion or component.
- 2. Registered Design Professional: Design professional, assigned by the Contractor, who is responsible for providing the delegated design work, and for certifying that the work is in compliance with the specified performance requirements and design criteria. Design professional shall be legally qualified to practice in jurisdiction where Project is located and shall be experienced in providing delegated design services of the kind indicated. Delegated design services are defined as those performed for installation of the system, assembly or product that are similar in material, design, and extent to those indicated for this Project.
- B. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- C. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Combine with Submittal Review Sheet before submitting to Architect .
- B. Project Closeout and Maintenance Material Submittals: See requirements in Division 01.
- C. Be responsible for quantities, weights, and dimensions to be confirmed and correlated at the site; for information that pertains solely to the fabrication processes and to the means, methods, techniques, sequences, and procedures of construction; and for coordination of the work of every trade, supplier, and subcontractor.
- D. Be responsible for each submittal to be in conformance with information given and the design intent expressed in the Contract Documents.
- E. Provide with each submittal specific written notice of any variation from the requirements of the Contract Documents by causing a specific notation to be made on the Submittal Review Sheet and Submittal Transmittal.

3.2 ARCHITECT'S AND GENERAL CONTRACTOR'S ACTION

- A. General: Architect will not review submittals that do not include the Submittal Review Sheet.
- B. Action Submittals: Architect's staff and consultants will review the submittal, and mark the Submittal Review Sheet with an action code. The code meanings are described below.

- C. Additional codes may be provided within comments or as an electronic submittal review stamp and shall be used in help indicating return of partial submittals.
- D. The Final Review Code on the Submittal Review Sheet prevails and governs the action of the overall submittal.
- E. Review Code meanings are as follows:
 - 1. Action Codes Permitting Use:
 - a. When an action code permitting use is assigned to a submittal, it does not authorize work that does not comply with the requirements of the Contract Documents. Acceptance of the Work will depend on compliance.
 - b. Code AP Approved: The Work covered by the submittal item may proceed, provided it complies with Contract Document requirements.
 - c. Code AN Approved as Noted: The Work covered by the submittal item may proceed, provided it complies with the Architect's notations and Contract Document requirements.
 - d. Code AN-R Approved as Noted Resubmit: Do not deliver or install the related work until the resubmittal has received Code AP or AN. However, fabrication and other off-site work covered by the submittal item may proceed, at the Contractor's risk, provided it complies with the Architect's notations and Contract Document requirements.
 - 2. Action Code Prohibiting Use:
 - a. Action Code REJ Not Approved: The Work covered by the submittal item, including purchasing, fabrication, delivery, and other activity, shall not proceed. Revise the submittal item or prepare a new item in accordance with the Architect's notations. Resubmit the corrected or new item without delay; do not permit submittal items marked "Not Approved" to be used. Work incorporating such items will be rejected.
 - 3. Action Code for Items Not Required:
 - a. Action Code X Not Requested by Contract Documents: The submittal item is not called for by the Contract Documents and is being returned unreviewed by the Architect except to the extent necessary to determine its status.
- F. Informational Submittals: For Architect's information only. Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
 - 1. Action Code for Information Only:
 - a. Action Code INF Information Only Received: The submittal item is not called for a return with a reviewed action code by the Contract Documents and is being returned un-reviewed by the Architect except to the extent necessary to determine its status.
- G. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- H. Incomplete submittals are not acceptable, will be considered non-responsive, and will be returned without review.
- I. Architect will return without review or discard submittals received from sources other than the Contractor.
- J. Submittals not required by the Contract Documents may be returned by the Architect without action.
 - 1. Do not submit Material Safety Data Sheets. They will be returned without review.

3.3 SUBMITTAL TRANSMITTAL REQUIREMENTS

- A. Submittal Transmittal shall be a PDF file in electronic format. It is recommended, to expedite the submittal review, the electronic form be emailed for review to the Architect as early as possible.
 - 1. Submittal Numbering: See below.
 - 2. Contact Information: Full Name, Phone Number and Email Address.
- B. Submittal Definition
 - 1. Each submittal consists of items from only ONE Specifications section.
 - 2. Complete Submittal: If ALL the items required by the Specifications section are listed on one Submittal Form (including continuation sheet), it is a complete submittal.
 - 3. Partial Submittals: If it is necessary to divide the required items of a given Specifications section into two or more submittals to meet schedule or handling requirements, the separate submittals are partial submittals. All partial submittals have the same submittal number, and are differentiated by sequential P-numbers (see below).
 - 4. All items in each submittal, whether complete or partial, will be processed together: Individual items will not be 'broken out' for special handling. Arrange submittals accordingly.

C. Submittal Numbering

- 1. Number submittals as described below to assist tracking.
- 2. Number each submittal in the format nnnnn-nn.
 - a. The 6-digit number is the number of the section that requires the submittal. For example, 044200.
 - b. The 2-digit number is based on the numerical sequence of submittals from that section. In other words, for each section, the first submittal is 01, the second is 02, and so on. The 2-digit number does not change for partial or re-submittals, so that the submittal can be tracked.
 - c. P-Number for Partial Submittals: Number each partial submittal in the pee space, beginning with P1, and increasing by one for each partial submittal of that submittal. If the submittal is a complete submittal, leave the P space blank.
 - d. R-Number for Re-submittals: Number each re-submittal in the arr space, beginning with R1, and increasing by one for each re-submittal of that submittal. Do not include an R-Number for the initial submittal.
 - e. Examples:
 - 1) Initial Complete Submittal: 044200-01. First Re-Submittal: 044200-01-R1.
 - 2) Initial Partial Submittal: 044200-01-P1. Second Partial Submittal: 0044200-01-P2. First Re-submittal of Second Partial Submittal: 044200-R1-P2.

3.4 SUBMITTAL REVIEW SHEET REQUIREMENTS

- A. Provide Submittal Review Sheet in PDF format. Submit as the page after the Submittal Transmittal.
- B. When attached, the Submittal Review Sheet shall not obscure information contained in the submittal.
- C. Do not edit any of the information contained within the Submittal Review Sheet except as follows:
 1. Submittal Number: See Submittal Numbering in Submittal Transmittal Requirements paragraph.
- D. The Contractor shall submit the PDF file in a manner that will allow editing of the Submittal Review Sheet fields by SmithGroup and its consultants.

END OF SECTION

SECTION 321316 - DECORATIVE CONCRETE PAVING

PART1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes colored concrete paving.
- B. Related Requirements:
 - 1. Refer to civil drawings and specifications for supplemental information.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash, slag cement, and other pozzolans.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at location to be determined by Architect.
 - 1. Review methods and procedures related to decorative concrete paving, including but not limited to, the following:
 - a. Quality control of concrete materials and decorative concrete paving construction practices.

1.5 ACTION SUBMITTALS

- A. Samples for Verification: For each type of exposed color, pattern, or texture indicated.
- B. Design Mixtures: For each decorative concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by manufacturer of decorative concrete paving systems.
- B. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities" (Quality Control Manual Section 3, "Plant Certification Checklist").
- C. Source Limitations: Obtain decorative concrete paving products and each type or class of cementitious material of the same brand from same manufacturer's plant, and obtain each aggregate from single source.
- D. Concrete Testing Service: Engage a qualified testing agency to perform material evaluation tests and to design concrete mixtures.
- E. ACI Publications: Comply with ACI 301 unless otherwise indicated.
- F. Provide 10'x10' mockups of all concrete finishes for review and approval prior to installation. Mockups to be located onsite in a protected area for project duration. Mockups should include all joint types.
- G. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Build mockups of full-thickness sections of decorative concrete paving to demonstrate typical joints; surface color, pattern, and texture; curing; and standard of workmanship.
 - 2. Build mockups of decorative concrete paving in the location and of the size indicated or, if not indicated, build mockups where directed by Architect.
 - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 4. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- H. Preinstallation Conference: Conduct conference at location to be determined by Architect.

- 1. Review methods and procedures related to decorative concrete paving, including but not limited to, the following:
 - a. Quality control of concrete materials and decorative concrete paving construction practices.
- 2. Require representatives of each entity directly concerned with decorative concrete paving to attend, including the following:
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for concrete design mixtures.
 - c. Ready-mix concrete manufacturer.
 - d. Decorative concrete paving Installer.

1.7 **PROJECT CONDITIONS**

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.
- B. Proof-roll prepared subbase surface below decorative concrete paving to identify soft pockets and areas of excess yielding. Correct subbase with soft spots and areas of pumping or rutting exceeding depth of 1/2 inch
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove loose material from compacted subbase surface immediately before placing concrete.
- B. Protect adjacent construction from discoloration and spillage during application of color hardeners, release agents, stains, curing compounds, and sealers.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
- B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 STEEL REINFORCEMENT INSTALLATION

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
- C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.
- D. Install welded-wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.
- E. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities, or replace units as required before placement. Set mats for a minimum 2-inch overlap to adjacent mats.

3.5 JOINTS

- A. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.
 - 1. When joining existing paving, place transverse joints to align with previously placed joints unless otherwise indicated.

- B. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.
 - 1. Continue steel reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of paving strips unless otherwise indicated.
 - 2. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.
- C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.
 - 1. Locate expansion joints at intervals of 24'-0" max. unless otherwise indicated.
 - 2. Extend joint fillers full width and depth of joint.
 - 3. Terminate joint filler not less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.
 - 4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
 - 5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
 - 6. During concrete placement, protect top edge of joint filler with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.
- D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows, to match jointing of existing adjacent decorative concrete paving:
 - 1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.
 - a. Tolerance: Ensure that sawed joints are within 3 inches in both directions from centers of dowels.
 - Doweled Contraction Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.
- E. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 3/8-inch radius. Repeat tooling of edges after applying surface finishes. Eliminate edging-tool marks on concrete surfaces.

3.6 CONCRETE PLACEMENT

- A. Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast-in.
- B. Remove snow, ice, or frost from subbase surface and steel reinforcement before placing concrete. Do not place concrete on frozen surfaces.
- C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.
- D. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.
- E. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.
- F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
- G. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.
 - 1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement dowels and joint devices.
- H. Screed paving surface with a straightedge and strike off.
- I. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleedwater appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

- J. Cold-Weather Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:
 - 1. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
 - 2. Do not use frozen materials or materials containing ice or snow.
 - 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in design mixtures.
- K. Hot-Weather Placement: Comply with ACI 301and as follows when hot-weather conditions exist:
 - 1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated in total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 - 2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
 - 3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.7 FLOAT FINISHING

- A. General: Do not add water to concrete surfaces during finishing operations.
- B. Float Finish: Begin the second floating operation when bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.

3.8 INTEGRALLY COLORED CONCRETE FINISH

- A. Integrally Colored Concrete Finish: After final floating, apply the following finish:
 - 1. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch deep with a stiff-bristled broom, perpendicular to line of traffic.
 - 2. Medium sand-blast/exposed aggregate finish.

3.9 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
- B. Comply with ACI 306.1 for cold-weather protection.
- C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

3.10 REPAIR AND PROTECTION

- A. Remove and replace decorative concrete paving that is broken or damaged or does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Architect.
- B. Protect decorative concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.
- C. Maintain decorative concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION

.0		E3.1
.1.1	BUILDING CODE SUMMARY	E7.0
CHITECTURA		FIRE AL
.1	ARCHITECTURAL ABBREVIATIONS AND SYMBOLS	FA0.1
3	TYPICAL MOUNTING HEIGHTS AND DIMENSIONING CONVENTIONS	FA0.1(2
5	TYPICAL REFLECTED CEILING PLAN LOCATIONS AND CONFIGURATIONS	FA0.1B
2.1	GROUND LEVEL DEMOLITION FLOOR PLAN	FA0.1B(
2.2	GROUND LEVEL DEMOLITION REFLECTED CEILING PLAN	FAD1.1
1.1	ARCHITECTURAL SITE PLAN - OVERALL	FA1.1 R
1.1	GROUND LEVEL FLOOR PLAN	FA5.1
1.1	GROUND LEVEL REFLECTED CEILING PLAN	
1.1	STAIR SECTIONS & TYPICAL DETAILS	TECHN
2.1	TYPICAL STAIR DETAILS	T0.0.0
1.1	ENLARGED TOILET ROOM FLOOR PLANS & ELEVATIONS	T2.1.1
2.1	ENLARGED JAZZ LAB FLOOR PLAN & RCP	T3.1.1
2.2	ENLARGED SOUND & LIGHT LOCK FLOOR PLAN & RCP & ELEVATIONS	TA0.0.0
1.1	INTERIOR ELEVATIONS & BUILDING SECTIONS	TA2.1.1
1.2	INTERIOR ELEVATIONS & BUILDING SECTIONS - ACOUSTICAL WALLS	TA3.1.1
1.3	INTERIOR RENDERINGS	TAD2.1
2.1	PARTITION SYSTEMS	TD3.1.1
3.2	DOOR AND FRAME ELEVATIONS	
6.1	INTERIOR DETAILS	
6.2	INTERIOR DETAILS	
6.3	MODULAR CASEWORK SCHEDULE AND DETAILS	
7.1	ARCHITECTURAL WOODWORK DETAILS	
2.1.1	GROUND LEVEL FINISH PLAN	
CHANICAL		
0.1	MECHANICAL AND PLUMBING ABBREVIATIONS AND SYMBOLS	
D2.1	FIRST LEVEL MECHANICAL AND PLUMBING DEMOLITION PLAN	
2.1	FIRST LEVEL MECHANICAL AND PLUMBING PLAN	
6.1	MECHANICAL AND PLUMBING DETAILS AND CONTROLS	NOTE:
7.1	MECHANICAL AND PLUMBING SCHEDULES	SET FO
ECTRICAL		
1	ELECTRICAL ABBREVIATIONS AND SYMBOLS	
2	ELECTRICAL SCHEDULES	
2		

SHEET NAME

SHEET NUMBER

SHEET NUMBER	
E2.1	FIRST LEVEL POWER
E3.1	FIRST LEVEL LIGHTIN
E7.0	ELECTRICAL DIAGRA
FIRE ALARM	
FA0.1	FIRE ALARM ABBREV
FA0.1(2436)	FIRE ALARM ABBREV
FA0.1B	FIRE ALARM ABBREV
FA0.1B(2436)	FIRE ALARM ABBREV
FAD1.1	FIRST LEVEL FIRE AL
FA1.1 RCP	FIRST LEVEL FIRE AL
FA5.1	FIRE ALARM RISER D
TECHNOLOGY	
T0.0.0	TELECOM INDEX
T2.1.1	TELECOM GROUND L
T3.1.1	TELECOM GROUND L
TA0.0.0	AUDIO VISUAL INDEX
TA2.1.1	AUDIOVISUAL GROUN
TA3.1.1	AUDIOVISUAL GROUN
TAD2.1	AUDIOVISUAL GROUN
TD3 1 1	TELECOM GROUND L

FOR DURTHER INFORMATION.



MP6

FI F

ED2.

SHEET NUMBER

PROJECT COVER SHEET

GENERA

FIRST LEVEL ELECTRICAL DEMOLITION POWER PLAN

UND LEVEL DEMOLITION PLAN TELECOM GROUND LEVEL DEMOLITION REFLECTED CEILING PLAN

E: ALL STRUCTURAL INFORMATION IS ISSUED UNDER A SEPARATE PACKAGE FROM WALTER P MOORE. REFER TO THIS ADDITIONAL

UNT Jazz Practice Labs

University of North Texas Music Jazz Practice Labs

1155 Union Cricle #311367 Denton TX 76203-5017

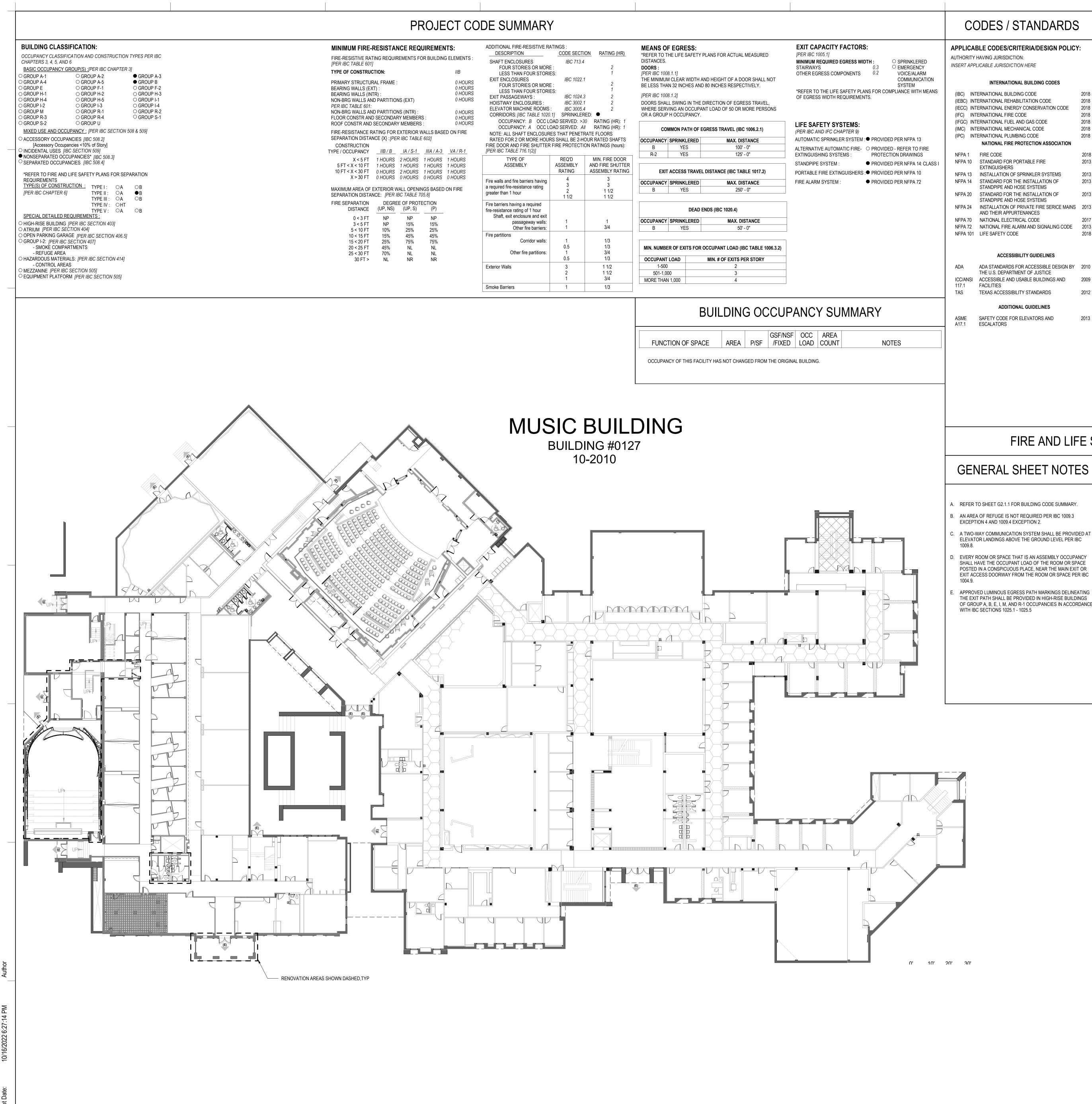
SMITHGROUP

5910 N. CENTRAL EXPRESSWAY **SUITE 1765** DALLAS, TX 75206 214.559.4851 smithgroup.com

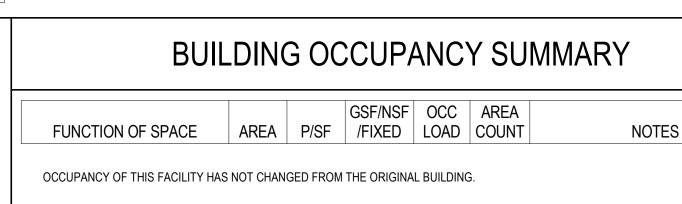
VOLUME I OF I

ISSUED FOR: CONSTRUCTION

ISSUE DATE: OCT 14, 2022 13746



IENTS: DING ELEMENTS : IIB 0 HOURS 0 HOURS 0 HOURS 0 HOURS 0 HOURS 0 HOURS	DESCRIPTION CODE SECTION RATING (HR) G ELEMENTS : SHAFT ENCLOSURES IBC 713.4 IIB FOUR STORIES OR MORE : 2 IIB LESS THAN FOUR STORIES: 1 0 HOURS FOUR STORIES OR MORE : 2 0 HOURS EXIT ENCLOSURES OR MORE : 2 0 HOURS HOIS TORIES OR MORE : 1 0 HOURS EXIT PASSAGEWAYS : IBC 1024.3 2 0 HOURS ELEVATOR MACHINE ROOMS : IBC 3002.1 2 0 HOURS CORPIDORS: (IBC TABLE 1020.11 SPRINKLEPED): •				8.1.1] M CLEAR WIDTH A N 32 INCHES ANI 8.1.2] LL SWING IN THE	PLANS FOR ACTUAL MEASURED AND HEIGHT OF A DOOR SHALL NOT D 80 INCHES RESPECTIVELY. DIRECTION OF EGRESS TRAVEL, INT LOAD OF 50 OR MORE PERSONS	EXIT CAPACITY FACTORS: [PER IBC 1005.1] MINIMUM REQUIRED EGRESS WIDTH : C STAIRWAYS 0.3 C OTHER EGRESS COMPONENTS 0.2 *REFER TO THE LIFE SAFETY PLANS FOR COMP OF EGRESS WIDTH REQUIREMENTS.		
0 HOURS 8ASED ON FIRE	OCCUPANCY: B OCC L OCCUPANCY: A OCC L NOTE: ALL SHAFT ENCLOSUR	DAD SERVED: A	II RATING (HR): 1	со	MMON PATH OF E	EGRESS TRAVEL (IBC 1006.2.1)	LIFE SAFETY SYSTEMS: (PER IBC AND IFC CHAPTER 9)		
	RATED FOR 2 OR MORE HOURS SHALL BE 2-HOUR RATED SHAFTS			OCCUPANCY	SPRINKLERED	MAX. DISTANCE	AUTOMATIC SPRINKLER SYSTE	M : PROVIDED PER N	
A-3 VA/R-1	FIRE DOOR AND FIRE SHUTTER [PER IBC TABLE 716.1(2)]	FIRE PROTECTI	ON RATINGS (hours):	В	YES	100' - 0"	ALTERNATIVE AUTOMATIC FIRE	- O PROVIDED - REF	
	,-	DEOID		R-2	YES	125' - 0"	EXTINGUISHING SYSTEMS :	PROTECTION DR	
RS 1 HOURS RS 1 HOURS RS 1 HOURS	TYPE OF ASSEMBLY	REQ'D ASSEMBLY RATING	MIN. FIRE DOOR AND FIRE SHUTTER ASSEMBLY RATING	EXIT ACCESS TRAVEL DISTANCE (IBC TABLE 1017.2)			STANDPIPE SYSTEM : PORTABLE FIRE EXTINGUISHER	 PROVIDED PER N RS : PROVIDED PER N 	
RS 0 HOURS	Fire walls and fire barriers having	4	3	OCCUPANCY	SPRINKLERED	MAX. DISTANCE	FIRE ALARM SYSTEM :	PROVIDED PER N	
SED ON FIRE	a required fire-resistance rating	3 2	3 1 1/2	B	YES	250' - 0"			
	greater than 1 hour	1 1/2	1 1/2		120	200 0			
	Fire barriers having a required fire-resistance rating of 1 hour Shaft, exit enclosure and exit				DEAD	ENDS (IBC 1020.4)			
	passageway walls:	1	1	OCCUPANCY	SPRINKLERED	MAX. DISTANCE			
	Other fire barriers:	1	3/4	В	YES	50' - 0"			
	Fire partitions Corridor walls: 1 0.5 Other fire partitions: 1		1 1/3 0.5 1/3 1 3/4 0.5 1/3	MIN. NUMBE	MIN. NUMBER OF EXITS FOR OCCUPANT LOAD (IBC TABLE 1006.3.2)				
	Exterior Walls	3	1 1/2	1-500	-	MIN. # OF EXITS PER STORY	_		
		2	1 1/2	501-1,0		3	_		
		1	3/4	MORE THAN		4	-		
	Smoke Barriers	1	1/3		,				



CODE COMPLIANCE CODES / STANDARDS APPROACH NARRATIVE APPLICABLE CODES/CRITERIA/DESIGN POLICY: AUTHORITY HAVING JURISDICTION:

2018

2018

2018

2018

2018

2018

2018

OCCUPANCY, USE, AND FUNCTION OF THE SPACES INCLUDED WITHIN THIS RENOVATION ARE NOT BEING ADJUSTED, MANIPULATED, OR CHANGED. MAINTAINING OR UPGRADING FIRE RATED ELEMENTS TO COMPLY WITH APPLICABLE CODES AS LISTED ADJACENT WILL BE ADDRESSED BASED UPON THE SCOPE OF WORK AS DEFINED IN THE DRAWING SHEETS AS PART OF THE SCOPE OF THIS RENOVATION. EXISTING PATHS OF EGRESS AND EXITS ARE TO REMAIN UNAFFECTED WITHIN THE SCOPE OF THIS PROJECT. THE ARE OF RENOVATION DOES NOT HAVE AN EXISTING FIRE

SPRINKLER SYSTEM AND THE INTENT IS TO NO UPGRADE THE RENOVATED ARE BUT MAINTAIN EXISTING RATED COMPONENTS AS APPLICABLE. ANY WALL INFILL BETWEEN SPACES WILL BE ADDRESSED WITH LIKE CONSTRUCTION OF A FIRE RATED ASSEMBLY AND ALL FINISHED WILL COMPLY WITH FLAME SPREAD REQUIREMENTS. NEW FIRE ALARM STROBES OF THE CONCEALED TYPE ARE TO BE USED TO MAINTAIN THE DESIGN INTENT OF THE SPACE.

THIS RENOVATION DOES NOT EXCEED 50% OF THE EXISTING BUILDING SQUARE FOOTAGE WHICH PLACES THE PROJECT ADHERING TO AN ALTERATION LEVEL 2 CATEGORY.

IFPA 1	FIRE CODE	2018
NFPA 10	STANDARD FOR PORTABLE FIRE EXTINGUISHERS	2013
IFPA 13	INSTALLATION OF SPRINKLER SYSTEMS	2013
IFPA 14	STANDARD FOR THE INSTALLATION OF STANDPIPE AND HOSE SYSTEMS	2013
IFPA 20	STANDARD FOR THE INSTALLATION OF STANDPIPE AND HOSE SYSTEMS	2013
IFPA 24	INSTALLATION OF PRIVATE FIRE SERICE MAINS AND THEIR APPURTENANCES	2013
IFPA 70	NATIONAL ELECTRICAL CODE	2017
IFPA 72	NATIONAL FIRE ALARM AND SIGNALING CODE	2013
IFPA 101	LIFE SAFETY CODE	2018
	ACCESSIBILITY GUIDELINES	
DA	ADA STANDARDS FOR ACCESSIBLE DESIGN BY THE U.S. DEPARTMENT OF JUSTICE	2010
CC/ANSI 17.1	ACCESSIBLE AND USABLE BUILDINGS AND FACILITIES	2009
-AS	TEXAS ACCESSIBILITY STANDARDS	2012
	ADDITIONAL GUIDELINES	
ASME A17.1	SAFETY CODE FOR ELEVATORS AND ESCALATORS	2013

INTERNATIONAL BUILDING CODES

NATIONAL FIRE PROTECTION ASSOCIATION

CODE COMPLIANCE APPROACH:

GENERAL FIRE AND LIFE SAFETY SHEET NOTES

GRAPHIC LEGEND

ITEM NOT SELECTED

ITEM SELECTED

PROJECT CODE SUMMARY SYMBOLS

0

- . THE PURPOSE OF THE FIRE AND LIFE SAFETY DRAWINGS IS TO ILLUSTRATE IN SCHEMATIC FASHION, THE APPLICABLE EXITING, FIRE-RESISTANCE, AND LIFE SAFETY CONCEPTS UTILIZED BY THIS PROJECT; INCLUDING, BUT NOT LIMITED TO: OCCUPANCY CLASSIFICATIONS OCCUPANCY LOAD FACTORS
- EXIT LOCATIONS, EXIT PATHS & CAPACITY FUNCTION OF SPACE FIRE-RESISTANCE RATED CONSTRUCTION
- AND OTHER STRATEGIES RELATED TO THE CODE COMPLIANCE APPROACH OF THIS PROJECT.
- ADDITIONAL DETAILED REQUIREMENTS APPLY TO THE CONSTRUCTION OF PARTITIONS, FIRE RATED DOOR ASSEMBLIES, INTERIOR GLAZED OPENINGS, DUCTS, SMOKE AND FIRE DAMPERS AND THROUGH PENETRATION FIRE STOPPING. REFER TO THE DRAWINGS OF EACH DISCIPLINE AND THE SPECIFICATIONS FOR THESE REQUIREMENTS.
- ADDITIONAL DETAILED REQUIREMENTS SHOWN ELSEWHERE MAY REQUIRE CONSTRUCTION HAVING GREATER FIRE RATINGS, MORE EXTENSIVE FIRE-RATED CONSTRUCTION, OR MORE COMPLEX ASSEMBLIES THAN INDICATED BY THE DIAGRAMS ON THIS SHEET. WHEN PROVIDED, THE ADDITIONAL DETAILED REQUIREMENTS SHALL GOVERN.
- FIRE BARRIERS SHALL EXTEND FROM THE TOP OF THE FOUNDATION OR FLOOR/CEILING ASSEMBLY BELOW TO THE UNDERSIDE OF THE FLOOR OR ROOF SHEATHING, SLAB OR DECK ABOVE AND SHALL BE SECURELY ATTACHED THERETO. SUCH FIRE BARRIERS SHALL BE CONTINUOUS THROUGH CONCEALED SPACES.
- SHAFT ENCLOSURES SHALL BE CONSTRUCTED AS FIRE BARRIERS.
- FIRE PARTITIONS SHALL EXTEND FROM THE TOP OF THE FOUNDATION OR FLOOR/CEILING ASSEMBLY BELOW TO THE UNDERSIDE OF THE FLOOR OR ROOF SHEATHING, SLAB OR DECK ABOVE OR TO THE FIRE-RESISTANCE-RATED FLOOR/CEILING OR ROOF/CEILING ASSEMBLY ABOVE, AND SHALL BE SECURELY ATTACHED THERETO.
- SMOKE BARRIERS SHALL FORM AN EFFECTIVE MEMBRANE CONTINUOUS FROM OUTSIDE WALL TO OUTSIDE WALL AND FROM THE TOP OF THE FOUNDATION OR FLOOR/CEILING ASSEMBLY BELOW TO THE UNDERSIDE OF THE FLOOR OR ROOF SHEATHING, DECK OR SLAB ABOVE, INCLUDING CONTINUITY THROUGH CONCEALED SPACES.
- SMOKE PARTITIONS SHALL EXTEND FROM THE TOP OF THE FOUNDATION OR FLOOR BELOW TO THE UNDERSIDE OF THE FLOOR OR ROOF SHEATHING, DECK OR SLAB ABOVE OR TO THE UNDERSIDE OF THE CEILING ABOVE WHERE THE CEILING MEMBRANE IS CONSTRUCTED TO LIMIT THE TRANSFER OF SMOKE.

PROJECT FIRE AND LIFE SAFETY SHEET NOTES

- A. A SIGN COMPLYING WITH IBC SECTION 1111 SHALL BE PROVIDED AT EACH LANDING OF THE ELEVATOR AND SAY THE FOLLOWING: "IN FIRE EMERGENCY, DO NOT USE THE ELEVATOR. USE EXIT STAIRS".
- INTERIOR WALL & CEILING FINISHES SHALL HAVE A FLAME SPREAD INDEX RATING OF NO MORE THAN CLASS B AT VERTICAL EXITS & EXIT PASSAGEWAYS AND EXIT ACCESS CORRIDORS AND OTHER EXITWAYS.
- INTERIOR WALL & CEILING FINISHES SHALL HAVE A FLAME SPREAD INDEX RATING OF NO MORE THAN CLASS C AT ROOMS AND ENCLOSED SPACES.
-). ALL MATERIALS EXPOSED WITHIN DUCTS OR PLENUMS SHALL HAVE A FLAME SPREAD RATING INDEX NOT MORE THAN 25 AND A SMOKE DEVELOPED RATING OF NOT MORE THAN 50. FIRE EXTINGUISHERS SHALL BE LOCATED SUCH THAT A
- MAXIMUM TRAVEL DISTANCE OF 75' SHALL NOT BE EXCEEDED (WHERE REQUIRED BY CODE). LEVEL/ AREA MAIN OCCUPANCY EXIT SIGN LOCATIONS MAY
- NOT BE SHOWN. REFERENCE ELECTRICAL SHEETS FOR ALL EXIT SIGN LOCATIONS. G. FIRE RESISTIVE ASSEMBLY DETAILS, IF APPLICABLE, ARE
- LOCATED ELSEWHERE IN THIS DRAWING SET PER THE SHEET INDEX
- ELEVATOR HOISTWAY OPENINGS SHALL BE PROTECTED AS REQUIRED BY THE CODE, CORRESPONDING TO THE RATING OF THE HOISTWAY.
- EVERY ASSEMBLY OCCUPANCY ROOM OR SPACE SHALL HAVE THE OCCUPANT LOAD POSTED IN A CONSPICUOUS PLACE.

DEFERRED SUBMITTALS

- ANTICIPATED DEFERRED SUBMITTALS
- FIRE PROTECTION DESIGN

ANNUNCIATOR

CONTROL PANEL

KEYSAFE (KNOX

FKS = FIREMAN'S

BOX)

- FIRE ALARM DESIGN BUILDING SIGNAGE (NON CODE REQUIRED)
- SECURITY SYSTEM DESIGN
- CCTV, PA SYSTEM
- FURNITURE SYSTEMS PRE-MANUFACTURED STAIRS
- H. EXTERIOR CURTAIN WALL SYSTEM

FIRE AND LIFE SAFETY ELEMENTS

GRAPHIC LEGEND

FIRE-RESISTANCE-RATED WALL ASSEMBLIES

0 HOUR SMOKE PARTITION

1 HOUR FIRE RESISTANCE RATING

2 HOUR FIRE RESISTANCE RATING

3 HOUR FIRE RESISTANCE RATING

4 HOUR FIRE RESISTANCE RATING

- A. REFER TO SHEET G2.1.1 FOR BUILDING CODE SUMMARY. AN AREA OF REFUGE IS NOT REQUIRED PER IBC 1009.3 EXCEPTION 4 AND 1009.4 EXCEPTION 2.
- A TWO-WAY COMMUNICATION SYSTEM SHALL BE PROVIDED AT ELEVATOR LANDINGS ABOVE THE GROUND LEVEL PER IBC 1009.8
- EVERY ROOM OR SPACE THAT IS AN ASSEMBLY OCCUPANCY SHALL HAVE THE OCCUPANT LOAD OF THE ROOM OR SPACE POSTED IN A CONSPICUOUS PLACE, NEAR THE MAIN EXIT OR EXIT ACCESS DOORWAY FROM THE ROOM OR SPACE PER IBC
- APPROVED LUMINOUS EGRESS PATH MARKINGS DELINEATING THE EXIT PATH SHALL BE PROVIDED IN HIGH-RISE BUILDINGS OF GROUP A, B, E, I, M, AND R-1 OCCUPANCIES IN ACCORDANCE WITH IBC SECTIONS 1025.1 - 1025.5

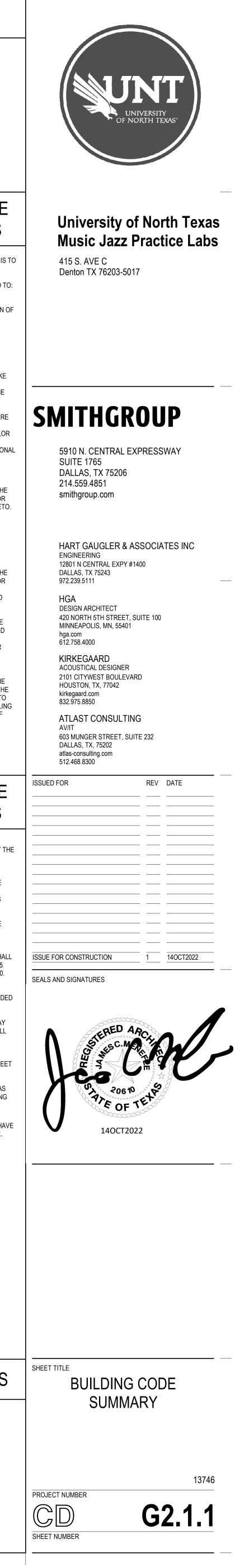
1FSB	1FSB	1FSB	1FSB	1FSB	FIRE	& SMOK	E BARRIER
1FB	1FB	1FB	1FB	1FB	FIRE	BARRIE	र
05FP	05FP	05FP	05FP	05FP	FIRE	PARTITI	NC
2FW	2FW	2FW	2FW	2FW	FIRE	WALL	
SP	SP	SP	SP	SP	SMO	KE PART	ITION
FIRE-F	RESIST	ANCE-R	ATING	(HOURS)	1		
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REQI	JIRED (CAPACI	TY —	\sim —		<u> </u>	ACTUAL CAPAC
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EXIT S	IGN SY	MBOLS	5				
	-						EILING MOUNTED
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_		CABI		IGUISHE	к ~		- FIRE STANDP
	FE		e Nguish	ED		FDCS	
Ó	•		NGUISH	LIN			COMMUNICATIO SYSTEM
	FAS	= FIR	RE ALAF	RW			
	/ 73	- STAT				FAACF	= FIRE ALARM

FDC = FIRE DEPARTMENT CONNECTION FHVC = FIRE HOSE VALVE

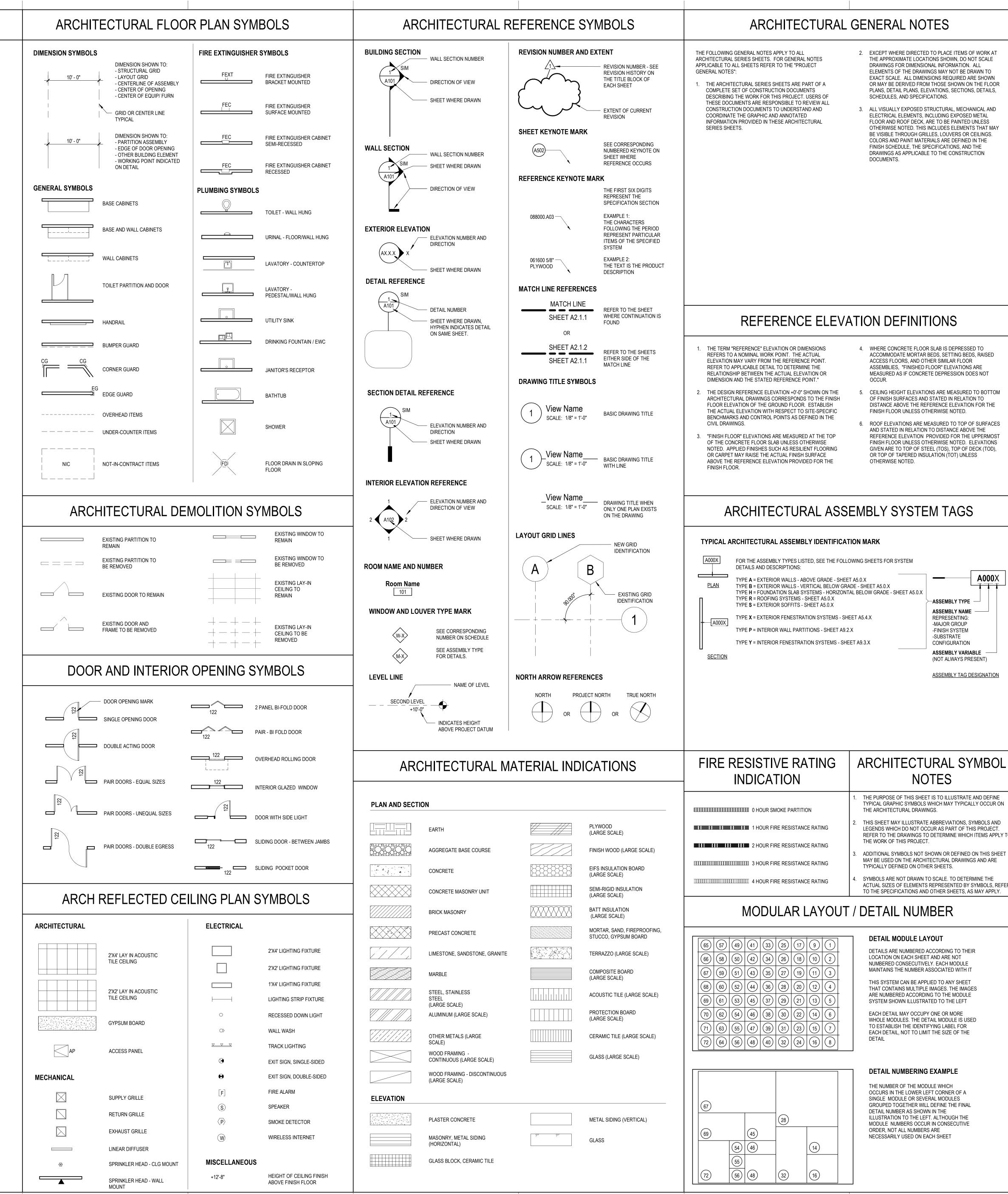
CABINET

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10'	20'	30'	



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A AB ACT ACP ACS PNL AD ADDL ADDL ADJ ADJ ADJ AFF AFG AFS AGGR ALUM	AREA DRAIN ADDITIONAL ADHESIVE ADJUSTABLE ADJACENT ABOVE FINISH FLOOR ABOVE FINISH GRADE ABOVE FINISH SLAB AGGREGATE ALUMINUM	G GA GAL GALV GB GC GFRC GFRC GFRG GLU LAM GLZ GR GVL GYP	GAS GAUGE, GAGE GALLON GALVANIZED GRAB BAR GENERAL CONTRACTOR GLASS FIBER REINFORCED CONCRETE GLASS FIBER REINFORCED GYPSUM GLASS GLUE LAMINATED GLAZING GRADE OR GRADING GRAVEL GYPSUM	Q QT QTR QTY R RA RA RA RB RCP RCPT RD RECT	QUARRY TILE QUARTER QUANTITY RISER RETURN AIR RADIUS RESILIENT BASE REFLECTED CEILING PLAN RECEPTACLE ROOF DRAIN RECTANGULAR
ALT ANOD APPROX ARCH ASPH AVG B B B B B B B D B T W N B I T UM B LDG	ALTERNATE ANODIZED APPROXIMATE(LY) ARCHITECT(URAL) ASPHALT AVERAGE BULLETIN BOARD BOARD BETWEEN BITUMINOUS BUILDING	GYP BD GYP PLAS H HB HC HD HDBD HDW HDWD HGT HM	GYPSUM BOARD GYPSUM PLASTER HIGH HOSE BIBB HOLLOW CORE HEAD HARDBOARD HARDWARE HARDWOOD HEIGHT HOLLOW METAL	REF REFR REG REINF REQD REQT RESIL RET REV RF RH RHMS RHWS RM	REFERENCE REFRIGERATOR REGISTER REINFORCE (D) (ING) (MENT) REQUIRED REQUIREMENT RESILIENT RETURN REVISION RESILIENT FLOORING RIGHT HAND ROUND HEAD MACHINE SCREW ROUND HEAD WOOD SCREW ROOM
BM BOD BOT BOS BRG BSMT BUR CAB CB	BENCHMARK BASIS OF DESIGN BOTTOM BOTTOM OF STEEL BEARING BASEMENT BUILT UP ROOFING SYSTEM CABINET CATCH BASIN	HNDRL HORIZ HPT HR HVAC HW ID IN INCAND	HANDRAIL HORIZONTAL HIGH POINT HOUR HEATING-VENTILATION-AIR CONDITIONING HOT WATER INSIDE DIAMETER INCH INCANDESCENT	RND ROW RWL S SA SB SC SCHED	ROUND ROUGH OPENING RIGHT OF WAY RAIN WATER LEADER SOUTH SUPPLY AIR SPLASH BLOCK SOLID CORE SCHEDULE
CCR CCTV CG CEM CER CH BD CI CJ CL CLG CLR CMU	CARD CONTROL READER CUBICLE CURTAIN TRACK CLOSED CIRCUIT TELEVISION CORNER GUARD CEMENT, CEMENTITIOUS CERAMIC CHALKBOARD CAST IRON CONTROL JOINT CENTER LINE CEILING CLEAR CONCRETE MASONRY UNIT	INCL INFO INSUL INTR INV IVT J JAN JST JT	INCLUDE, INCLUDING INFORMATION INSULATION INTERIOR INVERT INTRAVENOUS TRACK JANITOR JOIST JOINT	SCRN SD SECT SEG SEP JT SHT SHWR SHWR SHV SIM SK SMS SR	SCREEN STORM DRAIN SOUTHEAST SECTION SEGMENT SEPARATION OR SEPARATE SEPARATION JOINT SHEET, SHEETING SHOWER SHELVES, SHELVING SIMILAR SINK SHEET METAL SCREW SPACE SPACED SPACING
CNTR COL CONC CONF CONN CONSTR CONT CONTR CORR CPT CSK CSP CSWK	COUNTER COLUMN CONCRETE CONFERENCE CONNECTION CONSTRUCTION CONTINUOUS CONTRACTOR CORRUGATED CARPET COUNTERSUNK COMBINATION STANDPIPE CASEWORK	KG KIT KPL KS L LAB LAM LAV	KILOGRAM KITCHEN KICK PLATE KNEE SPACE LENGTH, LONG LABORATORY LAMINATE, LAMINATION LAVATORY	SP SPEC SPKLR SPKR SQ SS SSK SST ST STA STA STAG STC STD	SPACE, SPACED, SPACING SPECIFICATION SPRINKLER SPEAKER SQUARE SANITARY SEWER SERVICE SINK STAINLESS STEEL STREET STATION STAGGERED SOUND TRANSMISSION COEFFICIEN STANDARD STEEL
CT CU CW D DBL DBL ACT DEG DEMO DEPT DET	CERAMIC TILE CUBIC COLD WATER DEPTH DOUBLE DOUBLE ACTING DEGREE DEMOLISH DEPARTMENT DETAIL	LB LED LF LG LIN LL LT LT LT UT UT LTG LVR	POUND LIGHT EMITTING DIODE LINEAR FOOT LENGTH LINEAR LEAD LINED LOW POINT LIGHT LIGHT WEIGHT LIGHTING LOUVER	STL STOR STRUCT SUSP SUSP CLG SVCE SW SYMM SYST	STEEL STORAGE STRUCTURAL SELF-TAPPING STEEL SUSPENDED SUSPENDED CEILING SERVICE SOUTHWEST SYMMETRICAL SYSTEM
DF DIA DIAG DIFF DIM DIM PT DISP DIST DN DR DS DSP DT DWG	DRINKING FOUNTAIN DIAMETER DIAGONAL DIFFUSER DIMENSION DIMENSION POINT DISPENSER DISTANCE DOWN DRAIN DOWNSPOUT DRY STANDPIPE DRAPERY TRACK DRAWING	M MACH MATL MATV MAX MB MC MDO MECH MED MEMB MFR MH	METERS MACHINE MATERIAL MASTER ANTENNA TELEVISION SYSTEM MAXIMUM MACHINE BOLT MEDICINE CABINET MEDIUM DENSITY OVERLAY MECHANICAL MEDIUM MEMBRANE MANUFACTURER MANUFACTURER	T T&B T&G TC TD TEL TEMP THERM THR THRES THRU TMPD GL TO	TREAD TOP AND BOTTOM TONGUE AND GROOVE TOP OF CONCRETE, TOP OF CURB TRENCH DRAIN TELEPHONE TEMPORARY THERMAL THICK, THICKNESS THRESHOLD THROUGH TEMPERED GLASS TOP OF
DWGS (E) EA EDR EG EIFS EL ELAST ELEC ELEV	DRAWINGS EXISTING EACH EQUIPMENT DRAWING EDGE GUARD EXTERIOR INSULATION FINISH SYSTEM ELEVATION ELASTOMERIC ELECTRICAL ELEVATOR	MH MIN MISC MLDG MM MO MTD MTD MTG MVBL MULL NULL	MANHOLE MINIMUM MISCELLANEOUS MOLDING MILLIMETERS MASONRY OPENING MODULE, MODULAR MOUNTED MOUNTING MOVABLE MULLION	TOR TOS TOT TOW TP TTB TV TYP UC UL	TOP OF RAILING TOP OF STEEL TOTAL TOP OF WALL TOP OF PAVEMENT TELEPHONE TERMINAL BOARD TELEVISION TYPICAL
EMER ENCL ENGR EOS EP EPB EPDM EQ EQUIP EQUIP EQUIV ESCAL EST	EMERGENCY ENCLOSURE ENGINEER EDGE OF SLAB ELECTRICAL PANEL ELECTRICAL PANEL BOARD ETHYLENE PROPYLENE DIENE MONOMER EQUAL EQUALLY SPACED EQUIPMENT EQUIVALENT ESCALATOR ESTIMATE(D)	(N) NA NAT NE NIC NO NOM NRC NTS NW O	NEW NOT APPLICABLE NATURAL NORTHEAST NOT IN CONTRACT NUMBER NOMINAL NOICE REDUCTION COEFFICIENT NOT TO SCALE NORTHWEST	UON UPS UTIL VAC VB VCT VERT VEST VIF VIT	UNLESS OTHERWISE NOTED UNINTERRUPTABLE POWER SUPPLY UTILITY VACUUM VALVE BOX VINYL COMPOSITION TILE VERTICAL VESTIBULE VERIFY IN FIELD VITREOUS
EWC EXC EXH EXP EXP JT EXT F/F FA FAS EP	ELECTRIC WATER COOLER EXCAVATED EXHAUST EXPANSION EXPANSION JOINT EXTERIOR FACE TO FACE FIRE ALARM FIRE ALARM STATION ELAT BAD	oc OA OD OFCI OFOI OPP ORD OVHD OZ P	ON CENTER OVERALL OUTSIDE DIAMETER OWNER FURNISHED-CONTRACTOR INSTALLED OWNER FURNISHED-OWNER INSTALLED OPPOSITE OVERFLOW ROOF DRAIN OVERHEAD OUNCE	VP VOL VWC W W/ W/ W/O W/W WO	VENT PIPE VOLUME VINYL WALL COVERING WEST WITH WITHOUT WALL TO WALL WATER CLOSET OR WALL COVERIN WOOD
FB FCU FD FDC FDN FEC FE FF FHC FH/FEC FHMS FHWS FHWS FHY FLAM	FLAT BAR FAN COIL UNIT FLOOR DRAIN FIRE DEPARTMENT CONNECTION FOUNDATION FIRE EXTINGUISHER CABINET FIRE EXTINGUISHER CABINET FIRE HOSE CABINET FIRE HOSE / FIRE EXTINGUISHER CABINET FLAT HEAD MACHINE SCREW FLAT HEAD WOOD SCREW FIRE HYDRANT FLAMMABLE	PA PART PBD PBX PCF PCI PERF PERIM PERM PERP PI PL PLAM	PUBLIC ADDRESS PARTIAL PARTICLEBOARD PRIVATE TELEPHONE EXCHANGE POUNDS PER CUBIC FOOT POUNDS PER CUBIC INCH PERFORATED PERIMETER PERMANENT PERPENDICULAR POINT OF INTERSECTION PLATE PLASTIC LAMINATE	WDW WGL WCHR WM WO WPT WR WSCT WSP WT WTHPRF WTHPRF WTRPRF WWF	WINDOW WIRE GLASS WHEELCHAIR WIRE MESH WHERE OCCURS WORKING POINT WATER RESISTANT WAINSCOT WET STANDPIPE WEIGHT WEATHERPROOF WATERPROOF WATERPROOF WELDED WIRE FABRIC WELDED WIRE MESH
FLASH FLEX FLUOR FO FSB FSTNR FT FTG FURN FXTR	FLASHING FLEXIBLE FLUORESCENT FACE OF FOLDING SHOWER BENCH FASTENER FOOT, FEET FOOTING FURNITURE FIXTURE	PLAS PLBG PLF PLYWD PNEU PNL PNL BD PNT PORT PP PPM PR PR PRCST	PLASTER PLUMBING POUNDS PER LINEAR FOOT PLYWOOD PNEUMATIC PANEL PANEL BOARD PAINT PORTABLE PUSH PLATE PARTS PER MILLION PAIR PRECAST PREDATION	XFMR Y YD	TRANSFORMER YARD
		PREP PREFAB PRKG PROJ PROP PSF PSI PT PTN PTN PTS PVC PVG PVMT	PREPARATION PREFABRICATION PARKING PROJECT PROPERTY POUNDS PER SQUARE FOOT POUNDS PER SQUARE INCH POINT PARTITION PNEUMATIC TUBE STATION POLYVINYL CHLORIDE PAVING PAVEMENT		



	PLYWOOD (LARGE SCALE)
SE	FINISH WOOD (LARGE SCALE)
	EIFS INSULATION BOARD (LARGE SCALE)
ИТ	SEMI-RIGID INSULATION (LARGE SCALE)
	BATT INSULATION (LARGE SCALE)
	MORTAR, SAND, FIREPROOFING STUCCO, GYPSUM BOARD
, GRANITE	TERRAZZO (LARGE SCALE)
	COMPOSITE BOARD (LARGE SCALE)
	ACOUSTIC TILE (LARGE SCALE)
Ξ)	PROTECTION BOARD (LARGE SCALE)
	CERAMIC TILE (LARGE SCALE)
ALE)	GLASS (LARGE SCALE)
NTINUOUS	
	METAL SIDING (VERTICAL)
3	GLASS

TIVE RATING	ARCHITECTURAL S NOTES
OUR SMOKE PARTITION	 THE PURPOSE OF THIS SHEET IS TO ILLUSTRA' TYPICAL GRAPHIC SYMBOLS WHICH MAY TYPIC THE ARCHITECTURAL DRAWINGS.
UR FIRE RESISTANCE RATING	2. THIS SHEET MAY ILLUSTRATE ABBREVIATIONS, LEGENDS WHICH DO NOT OCCUR AS PART OF

4 HOUR FIRE RESISTANCE RATING	4.	SYMBOLS ARE NOT DRAWN TO SCALE. TO DETERMINE THE ACTUAL SIZES OF ELEMENTS REPRESENTED BY SYMBOLS, RE TO THE SPECIFICATIONS AND OTHER SHEETS, AS MAY APPLY.
3 HOUR FIRE RESISTANCE RATING	3.	ADDITIONAL SYMBOLS NOT SHOWN OR DEFINED ON THIS SHE MAY BE USED ON THE ARCHITECTURAL DRAWINGS AND ARE TYPICALLY DEFINED ON OTHER SHEETS.
2 HOUR FIRE RESISTANCE RATING		THE WORK OF THIS PROJECT.

MODULAR LAYOUT / DETAIL NUMBER

_										
	65	57	(49)	(41)	33	25	(17)	9	(1)	
	66	58	50	(42)	34	26	(18)	(10)	2	
	67	59	(51)	(43)	35	27)	(19)	(1)	(\mathfrak{R})	
	68	60	52	44	36	28	20	(12)	4	
	69	61	53	(45)	37	29	(21)	(13)	5	
	70	62	54	(46)	38	30	22	(14)	6	
	(71)	63	55	47	39	31	23	(15)	7	
	(72)	64	56	(48)	(40)	32	24	(16)	8	

67			
69	(45)	28	
	54 46 (55)	_	14)
(72)	56 48	32	(16)

DETAIL MODULE LAYOUT

DETAILS ARE NUMBERED ACCORDING TO THEIR LOCATION ON EACH SHEET AND ARE NOT NUMBERED CONSECUTIVELY. EACH MODULE MAINTAINS THE NUMBER ASSOCIATED WITH IT

_

-ASSEMBLY TYPE

ASSEMBLY NAME

REPRESENTING:

-MAJOR GROUP

-FINISH SYSTEM

CONFIGURATION

ASSEMBLY VARIABLE -

(NOT ALWAYS PRESENT)

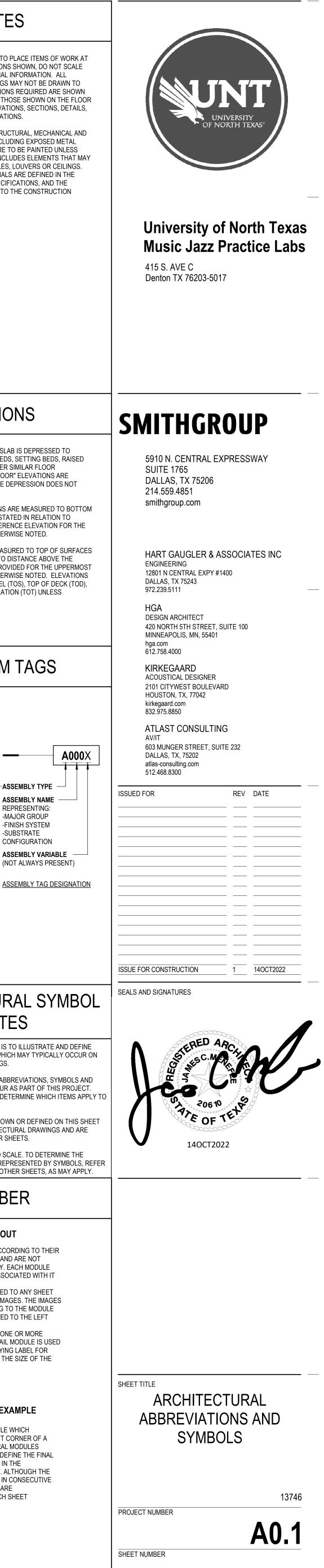
-SUBSTRATE

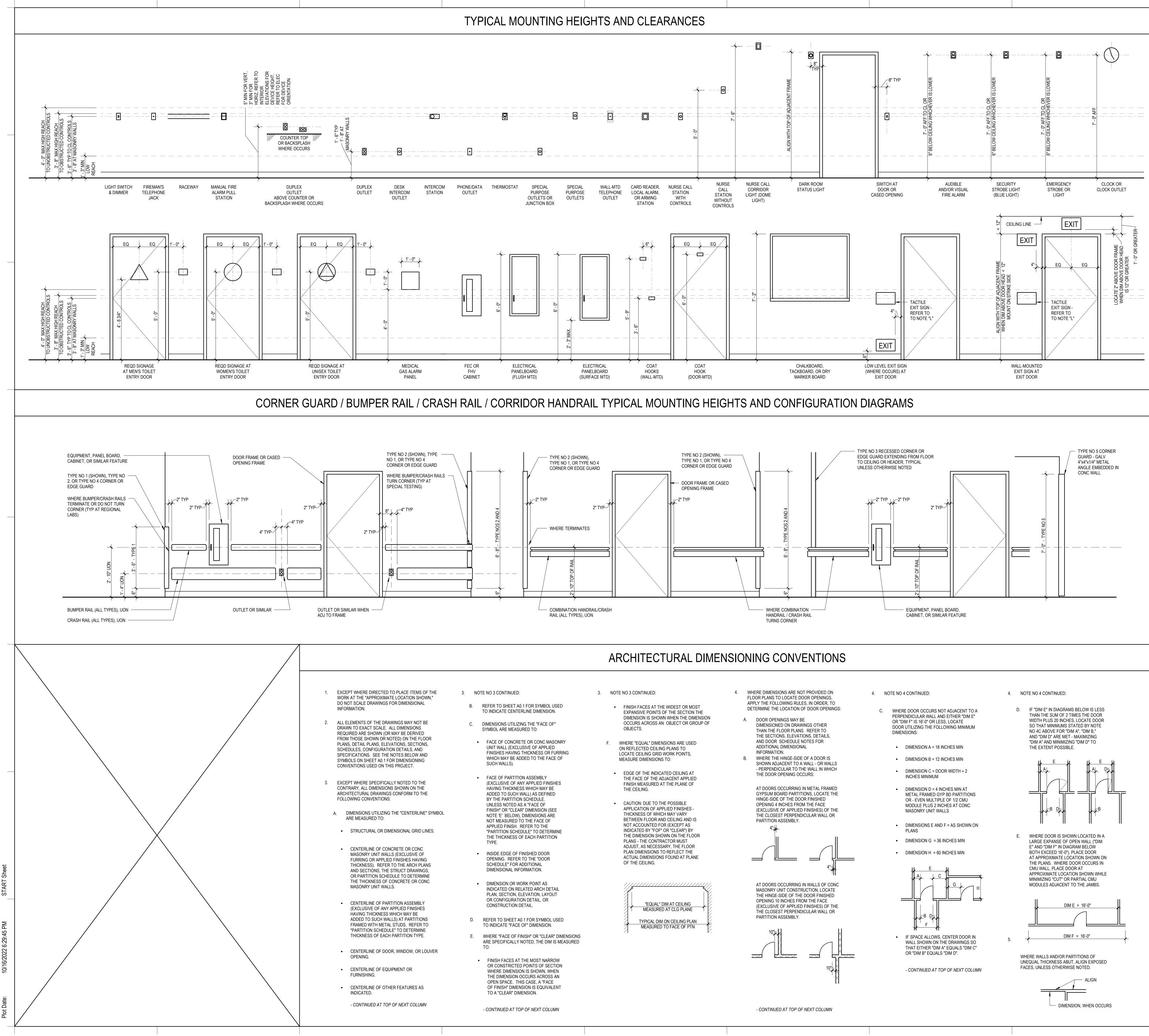
THIS SYSTEM CAN BE APPLIED TO ANY SHEET THAT CONTAINS MULTIPLE IMAGES. THE IMAGES ARE NUMBERED ACCORDING TO THE MODULE SYSTEM SHOWN ILLUSTRATED TO THE LEFT

EACH DETAIL MAY OCCUPY ONE OR MORE WHOLE MODULES. THE DETAIL MODULE IS USED TO ESTABLISH THE IDENTIFYING LABEL FOR EACH DETAIL, NOT TO LIMIT THE SIZE OF THE

DETAIL NUMBERING EXAMPLE

THE NUMBER OF THE MODULE WHICH OCCURS IN THE LOWER LEFT CORNER OF A SINGLE MODULE OR SEVERAL MODULES GROUPED TOGETHER WILL DEFINE THE FINAL DETAIL NUMBER AS SHOWN IN THE ILLUSTRATION TO THE LEFT. ALTHOUGH THE MODULE NUMBERS OCCUR IN CONSECUTIVE ORDER, NOT ALL NUMBERS ARE NECESSARILY USED ON EACH SHEET





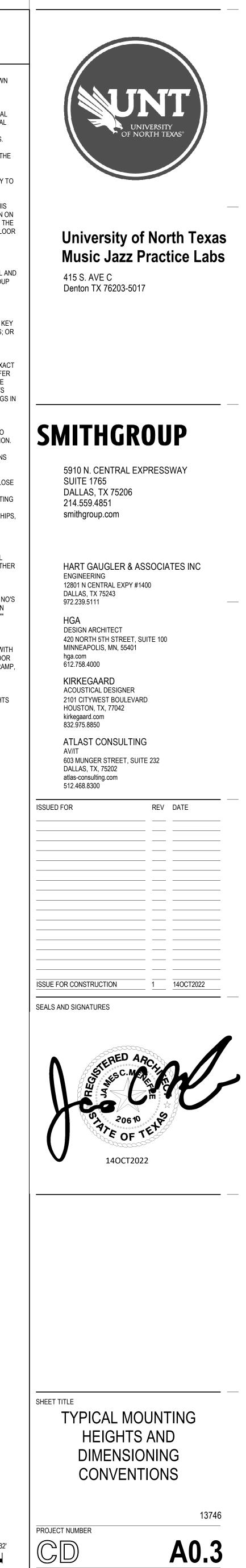
GENERAL MOUNTING HEIGHT NOTES

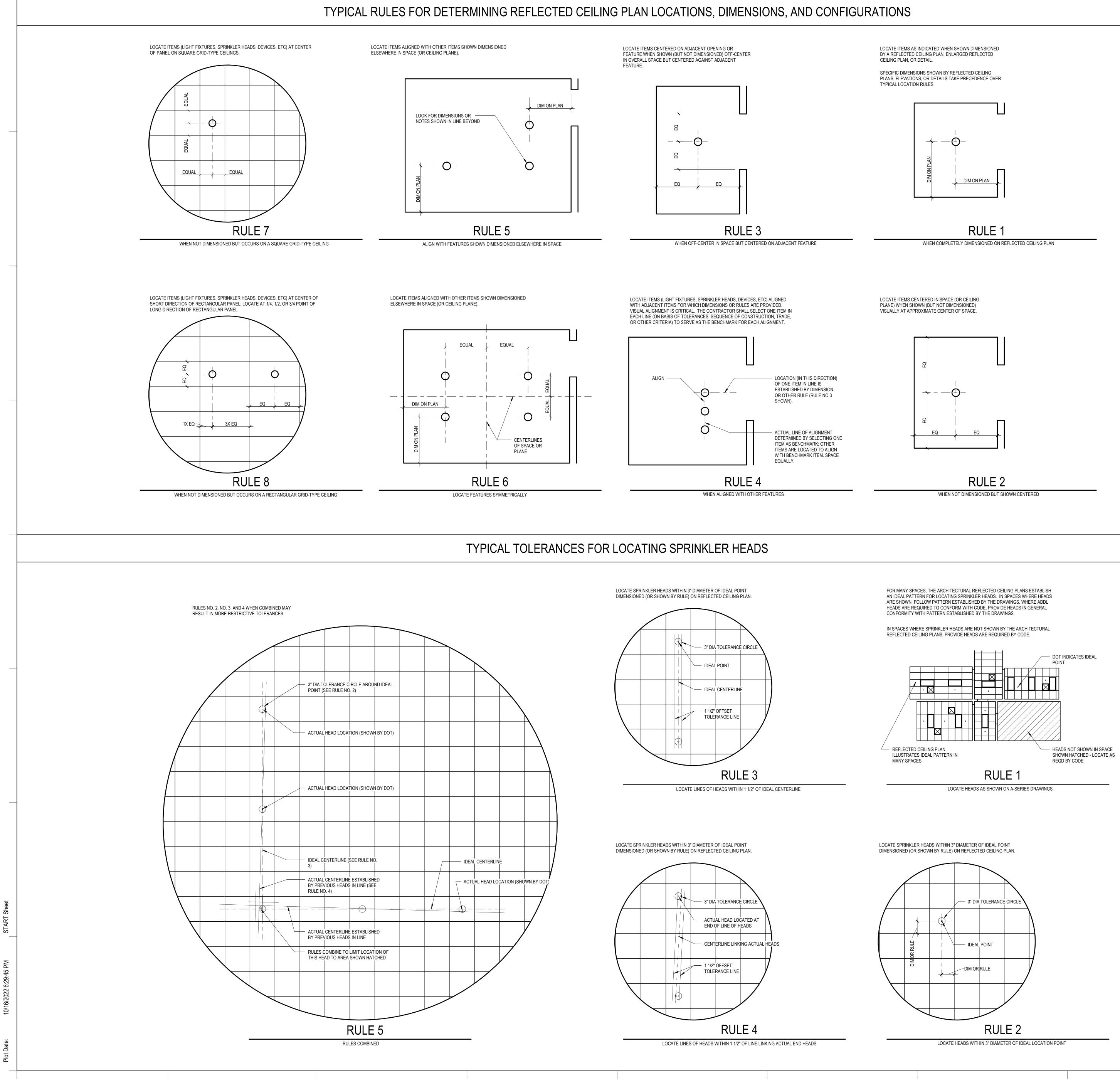
- A. IT IS THE INTENT OF THE DESIGN THAT ALL ITEMS SHOWN MOUNTED AT TYPICAL HEIGHTS BE ACCESSIBLE TO PERSONS WITH DISABILITIES.
- THE PURPOSE OF THIS SHEET IS TO ILLUSTRATE TYPICAL MOUNTING HEIGHTS AND - WHERE APPLICABLE - TYPICAL MINIMUM OR MAXIMUM CLEARANCES AND/OR TYPICAL MOUNTING CONFIGURATIONS FOR A VARIETY OF ITEMS. CAUTION: THIS SHEET MAY ILLUSTRATE ITEMS OR CONFIGURATIONS WHICH DO NOT OCCUR AS PART OF THE WORK OF THIS PROJECT. REFER TO THE PLANS, ELEVATIONS, SECTIONS, DETAILS, AND SCHEDULES TO DETERMINE WHICH ITEMS AND CONFIGURATIONS APPLY TO THE WORK OF THIS PROJECT.
- NOT ALL PROJECT ITEMS MAY BE REPRESENTED ON THIS SHEET. FOR ITEMS WITH OPERABLE PARTS NOT SHOWN ON THIS SHEET, THE ITEM SHALL BE MOUNTED SUCH THAT THE OPERABLE PART IS A MAXIMUM OF 42" ABOVE FINISH FLOOR UNLESS SPECIFICALLY NOTED OR DIMENSIONED OTHERWISE.
- THE MOUNTING HEIGHTS, CLEARANCES, AND CONFIGURATIONS SHOWN ON THIS SHEET ARE TYPICAL AND SHALL APPLY TO ALL INSTANCES OF THE ITEM (OR GROUP OF ITEMS) SHOWN UNLESS SPECIFICALLY NOTED OR DIMENSIONED OTHERWISE.
- SPECIAL OR NON-TYPICAL MOUNTING HEIGHTS OCCUR ONLY WHERE INDICATED BY ANNOTATED SYMBOLS; BY KEY NOTES; BY NOTES ON PLANS, ELEVATIONS, OR DETAILS; OR BY UNIQUE DIMENSIONS ON ELEVATIONS OR DETAILS.
- FOR ADDITIONAL INFORMATION REGARDING THE PRECEDENCE OF DRAWINGS FOR DETERMINING THE EXACT LOCATION OF EACH EXPOSED PART OF THE WORK, REFER TO THE "ARCHITECTURAL GENERAL NOTES" AND TO THE "TYPICAL RULES FOR DETERMINING MOUNTING HEIGHTS AND LOCATIONS" LOCATED PER THE INDEX OF DRAWINGS IN THIS SET.
- TYPICAL MOUNTING HEIGHTS MAY BE ILLUSTRATED BY OTHER DRAWING SERIES, SUCH AS Q SERIES. REFER TO THE 'INDEX OF DRAWINGS' FOR ADDITIONAL INFORMATION.
- MOUNTING CONFIGURATION DIAGRAMS ARE ELEVATIONS WHICH ILLUSTRATE TYPICAL RULES GOVERNING THE RELATIONSHIPS BETWEEN, AND PLACEMENT OF, ITEMS WHICH OCCUR IN GROUPS OF RELATED ITEMS OR IN CLOSE PROXIMITY TO OTHER PARTS OF THE WORK (SUCH AS SWITCHES AND DOOR FRAMES). UNLESS OTHER MOUNTING CONFIGURATIONS ARE SPECIFICALLY NOTED, DIMENSIONED, OR ELEVATED, THE TYPICAL RELATIONSHIPS ARRANGEMENTS, AND THE TYPICAL CONFIGURATION DIAGRAMS APPLY THROUGHOUT THE WORK OF THIS PROJECT.
- TYPICAL MOUNTING CONFIGURATIONS FOR ADDITIONAL GROUPING NOT SHOWN ON THIS MAY BE SHOWN ON OTHER SHEETS. REFER TO THE "INDEX OF DRAWINGS" FOR ADDITIONAL INFORMATION.
- FOR DEFINITION OF CORNER (OR EDGE) GUARDS TYPE NO'S 1 THRU 4, REFER TO THE APPLIED FINISH SCHEDULE ON SHEET A9.1. TYPE NO 5 CORNER GUARDS ARE 4"x4"x1/4"" METAL ANGLES EMBEDDED IN CONCRETE WALL - SEE INDICATED DETAILS.
- A TACTILE EXIT SIGN STATING "EXIT" AND COMPLYING WITH ICC A117.1 SHALL BE PROVIDED ADJACENT TO EACH DOOR TO AN AREA OF REFUGE. AN EXIT STAIRWAY, AN EXIT RAMP. AN EXTERIOR AREA FOR ASSISTED RESCUE, AN EXIT PASSAGEWAY AND THE EXIT DISCHARGE.
- M. REFER TO RULE 16 ON A0.4 FOR ITEM MOUNTING HEIGHTS IN MASONRY PARTITIONS.

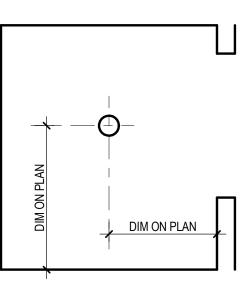
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SHEET NUMBER

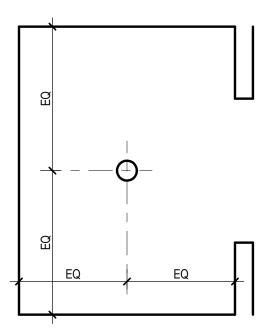
16' 8' 0'









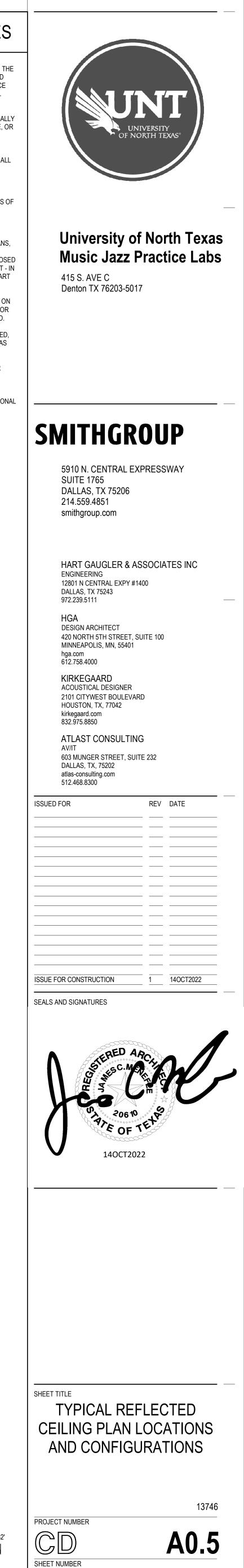


- A. THE A-SERIES DRAWINGS ESTABLISH AND COORDINATE THE FINISHED APPEARANCE AND LOCATION OF ALL EXPOSED ELEMENTS. THE A-SERIES DRAWINGS TAKE PRECEDENCE FOR THE FINISHED APPEARANCE AND LOCATION OF ALL PARTS OF THE WORK. EXCEPTION: DIMENSIONED LOCATIONS SHOWN ON ON DRAWINGS OF OTHER DISCIPLINES SHALL GOVERN ONLY WHERE: 1. SPECIFICALLY AND INDIVIDUALLY INDICATED BY SYMBOL, KEYED NOTE, OR NOTATION ON THE ARCHITECTURAL DRAWINGS. 2. OCCURRING WITHIN A ROOM OR OTHER IDENTIFIABLE SPACE FOR WHICH ARCH SHEET OR SCHEDULE NOTES INDICATE THAT DIMENSIONS PROVIDED ELSEWHERE SHALL
- B. THE PURPOSE OF THIS SHEET IS TO ILLUSTRATE THE TYPICAL RULES WHICH GOVERN THE LOCATION, CONFIGURATION IN RELATIONSHIP TO OTHER ELEMENTS OF THE WORK, AND FINISHED ALIGNMENT OF ALL ITEMS OCCURRING ON REFLECTED CEILING PLANS OF THE PROJECT.

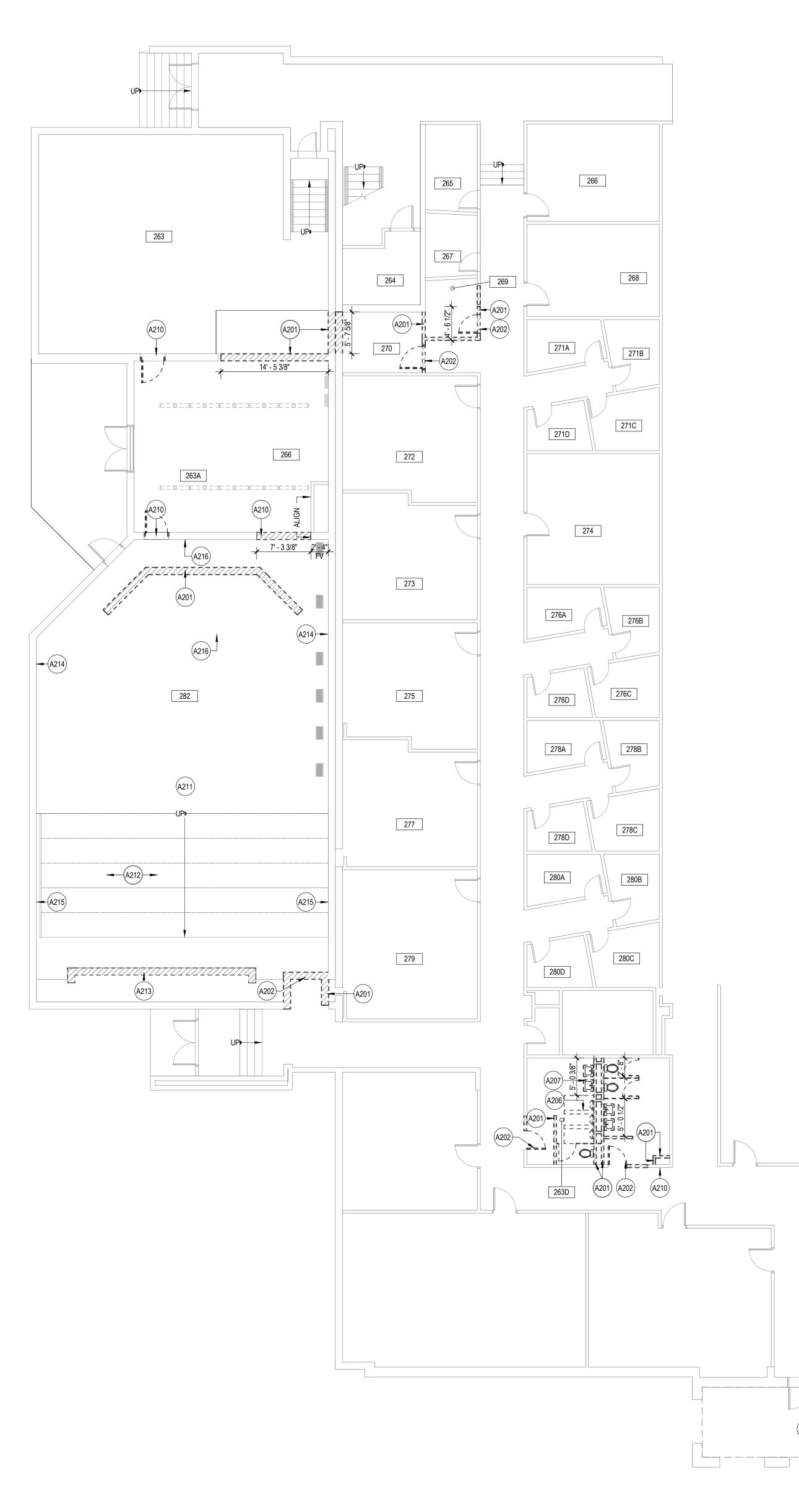
GOVERN.

- C. CTHE A-SERIES FLOOR PLANS, REFLECTED CEILING PLANS, SECTIONS, ELEVATIONS, AND DETAILS ILLUSTRATE THE DIMENSIONED LOCATION OF MANY - BUT NOT ALL - EXPOSED PARTS OF THE WORK. APPLY THE RULES ON THIS SHEET - IN ORDER - TO DETERMINE THE LOCATION OF EXPOSED PART OF THE WORK.
- 1. WHEN UNIQUELY AND SPECIFICALLY DIMENSIONED ON THE A-SERIES PLANS, SECTIONS, OR ELEVATIONS (OR COMBINATION THEREOF), LOCATE AS DIMENSIONED.
- 2. IF NOT SHOWN, OR IF SHOWN BUT NOT DIMENSIONED, BY THE A-SERIES PLANS OR ELEVATIONS, LOCATE AS INDICATED BY THE APPLICABLE RULE.
- . REFER TO THE "ARCHITECTURAL GENERAL NOTES" FOR ADDITIONAL NOTES WHICH MAY BE APPLICABLE TO THE WORK SHOWN ON THIS SHEET.
- E. REFER TO THE "PROJECT GENERAL NOTES" FOR ADDITIONAL NOTES WHICH APPLY TO THE ENTIRE PROJECT.

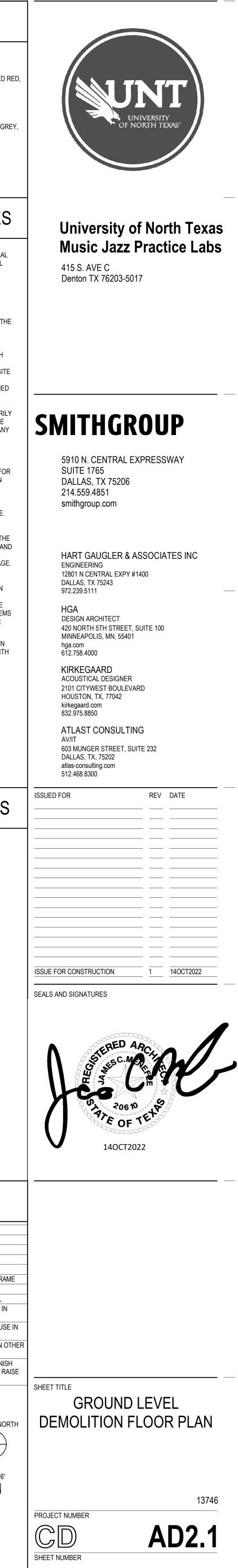
16' 8' 0' GRAPHIC SCALE: 1/16" = 1'-0"



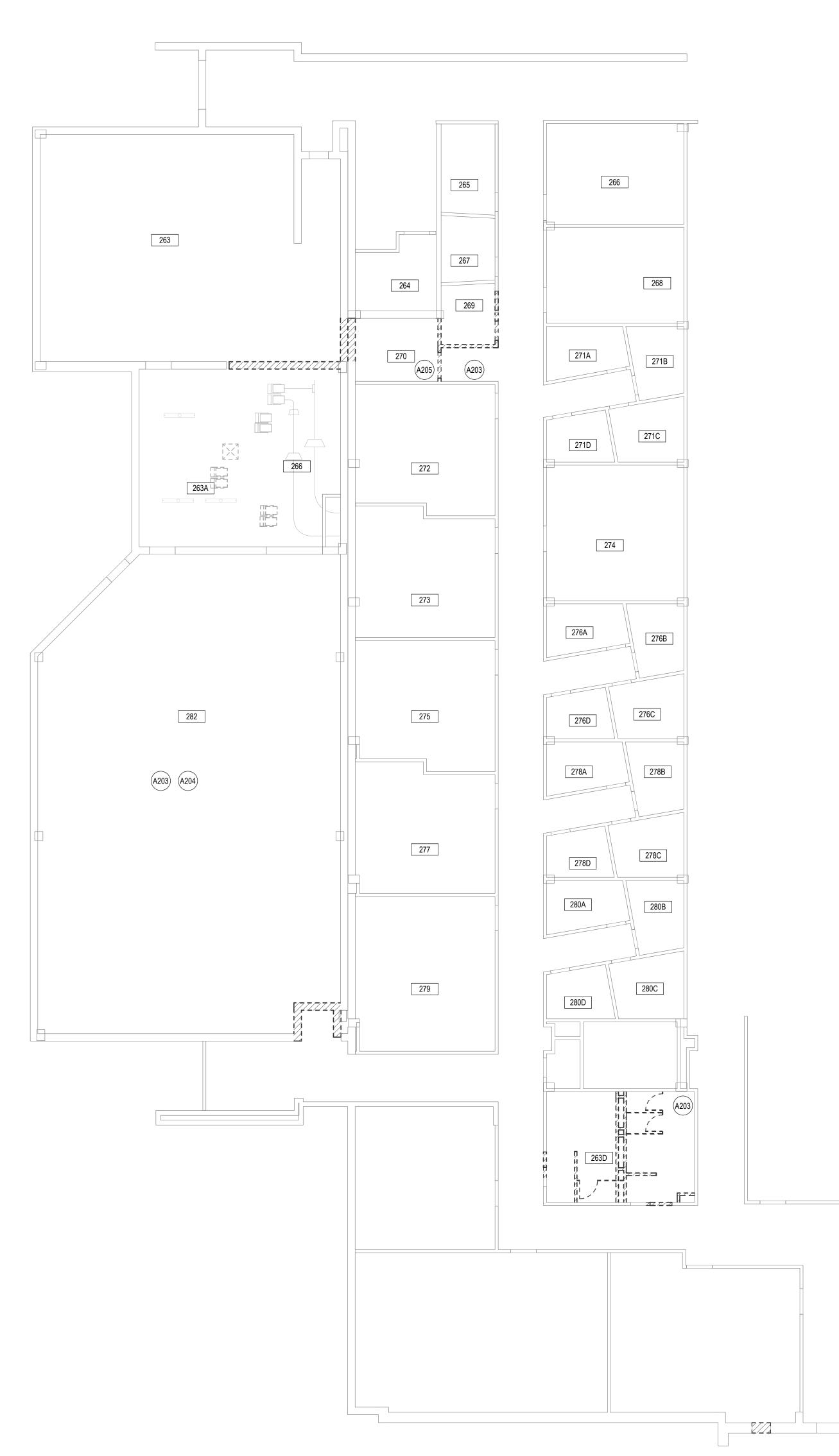
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10/16/2(64 LEVEL 1 - DEMOLITION PLAN SCALE: 1/8" = 1'-0"
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GRAPHIC LEGEND
WORK SHOWN DASHED RETO BE DEMOLISHED. WORK SHOWN SOLID GREEN WORK SHOWN SOLID GREEN
GENERAL SHEET NOTES
 A. REFER TO THE A0.X SERIES SHEETS FOR ARCHITECTURAL GENERAL NOTES, DRAWING, REFERENCE AND MATERIAL SYMBOLS, ABBREVIATIONS, AS WELL AS DIMENSIONING CONVENTIONS USED ON THIS DRAWING. B. EXISTING CONDITIONS SHOWN ARE FROM AVAILABLE RECORD DRAWINGS AND VISUAL FIELD SURVEYS. THE CONTRACTOR SHALL VERIFY ACTUAL EXISTING CONDITIONS AT THE SITE PRIOR TO SUBMITTING A BID. THE CONTRACTOR SHALL NOTIFY THE ARCHITECT OF ANY DISCREPANCIES. C. DEMOLITION WORK SHALL BE DONE IN A MANNER WHICH WILL NOT CAUSE UNNECESSARY INCONVENIENCE OR DANGER TO USERS OF THE PREMISES AND ADJACENT SITE AND NOT INTERFERE WITH ITS OPERATION. ANY DEMOLITION WORK TO BE PERFORMED MUST BE PLANNED IN ADVANCE AND APPROVED BY THE OWNER. D. ANY EQUIPMENT, MATERIALS, AND SUPPLIES TEMPORARILY REMOVED FOR THE PURPOSE OF ROTECTION SHALL BE REPLACED IN ORIGINAL LOCATIONS AND CONDITIONS. ANY MATERIALS DAMAGED SHALL DE REPLACED WITH NEW MATERIALS OF LIKE KIND AND QUALITY. E. REFER TO AND COORDINATE WITH STRUCTURAL, CIVIL, MECHANICAL, PLUMBING, AND ELECTICAL DRAWINGS FOR ADDITIONAL DEMOLITION INFORMATION NOT SHOWN ON THIS DRAWING. F. ALL MATERIALS INDICATED TO BE REMOVED SHALL BE DISPOSED OF PROPERLY AND REMOVED FROM THE SITE. G. ALL REMOVED MATERIALS AND EQUIPMENT WHICH IS CLASSIFIED AS "SALVAGE FOR OWNER" SHALL REMAIN THE PROPERTY OF THE OWNER. DELIVER SUCH MATERIALS AND EQUIPMENT ON THE PREMISES AS DIRECTED BY THE OWNER AND NEATLY STORE AND PROTECT FROM DAMAGE. H. ALL REMOVED MATERIALS AND EQUIPMENT WHICH IS CLASSIFIED AS "SALVAGE FOR RELOCATION" SHALL REMAIN THE PROPERTY OF THE OWNER. THE CONTRACTOR IS RESPONSIBLE FOR PLACING ITEMS IN STORAGE ON SITE AND FOR THE PROTECTION OF THOSE ITEMS. THESE ITEMS WILL BE RELOCATED. REFER TO THE FLOOR PLANS FOR NEW LOCATIONS. J. PATCH AND REARIAL LELEMENTS THAT ARE TO REMAIN WHICH ARE DAMAGED FROM THE DEMOLITION WORK WITH CONSTRUCTION TO MATCH EXISTING CONDITIONS.
REFERENCE KEYNOTES
○ SHEET KEYNOTES
A201DEMOLISH EXISTING PARTITIONA202DEMOLISH DOOR AND FRAMESA206DEMOLISH TOILET PARTITIONS AND URINAL SCREENSA207DEMOLISH EXISTING TOILET ACCESSORIESA208DEMOLISH EXISTING RAILINGSA210DEMOLISH A PORTION OF THE WALL TO ADD DOOR & FRAMEA212DEMOLISH EXISTING FIXED SEATINGA213DEMOLISH EXISTING COUNTER ELEMENT AT TOP LEVELA214SALVAGE EXISTING TECTUM WALL PANELS FOR REUSE IN OTHER AREASA215SALVAGE EXISTING FABRIC WRAPPED PANELS FOR REUSE OTHER AREAS
A216 SALVAGE EXISTING BLACK WALL PANELS FOR REUSE IN OTI AREAS A217 DEMOLISH INSIDE THE COLONNADE, REMOVING THE FINISH AND ADDING ON TOP OF THE EXISTING STRUCTURE TO RAIS IT HIGHER B' 4' 0' 8' 16' B' 4' 0' 8' 16' GRAPHIC SCALE: 1/8" = 1'-0"

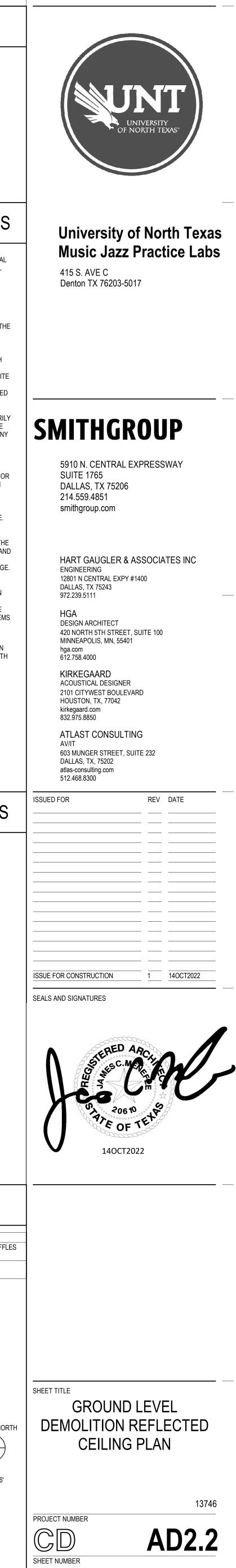


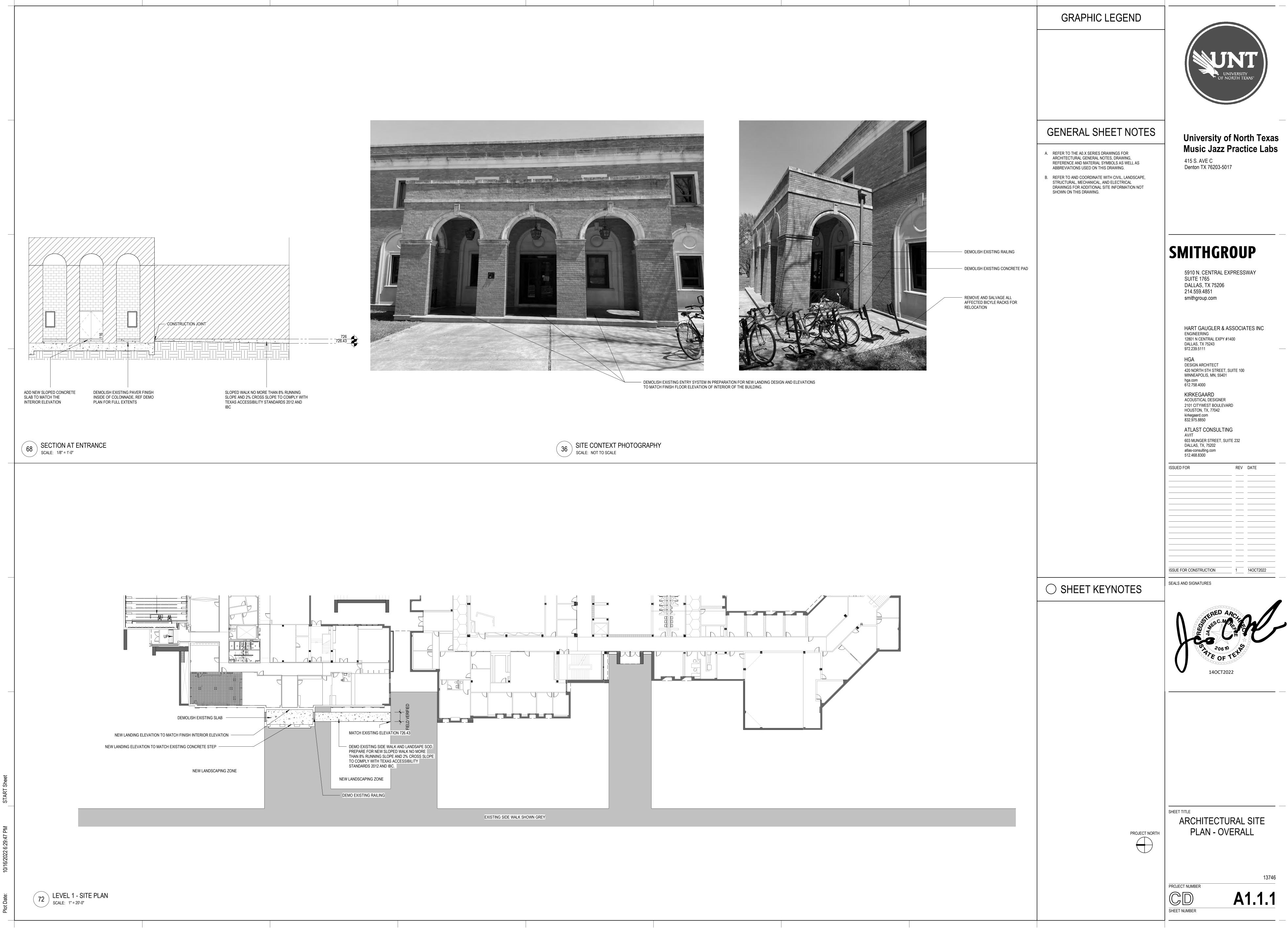
	
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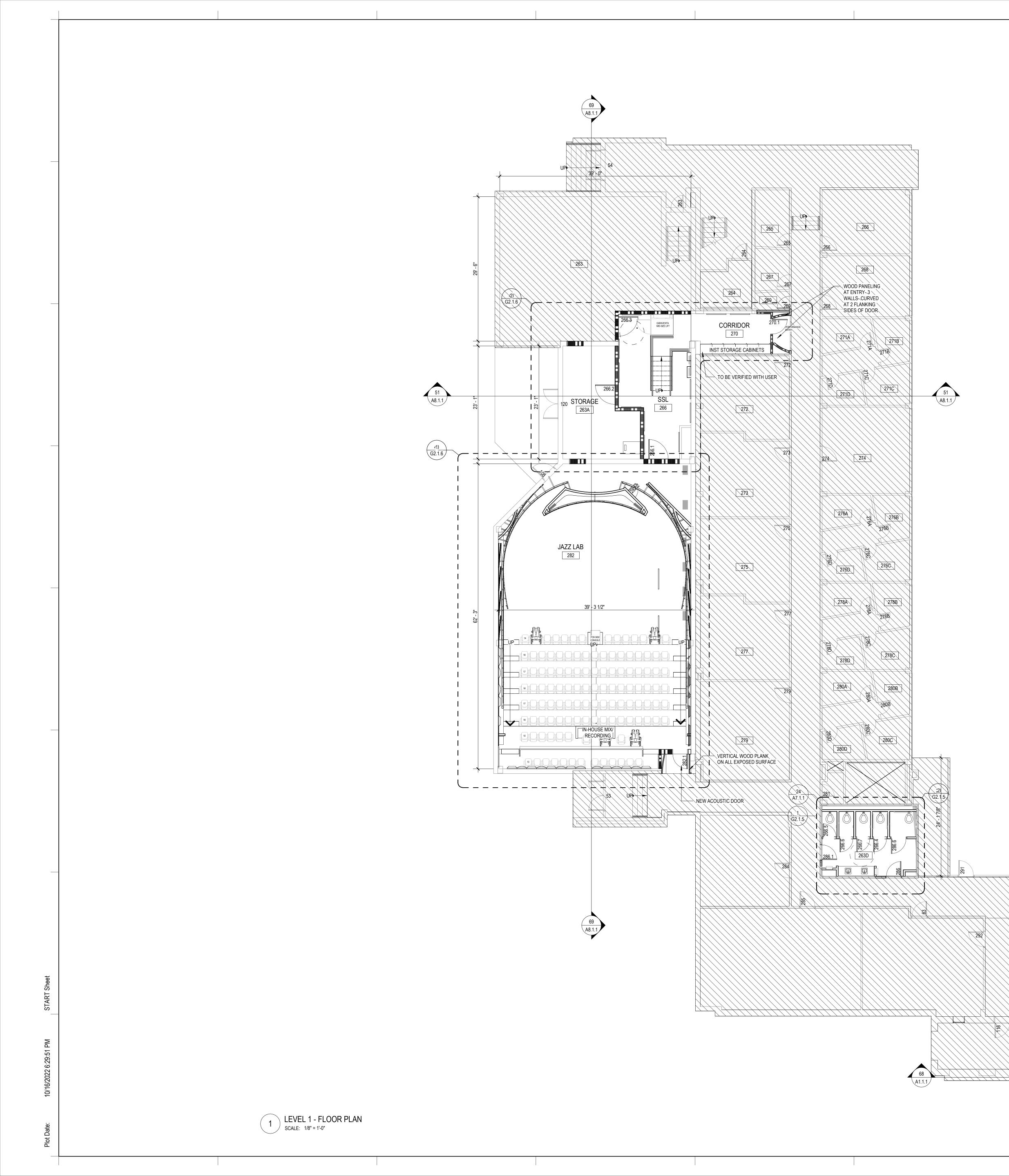


56 LEVEL 1 - CEILING DEMOLITION PLAN SCALE: 1/8" = 1'-0"

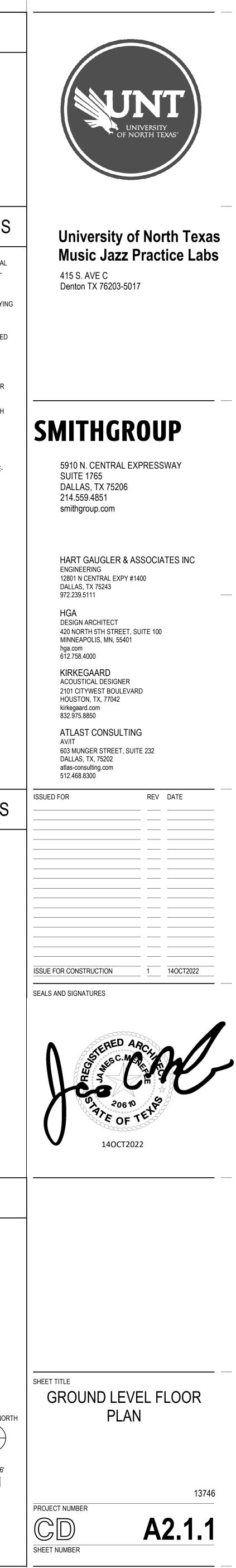
	_	GRAPHIC LEGEND
		GENERAL SHEET NOTES
		 A. REFER TO THE A0.X SERIES SHEETS FOR ARCHITECTURAL GENERAL NOTES, DRAWING, REFERENCE AND MATERIAL SYMBOLS, ABBREVIATIONS, AS WELL AS DIMENSIONING CONVENTIONS USED ON THIS DRAWING. B. EXISTING CONDITIONS SHOWN ARE FROM AVAILABLE RECORD DRAWINGS AND VISUAL FIELD SURVEYS. THE CONTRACTOR SHALL VERIFY ACTUAL EXISTING CONDITIONS AT THE SITE PRIOR TO SUBMITTING A BID. THE CONTRACTOR SHALL NOTIFY THE ARCHITECT OF ANY DISCREPANCIES. C. DEMOLITION WORK SHALL BE DONE IN A MANNER WHICH WILL NOT CAUSE UNNECESSARY INCONVENIENCE OR DANGER TO USERS OF THE PREMISES AND ADJACENT SITE AND NOT INTERFERE WITH ITS OPERATION. ANY DEMOLITION WORK TO BE PERFORMED MUST BE PLANNED IN ADVANCE AND APPROVED BY THE OWNER. D. ANY EQUIPMENT, MATERIALS, AND SUPPLIES TEMPORARILY REMOVED FOR THE PURPOSE OF PROTECTION SHALL BE REPLACED IN ORIGINAL LOCATIONS AND CONDITIONS. ANY MATERIALS OF LIKE KIND AND QUALITY. E. REFER TO AND COORDINATE WITH STRUCTURAL, CIVIL, MECHANICAL, PLUMBING, AND ELECTRICAL DRAWINGS FOR ADDITIONAL DEMOLITION INFORMATION NOT SHOWN ON THIS DRAWING. F. ALL MATERIALS INDICATED TO BE REMOVED SHALL BE DISPOSED OF PROPERLY AND REMOVED FROM THE SITE. G. ALL REMOVED MATERIALS AND EQUIPMENT WHICH IS CLASSIFIED AS "SALVAGE FOR OWNER" SHALL REMAIN THE PROPERTY OF THE OWNER. AND PROTECT FROM DAMAGE. H. ALL REMOVED MATERIALS AND EQUIPMENT WHICH IS CLASSIFIED AS "SALVAGE FOR OWNER" SHALL REMAIN THE PROPERTY OF THE OWNER. AND PROTECT FROM DAMAGE. H. ALL REMOVED MATERIALS AND EQUIPMENT WHICH IS CLASSIFIED "SALVAGE FOR RELOCATION" SHALL REMAIN THE PROPERTY OF THE OWNER. AND PROTECT FROM DAMAGE. H. ALL REMOVED MATERIALS AND EQUIPMENT WHICH IS CLASSIFIED "SALVAGE FOR RELOCATION" SHALL REMAIN THE PROPERTY OF THE OWNER. AND PROTECT FROM DAMAGE. H. ALL REMOVED MATERIALS AND EQUIPMENT WHICH IS CLASSIFIED "SALVAGE FOR RELOCATION" SHALL REMAIN THE PROPERTY OF THE OWNER. THE CONTRACTOR IS RESPONSIBLE FOR PLACING ITEMS IN STORAGE ON SITE AND FOR THE P
		AND FOR THE PROTECTION OF THOSE ITEMS. THESE ITEMS WILL BE RELOCATED. REFER TO THE FLOOR PLANS FOR NEW LOCATIONS. J. PATCH AND REPAIR ALL ELEMENTS THAT ARE TO REMAIN WHICH ARE DAMAGED FROM THE DEMOLITION WORK WITH CONSTRUCTION TO MATCH EXISTING CONDITIONS.
		○ SHEET KEYNOTES
	A	203 DEMOLISH LIGHT FIXTURES 204 SALVAGE ALL CYLINDRICAL ACOUSTIC BAFFLE FOR REUSE IN OTHER AREAS 205 205 DEMOLISH EXISTING CEILING AND LIGHT FIXTURES FIXTURES
		PROJECT NORT



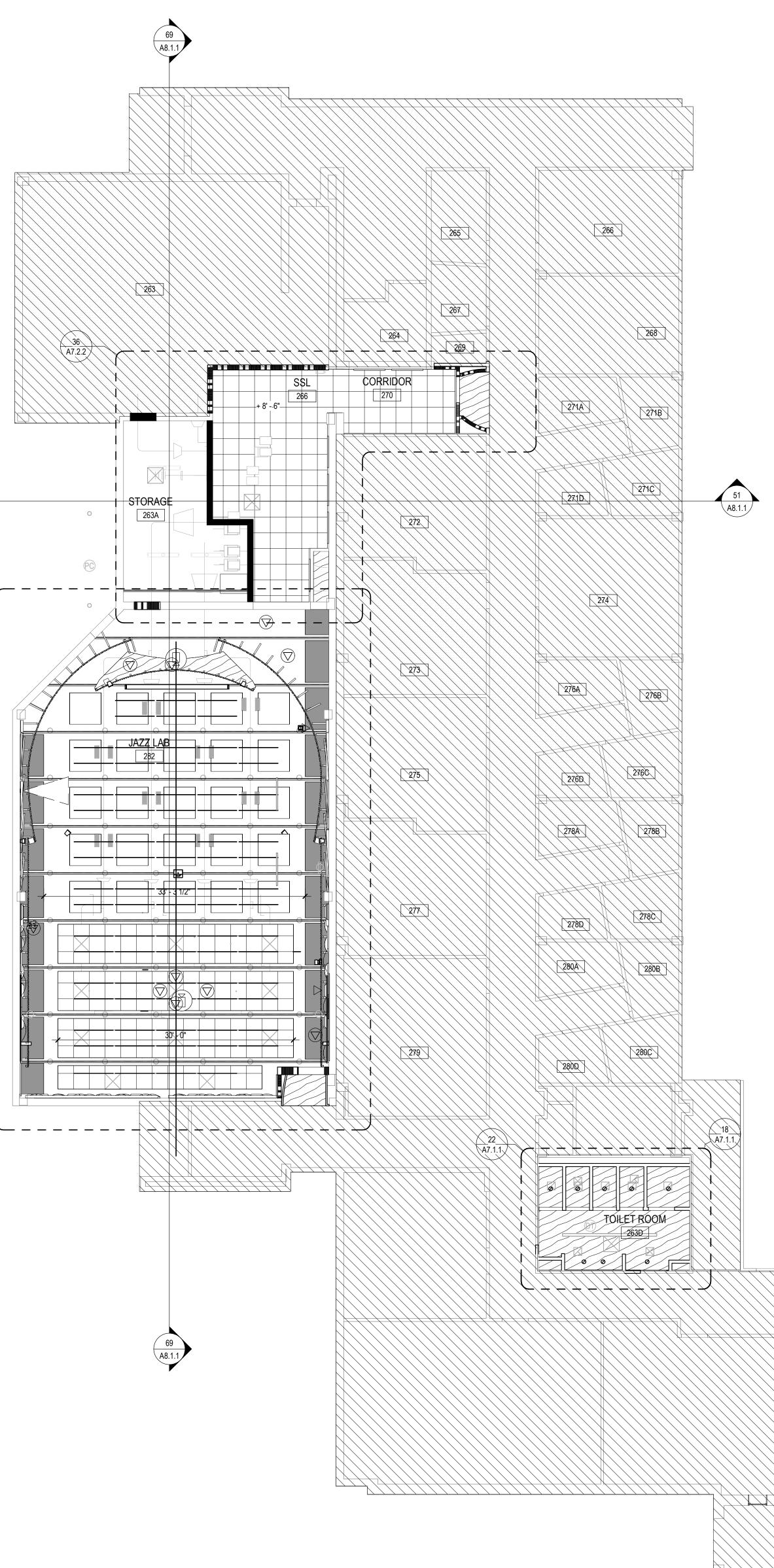




	GRAPHIC LEGEND
	GENERAL SHEET NOTES
	 A. REFER TO THE A0.X SERIES SHEETS FOR ARCHITECTURAL GENERAL NOTES, DRAWING, REFERENCE AND MATERIAL SYMBOLS, ABBREVIATIONS, AS WELL AS DIMENSIONING CONVENTIONS USED ON THIS SHEET. B. FOR BASIC LIFE SAFETY AND CODE INFORMATION APPLYING TO THIS PROJECT, REFER TO THE G2.X SERIES SHEETS LOCATED PER THE PROJECT SHEET INDEX. C. REFER TO THE A3.X SERIES SHEETS FOR THE REFLECTED CEILING PLANS. D. REFER TO THE A9.2.X SERIES SHEETS FOR PARTITION SYSTEMS TYPES AND DETAILS. E. REFER TO THE A9.3.X SERIES SHEETS FOR THE INTERIOR OPENING SCHEDULE(S), TYPES, AND DETAILS. F. REFER TO THE 'AF' SERIES SHEETS FOR INTERIOR FINISH INFORMATION. G. REFER TO THE 'AI' SERIES SHEETS FOR INTERIOR FINISH INFORMATION. H. PATCH CMU TO MATCH AS REQUIRED TO MAINTAIN FIRE- RATING.
	REFERENCE KEYNOTES
	O SHEET KEYNOTES
	PROJECT NORTI 8' 4' 0' 8' 16' 6' 16' GRAPHIC SCALE: 1/8" = 1'-0"



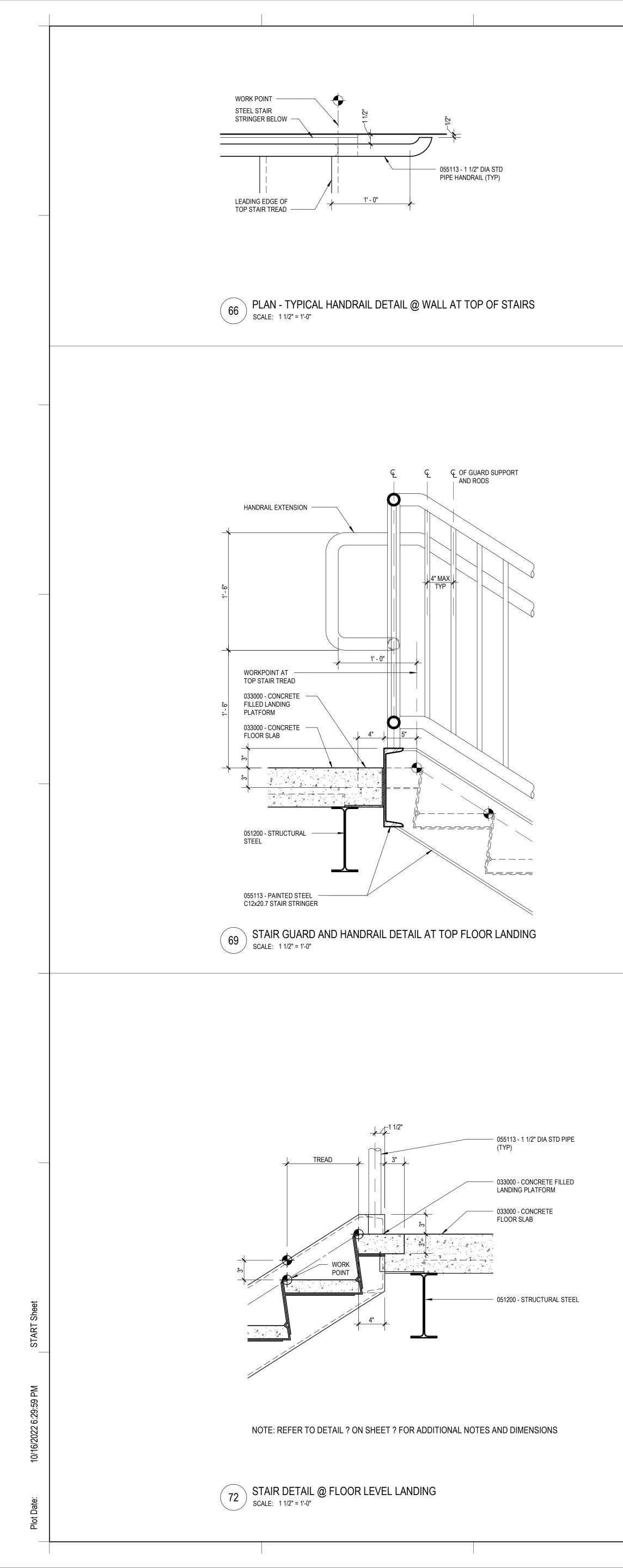
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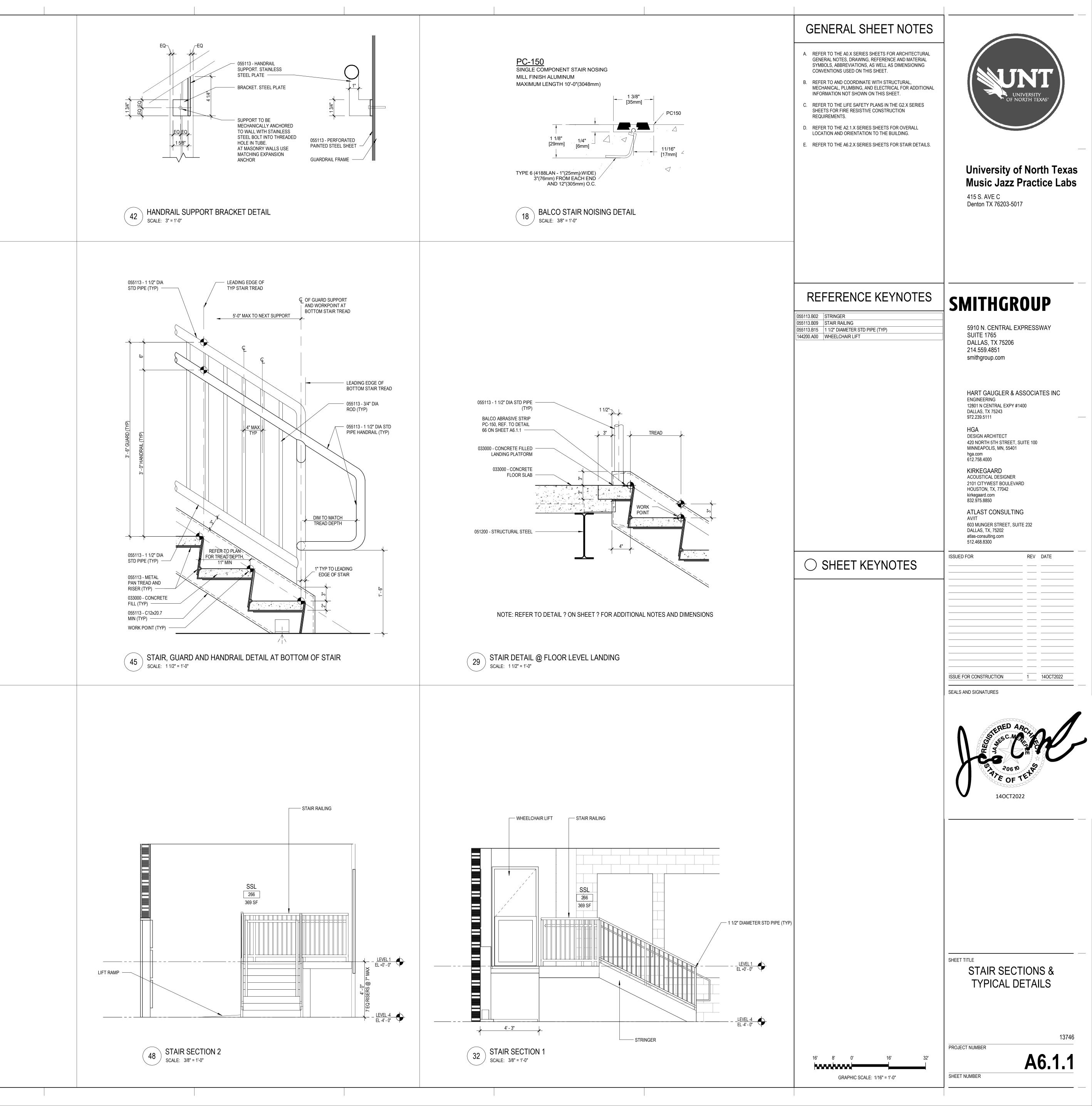


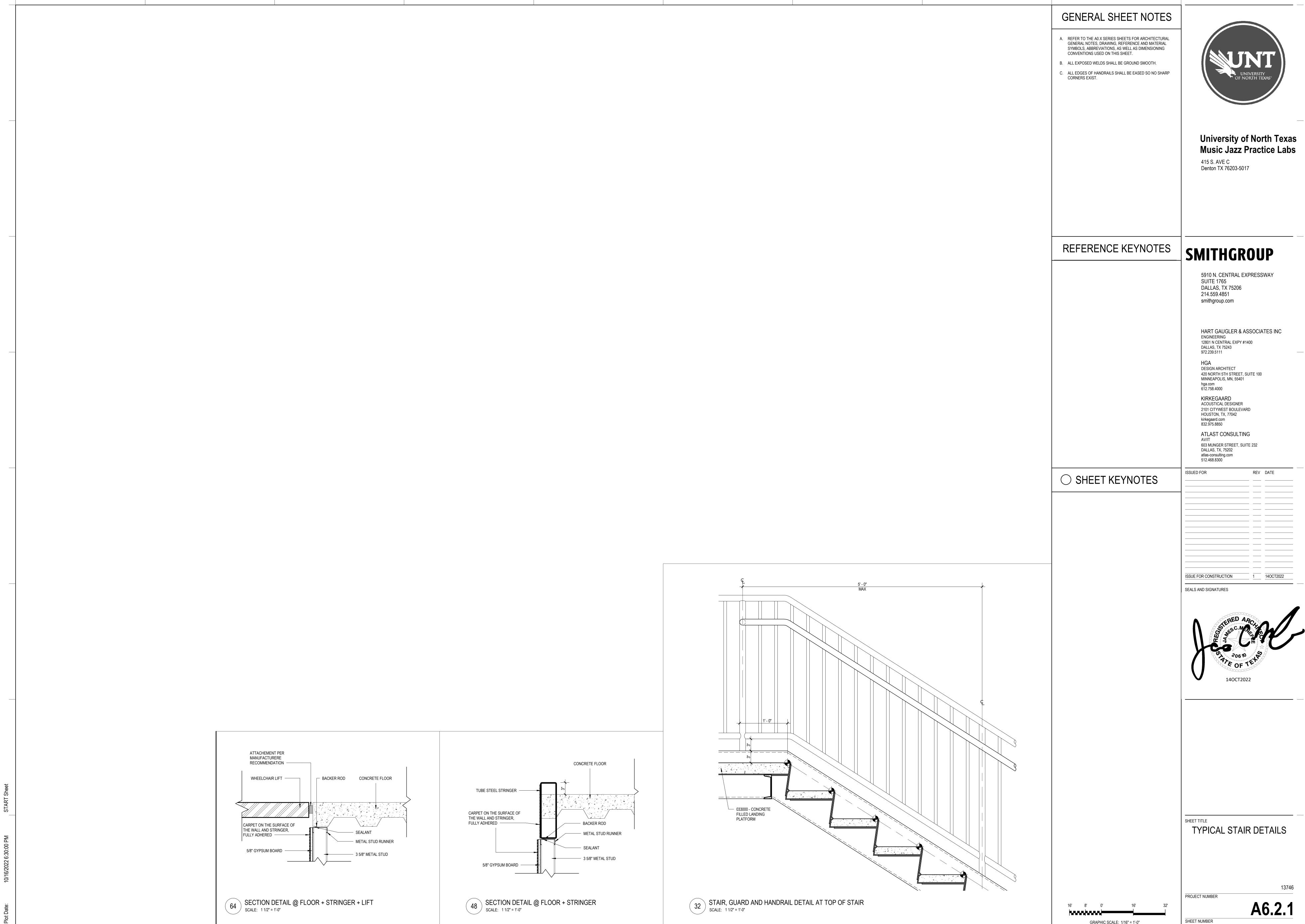
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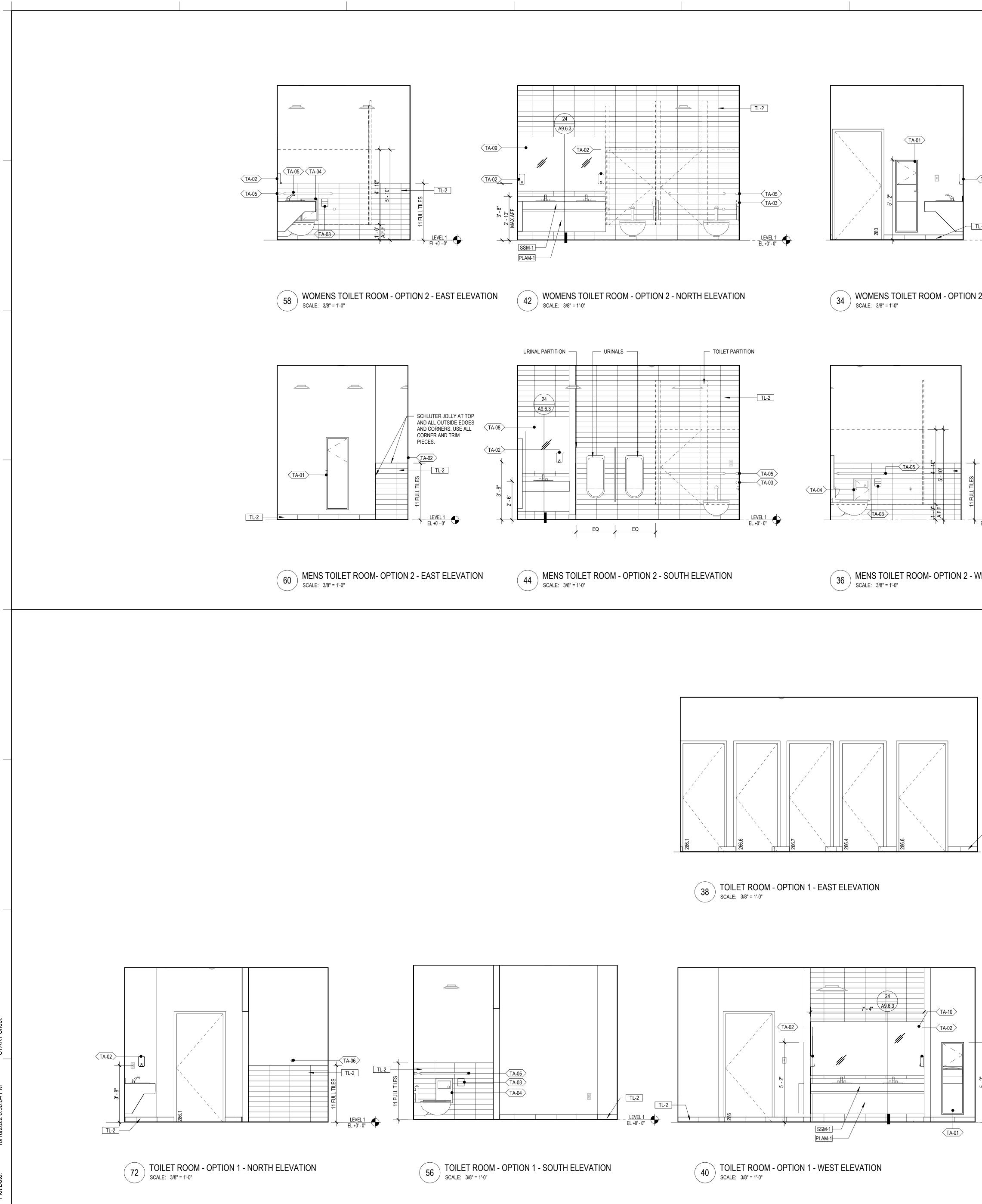
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	CEILING REFLECTORS
	GENERAL SHEET NOTES
	A. REFER TO THE A0.X SERIES SHEETS FOR ARCHITECTURAL GENERAL NOTES, DRAWING, REFERENCE AND MATERIAL SYMBOLS, ABBREVIATIONS, AS WELL AS DIMENSIONING CONVENTIONS USED ON THIS SHEET.
	B. VERTICAL ELEVATIONS ON THIS PLAN ARE SHOWN RELATIV TO THE FINISH FLOOR DESIGN REFERENCE ELEVATION UNLESS OTHERWISE NOTED. REFER TO THE "REFERENCE ELEVATION DEFINITIONS" LOCATED IN THE A0.X SERIES
	SHEETS. C. FOR BASIC LIFE SAFETY AND CODE INFORMATION APPLYING TO THIS PROJECT, REFER TO THE G2.X SERIES SHEETS LOCATED PER THE PROJECT SHEET INDEX.
	D. REFER TO THE A0.X SERIES SHEETS FOR TYPICAL RULES AND REQUIREMENTS GOVERNING THE LOCATION OF CEILING ITEMS SHOWN BUT NOT DIMENSIONED ON THE REFLECTED CEILING PLANS.
	 E. ALL SUSPENDED ACOUSTIC TILE GRID CEILING SYSTEMS SHALL BE CENTERED IN ROOMS UNLESS OTHERWISE NOTED. F. REFER TO AND COORDINATE WITH PLUMBING, MECHANICAL AND ELECTRICAL DRAWINGS FOR ADDITIONAL INFORMATIO
	NOT SHOWN ON THIS SHEET. G. REFER TO THE A2.1.X SERIES SHEETS FOR PARTITION TYPE DESIGNATIONS.
	H. REFER TO THE 'AF' SERIES SHEETS FOR INTERIOR FINISH INFORMATION.
	REFERENCE KEYNOTES
	8' 4' 0' 8' 16'
	GRAPHIC SCALE: 1/8" = 1'-0"

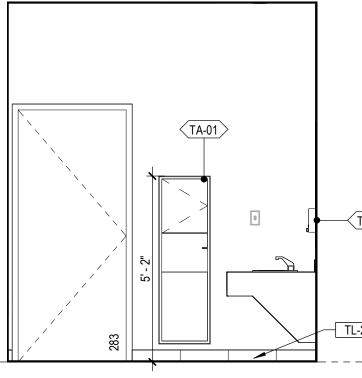




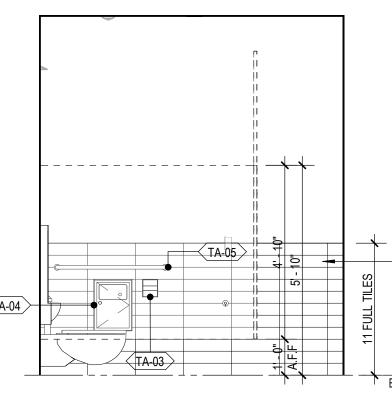


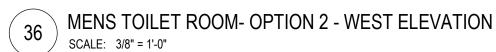


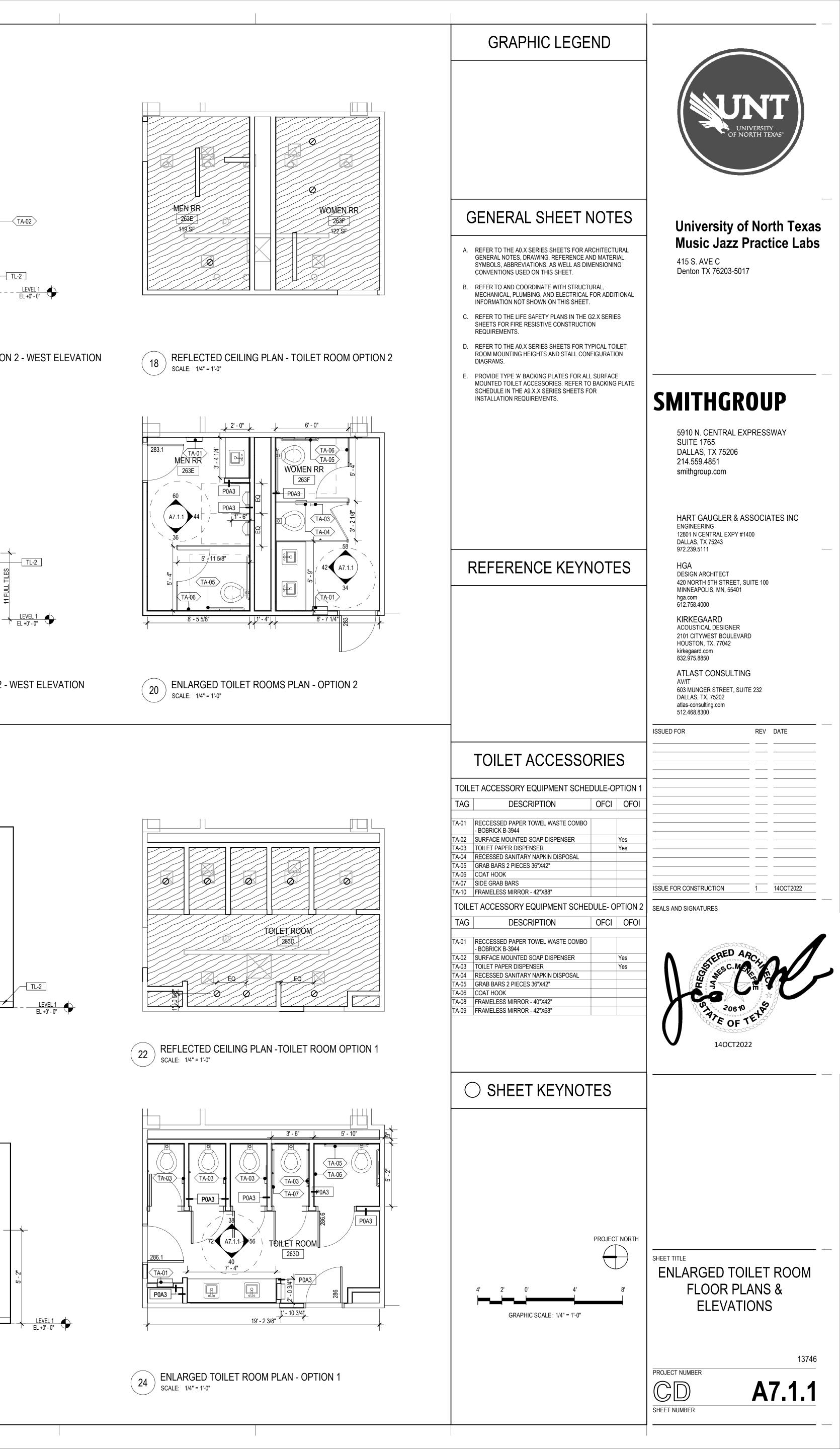


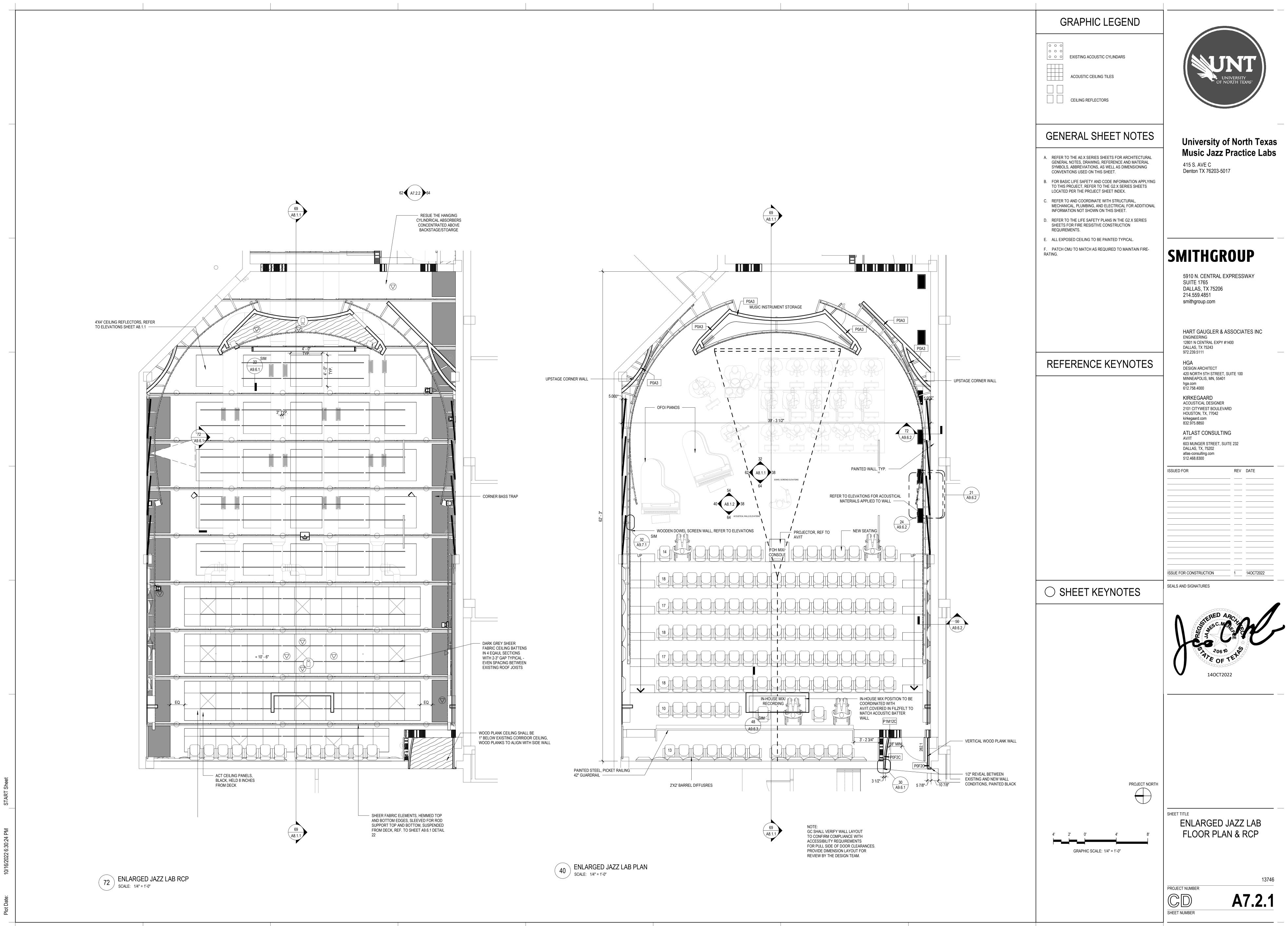


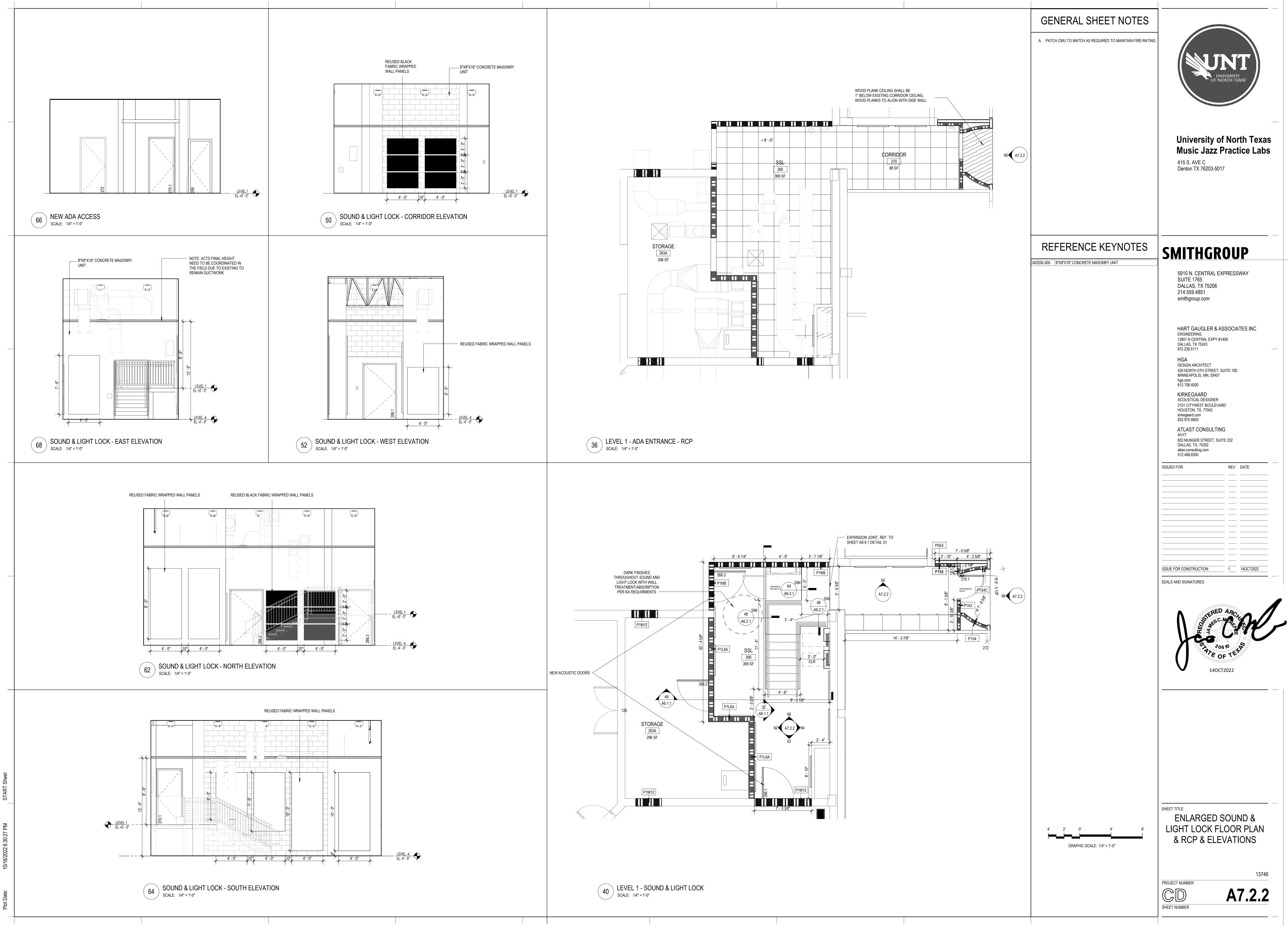
WOMENS TOILET ROOM - OPTION 2 - WEST ELEVATION

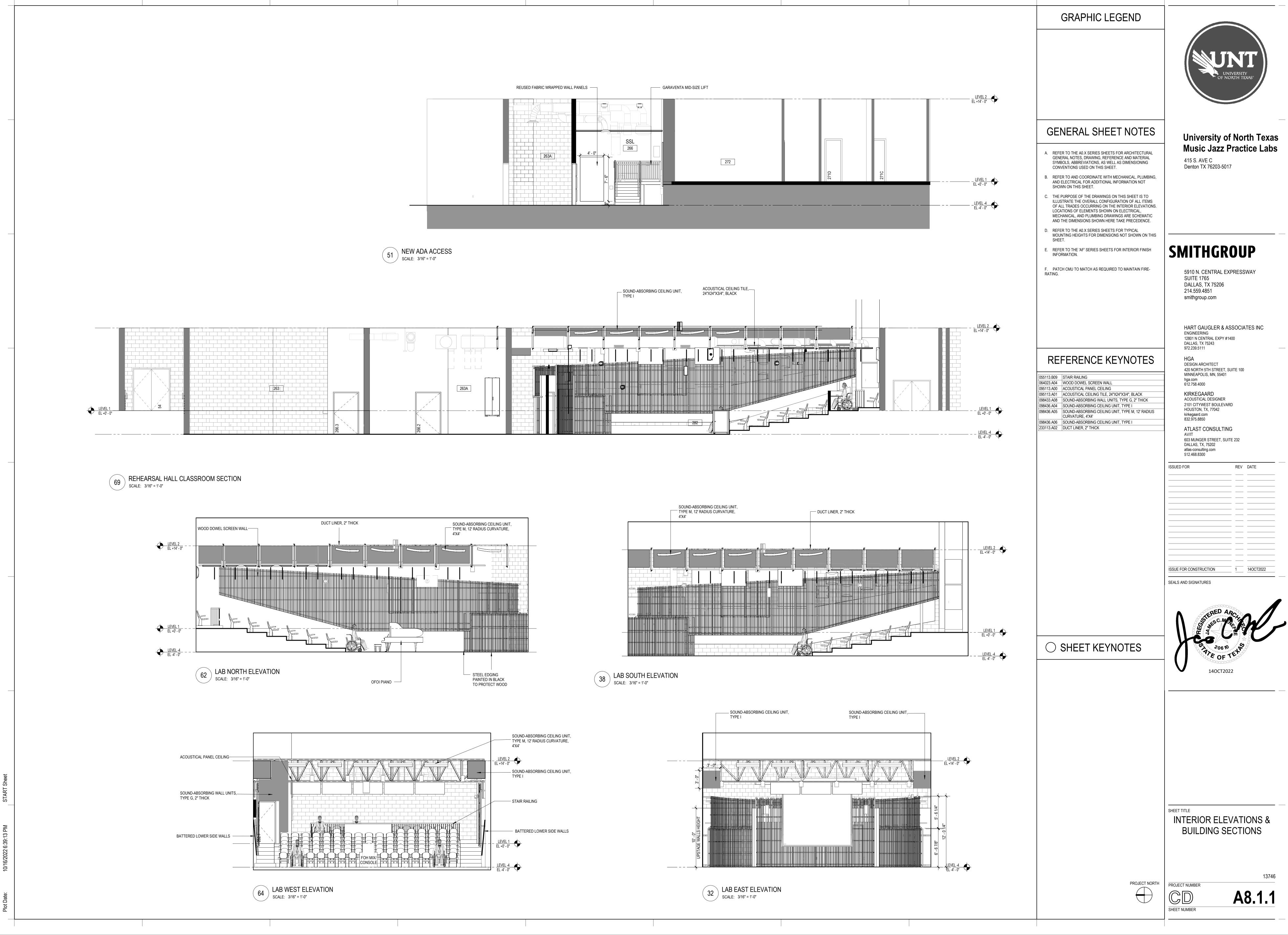


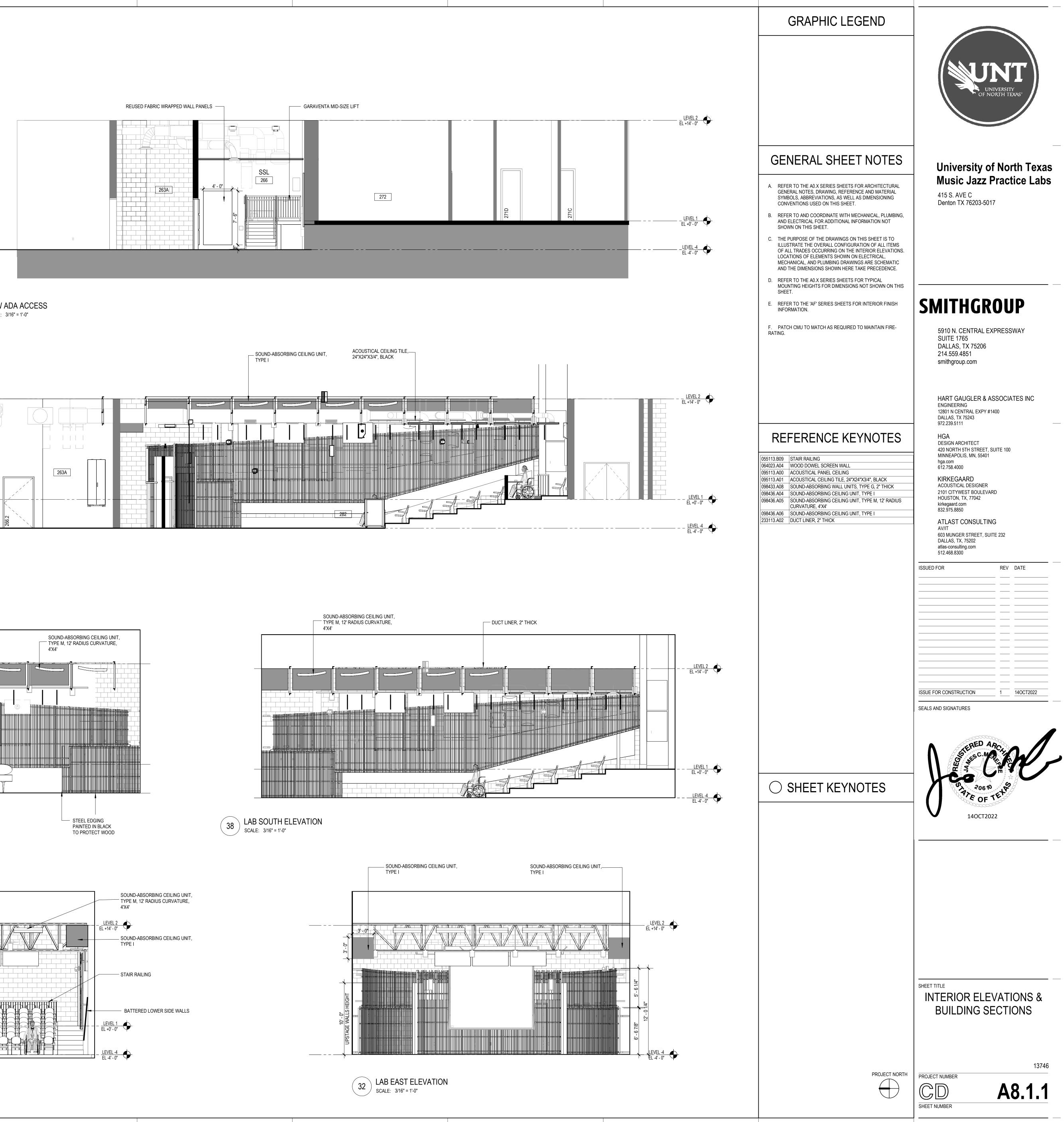


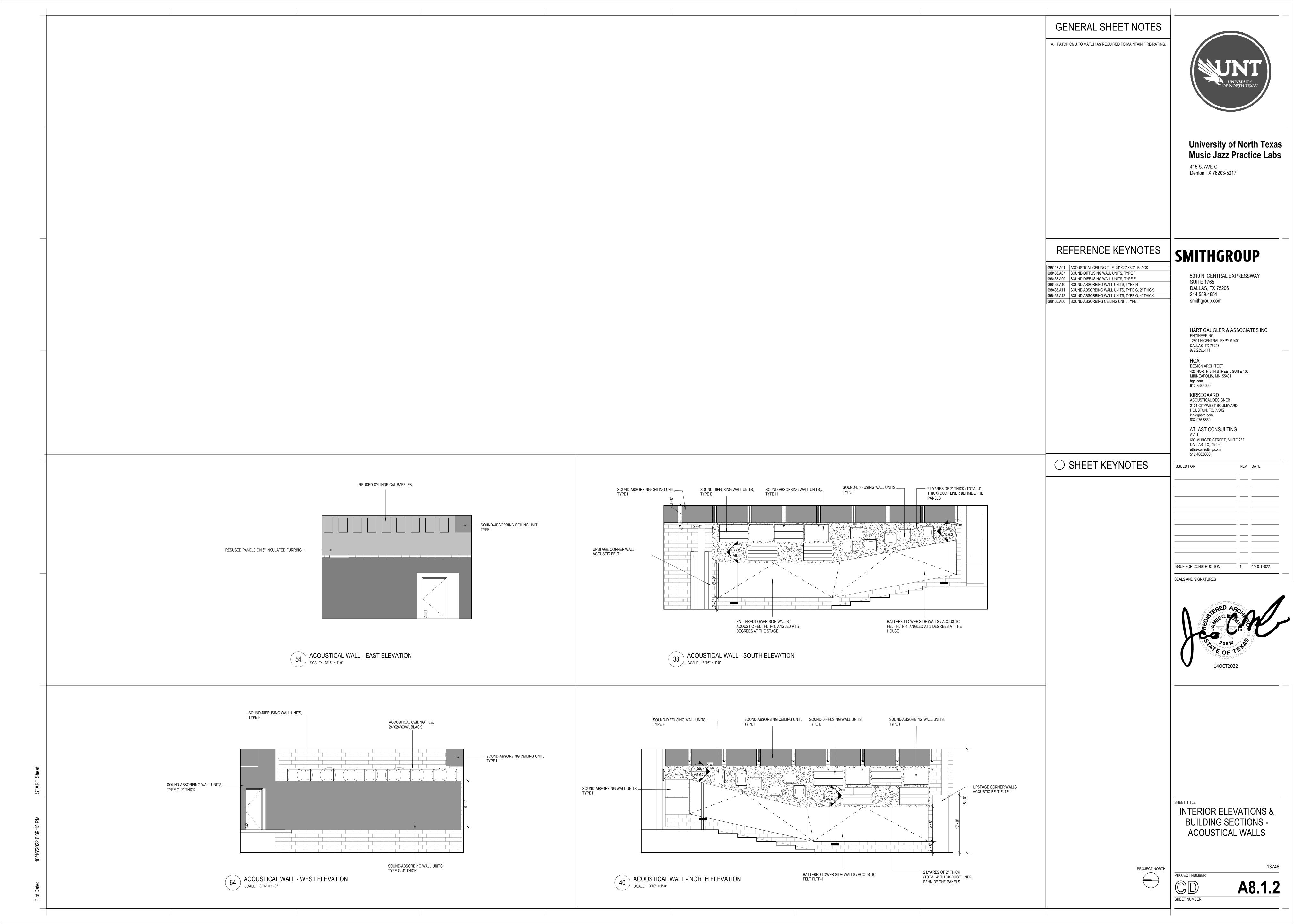




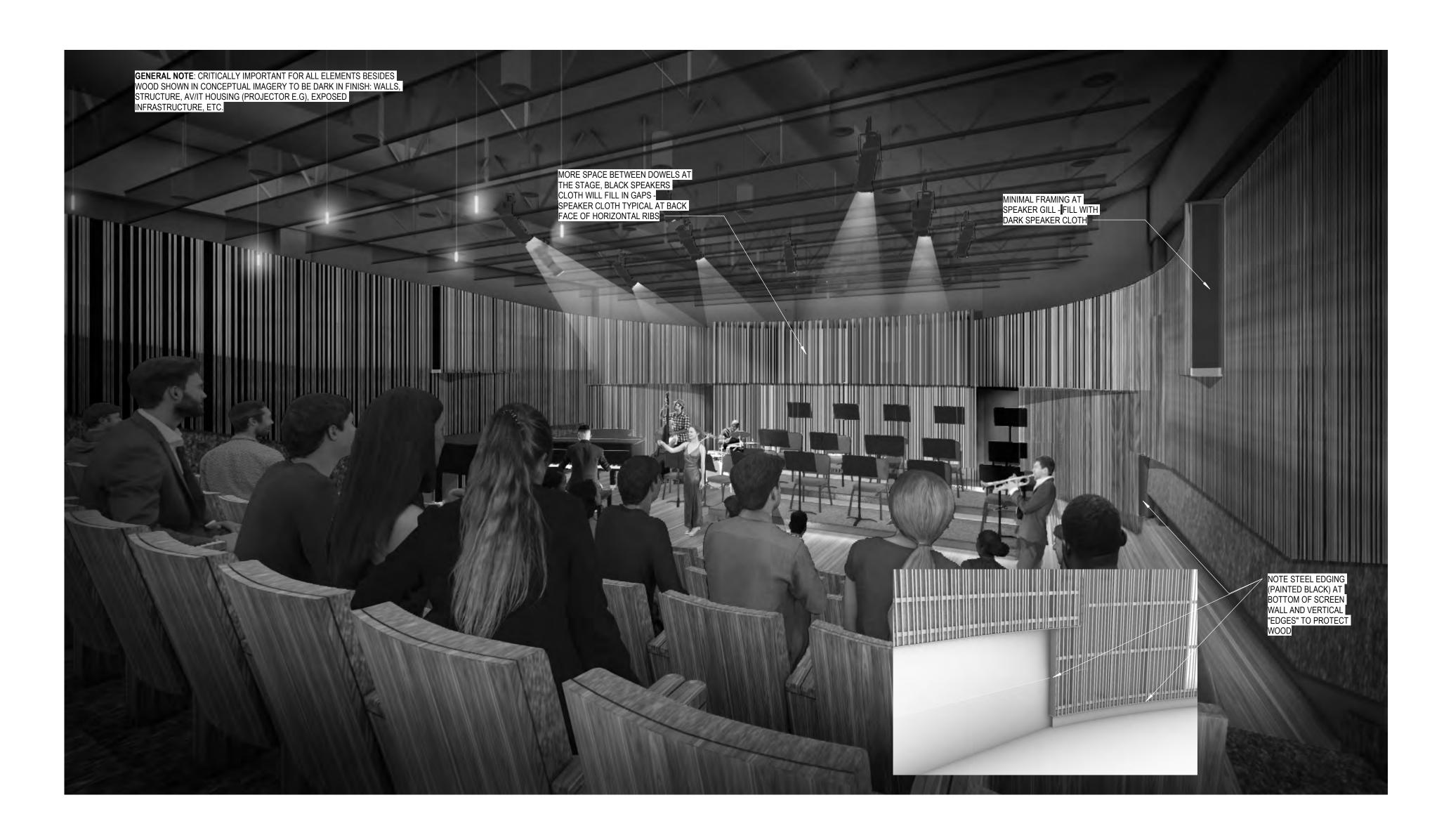






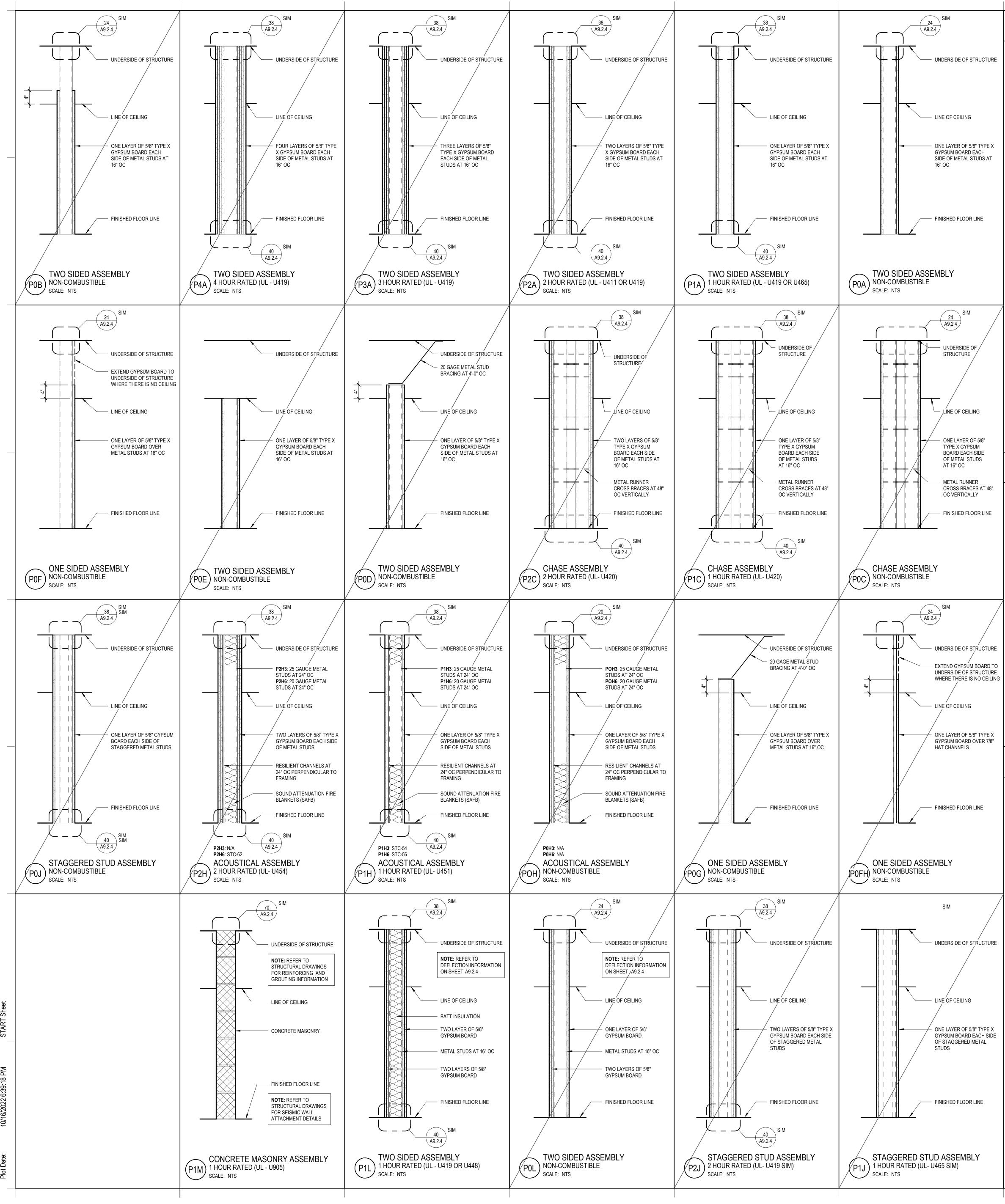






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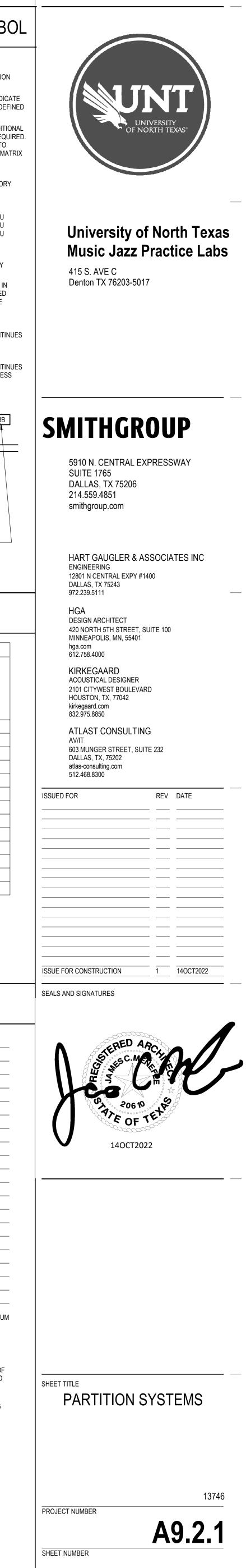


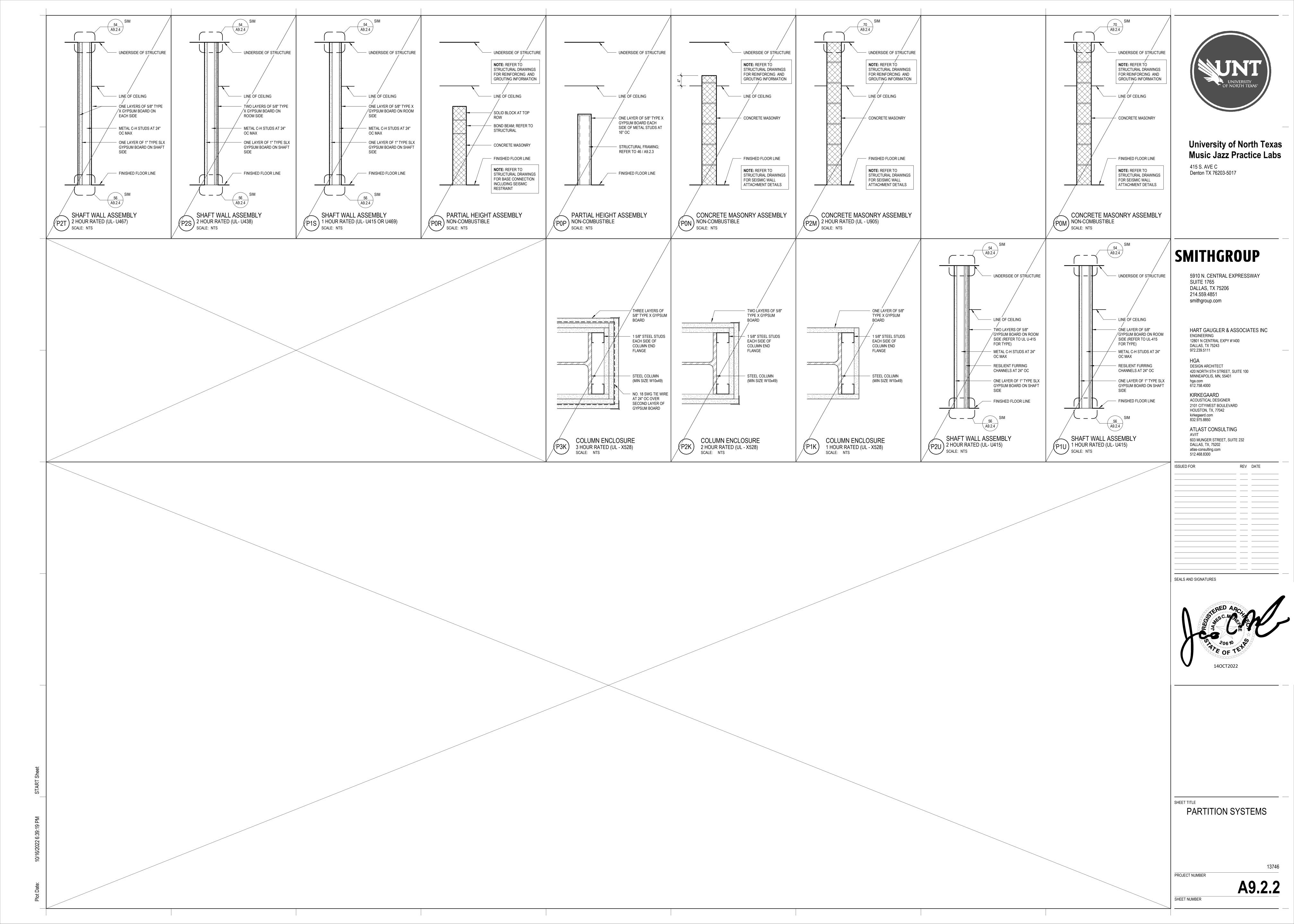
	PARTITION NOTES	FRAMING NOTES	PARTITION TYPE SYMBOL
TRUCTURE	A. PARTITIONS AND FURRING ARE DIMENSIONED TO THE FACE OF PARTITION ASSEMBLY (NOT TO THE FACE OF APPLIED FINISH OR FACE OF STUD), UNLESS OTHERWISE NOTED	A. ALL INTERIOR NON-LOAD-BEARING METAL WALL FRAMING EXCEEDING 6 FEET IN HEIGHT SHALL RESIST A HORIZONTAL LOAD OF NOT LESS THAN 5 PSF, UNLESS OTHERWISE NOTED OR REQUIRED BY THE SPECIFICATIONS.	SYMBOL DEFINITION ASSEMBLY TYPE DESIGNATION P = INTERIOR PARTITION
	B. PARTITION TYPE INDICATIONS ARE INDEPENDENT OF APPLIED FINISHES. SEE FINISH SCHEDULE AND/OR THE DESIGNATIONS ON THE PLANS FOR ADDITIONAL INFORMATION REGARDING APPLIED FINISHES	B. GAUGE THICKNESS DESIGNATION IS BASED ON THE FOLLOWING MIL THICKNESS FOR INTERIOR NON-LOAD BEARING PARTITION FRAMING, ALL 33 ksi, PER THE STEEL STUD MANUFACTURERS ASSOCIATION (SSMA):	SECOND & THIRD DIGITS INDICATE BASIC PARTITION TYPE AS DEFINED ON THIS SHEET
	C. WHERE PARTITION TYPE DESIGNATION ON FLOOR PLANS IS INTERRUPTED BY DOOR OPENING, GLAZED PARTITION, ETC., CONSTRUCTION ABOVE INTERRUPTION (AND WHERE APPLICABLE BELOW) IS TO BE THE SAME AS THAT DESIGNATED FOR THE PARTITION IN WHICH THE INTERRUPTION OCCURRED	18 MIL = 0.0179 INCHES = 25 GAUGE 25 MIL = 0.0250 INCHES = 20 GAUGE (DIMPLED) 30 MIL = 0.0269 INCHES = 20 GAUGE (STANDARD) 33 MIL = 0.0329 INCHES = 20 GAUGE (STRUCTURAL)	FINAL DIGIT INDICATES ADDITIONAL COMPONENTS GROUP IF REQUIRED IF REQUIRED THEN REFER TO ADDITIONAL COMPONENTS MATRIX THIS SHEET
8" TYPE X EACH TUDS AT	D. THE MINIMUM REQUIREMENTS FOR CONSTRUCTION OF EACH PARTITION TYPE AS EXPRESSED BY THE INDICATED FIRE RATING REFERENCE ARE INCORPORATED BY REFERENCE AND ARE APPLICABLE TO THE WORK OF THIS PROJECT. HOWEVER, ADDITIONAL AND/OR MORE RESTRICTIVE REQUIREMENTS MAY BE	 43 MIL = 0.0428 INCHES = 18 GAUGE 54 MIL = 0.0538 INCHES = 16 GAUGE C. ALL INTERIOR NON-LOAD-BEARING METAL WALL FRAMING SHALL BE 25 GAUGE INSTALLED AT 16" O.C. UNLESS OTHERWISE NOTED. 	FRAMING UNIT SIZE CATEGORY 1 = 1 5/8" STUDS 2 = 2 1/2" STUDS 3 = 3 5/8" STUDS 4 = 4" STUDS / 4" (NOM) CMU
	INDICATED BY THE SPECIFICATIONS AND DRAWINGS. SUCH REQUIREMENTS ALSO APPLY AND SHALL GOVERN. SUCH REQUIREMENTS INCLUDE BUT ARE NOT LIMITED TO:	D. ALL INTERIOR NON-LOAD-BEARING METAL WALL FRAMING SHALL BE INSTALLED WITH A DEFLECTION CRITERIA OF L/240, UNLESS OTHERWISE NOTED OR REQUIRED BY THE SPECIFICATIONS.	6 = 6" STUDS / 6" (NOM) CMU 8 = 8" STUDS / 8" (NOM) CMU 12 = 12" (NOM) CMU H = HAT CHANNELS
LINE	 USE 5/8 THICK GYPSUM BOARD THROUGHOUT USE 16 OC MAX STUD SPACING UNLESS OTHERWISE NOTED. THE SPACING STATED BY THE REFERENCED APPROVAL OR TEST REPORT IS THE MAX SPACING 	E. WHERE AN ADDITIONAL INTERIOR WALL FINISH IS APPLIED TO THE BASE PARTITION SUCH AS TILE, VENEERS, WOOD PANELING, OR SIMILAR; ALL INTERIOR NON-LOAD-BEARING METAL WALL FRAMING SHALL BE INSTALLED WITH A DEFLECTION CRITERIA OF L/360, UNLESS OTHERWISE NOTED OR REQUIRED BY THE SPECIFICATIONS.	BASIC PARTITION ASSEMBLY CATEGORY FIRE RATING OF PARTITION IN HOURS. RATING MAY EXCEED
	 USE STUDS OF GAUGE INDICATED ON THE DRAWINGS OR IN THE SPECIFICATIONS. THE GAUGE STATED BY THE REFERENCED APPROVAL OR TEST REPORT IS THE MINIMUM GAUGE USE STUDS OF DEPTH INDICATED BY THE DRAWINGS. THE 	F. LIMITING HEIGHTS OF INTERIOR NON-LOAD-BEARING FRAMING SHALL BE PER THE MANUFACTURERS SPAN TABLES BASED ON THE FOLLOWING CRITERIA OUTLINED IN THIS SET OF DRAWINGS AND THE PROJECT MANUAL: HORIZONTAL LOADING, STUD DEPTH, STUD SPACING, AND DEFLECTION CRITERIA.	RATING REQUIRED BY CODE USAGE ON FLOOR PLANS / PARTITION TYPE 'P0A3' CONTINUES THROUGH WITHOUT
	DEPTH STATED BY THE REFERENCED APPROVAL OR TEST REPORT IS THE MINIMUM DEPTH E. REFER TO THE GYPSUM BOARD PRODUCT LOCATION MATRIX FOR LOCATIONS OF GYPSUM BOARD PRODUCTS.	G. PROVIDE 20 GAUGE (OR GREATER AS REQUIRED) METAL WALL FRAMING AT THE FOLLOWING LOCATIONS:	ABOVE HEAD OF DOOR UNLESS OTHERWISE NOTED
	ACOUSTIC PARTITION ASSEMBLY STC GUIDELINES: UNITED STATES GYPSUM (USG) https://tinyurl.com/yae89527 https://tinyurl.com/y6dfg7yf	 DOUBLE STUD JAMB ASSEMBLIES AT OPENINGS FIRST STUD IN THE PARTITION BEYOND THE DOUBLE STUD JAMB ASSEMBLY. LOCATE STUD 6" FROM DOUBLE STUD ASSEMBLY. 	
IF	P0H2 - NO STC RATINGS LISTED P0H3 - NO STC RATINGS LISTED P0H6 - NO STC RATINGS LISTED	 STUDS TO WHICH GLASS-MAT BACKER WATER-RESISTANT BACKER BOARD, SPECIFIED IN SECTION 093000, ARE INSTALLED FOR WET AREAS 	
/	P0H8-NO STC RATINGS LISTEDP1H2-NO STC RATINGS LISTEDP1H3STC-4925 GAUGE STUDS @ 24" OC / 3 1/2" GLASS FIBERP1H3STC-4920 GAUGE STUDS @ 16" OC / 3 1/2" GLASS FIBER	 STUDS TO WHICH ABUSE-RESISTANT AND HIGH-IMPACT GYPSUM WALL PANELS ARE ATTACHED STUDS TO WHICH WALL MOUNTED EQUIPMENT, INCLUDING 	
	P1H6 STC-52 25 GAUGE STUDS @ 24" OC / 6" GLASS FIBER P1H6 STC-53 20 GAUGE STUDS @ 16" OC / 6" GLASS FIBER P1H3 STC-54 25 GAUGE STUDS @ 24" OC / 3" SAFB P1H6 STC-56 20 GAUGE STUDS @ 24" OC / 5" SAFB	OWNER FURNISHED EQUIPMENT, IS FASTENED6. STUD INFILL AND SILL TRACK BELOW WINDOW OPENINGS	LINE INDICATES BREAK BETWEEN
NG F 5/8" UM	P1H6STC-3620 GAUGE STUDS @ 24 OC / 5 SAFBP1H8-NO STC RATINGS LISTEDP2H2STC-5725 GAUGE STUDS @ 24" OC / 1" SAFBP2H3-NO STC RATINGS LISTEDP2H6STC-6220 GAUGE STUDS @ 24" OC / 5" MINERAL WOOLP2H8-NO STC RATINGS LISTED	 7. STUDS INSTALLED FOR OPENING HEADS BETWEEN DOUBLE STUD JAME ASSEMBLIES H. PROVIDE DEFLECTION TRACKS AT TOP OF ALL FULL HEIGHT PARTITIONS THAT ATTACHED TO STRUCTURE ABOVE 	LOCATION OF ADDITIONAL COMPONENT WITHIN THE PARTITION ASSEMBLY SHALL BE TO THE SAME SIDE AS THE PARTITION TYPE SYMBOL IS DESIGNATED FROM
SIDE JDS	GYPSUM	BOARD PRODUCT LOCATION	MATRIX
ER ES AT 48" LY	PRODUCT	LOCATION	

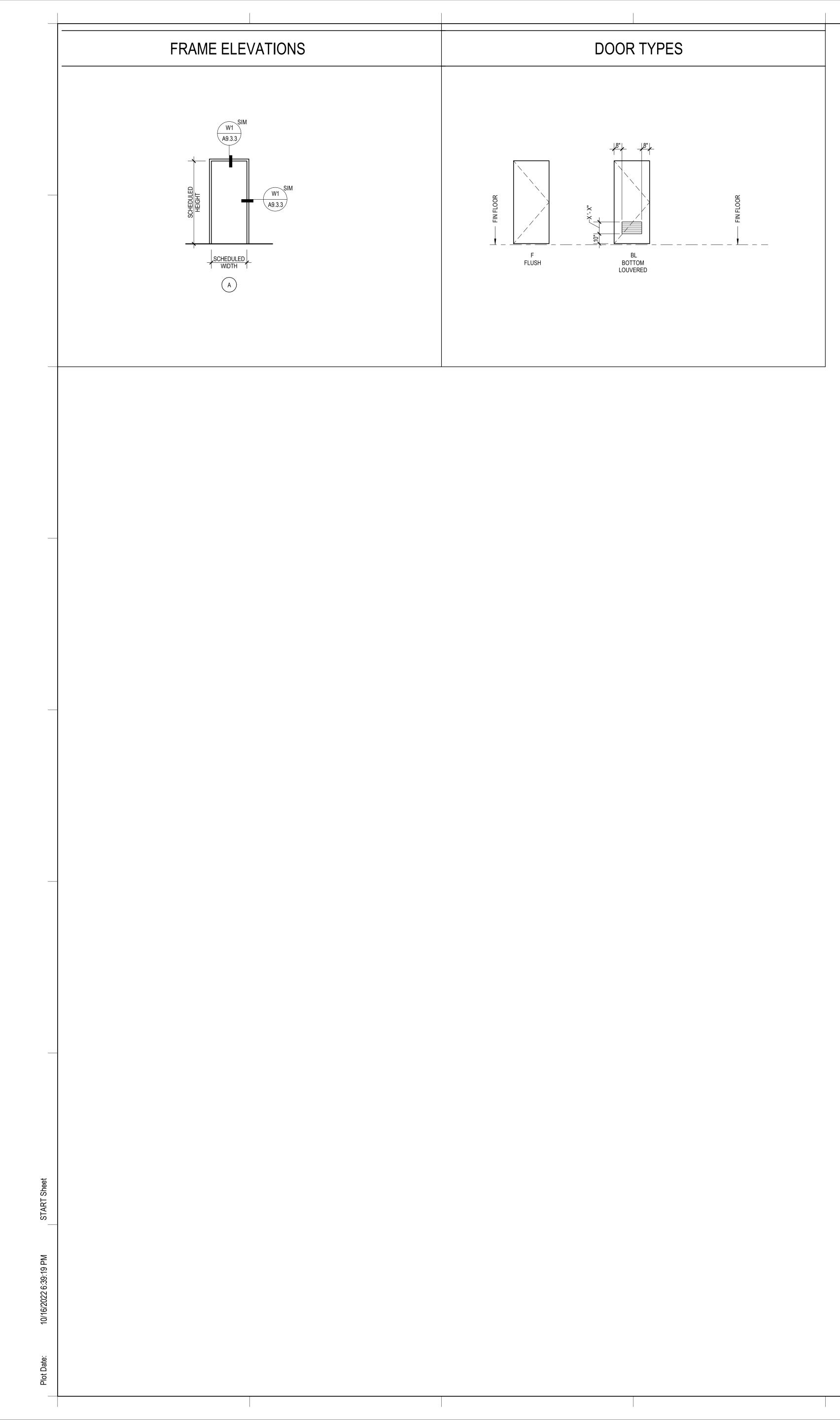
	THIS ,MATRIX MAY ILLUSTRATE PRODUCTS WHICH DO NOT OCCUR AS PART OF THIS PROJECT. REFER TO THE DRAWINGS AND SPECIFICATION TO DETERMINE WHICH PRODUCTS APPLY TO THE WORK OF THIS PROJECT.	WITHIN 2 FEET HORIZONTALLY AND 4 FEET VERTICALLY OF JANITORS SINKS FOR FRP INSTALLATION - OR PER FINISH SCHEDULE	SHOWER AND TUB ENCLOSURES	PARTITIONS AND CEILINGS IN ROOMS WITH SHOWERS AND TUBS - EXCLUDING SHOWER AND TUB ENCLOSURE	PARTITIIONS TO RECEIVE TILE FINISH NOT INCLUDING SHOWER AND TUB ENCLOSURES - SEE A9.1, A8 SERIES, AND AF SERIES	FOR USE LOCATIONS OF THESE PRODUCTS REFER TO PARTITION TYPES, PROJECT DETAILS, AND SPECIFICATION
	GYPSUM WALLBOARD					
	GYPSUM BOARD, TYPE X					•
	FLEXIBLE GYPSUM BOARD					
	FOIL-BACKED GYPSUM BOARD					•
	ABUSE-RESISTANT GYPSUM BOARD					•
7	IMPACT-RESISTANT GYPSUM BOARD					•
	MOLD-RESISTANT GYPSUM BOARD					•
	GYPSUM BOARD, TYPE C					•
	GLASS-MAT INTERIOR GYPSUM BOARD	•				
	ACOUSTICALLY ENHANCED GYPSUM BOARD					•
	SKIM-COATED GYPSUM BOARD					
	GLASS-MAT WATER RESISTANT BACKING BOARD					
	CEMENTITIOUS BACKER UNIT					

ADDITIONAL PARTITION COMPONENTS MATRIX

AL	DITIONAL COMPONENTS GROUP	•	A	В	С	D	E	F	G	H	J	K		M	N	Ρ	Q	R	S		U	V	W	' X	Y	Z	NOTES
	NO. ADDITIONAL COMPONENTS																										
	NO 1: ADD SMOKE SEAL																										SEE NOTE 1
	NO 2: ADD ACOUSTIC SEALANT																										SEE NOTE 2
	NO 3: ADD SOUND ATTENUATION BATTS - TYPE I		•																								SEE NOTE 3
	SOUND TRANSMISSION CLASS																										
	NO 4: ADD OUTLET BOX ACOUSTIC PADS																										SEE NOTE 4
	NO 5: ADD THERMAL INSULATION - TYPE I																										SEE NOTE 5
	NO 6: ADD THERMAL INSULATION - TYPE III																										SEE NOTE 6
	NO 7: ADD THERMAL INSULATION - RIGID																										SEE NOTE 7
	NO 8: ADD CONTINUOUS BACKING PLATE (TYP)																										SEE NOTE 8
	HGT IN INCHES TO CENTERLINE OF PLATE																										
	HGT IN INCHES TO CENTERLINE OF PLATE																										
	NO 9: PROVIDE LEAD LINED GYPSUM BOARD																										SEE NOTE 9
	NO 10: ADD CONTINUOUS VAPOR BARRIER																										SEE NOTE 10
	NO 11: ADD SECURITY MESH TO STRUCTURE ABOVE																										SEE NOTE 11
	NO 12: PROVIDE BALLISTIC SHEET																										SEE NOTE 12
	NO 13: ADD 5/8" ADDITIONAL GYPSUM BOARD LAYER																										
	NO 13: ADD 3/4" WOOD PLANK, WITH RANDOM KERF																										
	THOSE ABOVE FINISH CEILINGS SEAL PERIMETER OF PARTITION WITH CONT BEAD OF ACOUSTICAL SEALANT. CLOSE ALL GAPS THROUGH OR AROUND PARTITION BY SEALING ALL JOINTS, GAPS AROUND OUTLET BOXES AND PENETRATIONS, INCLUDING THOSE ABOVE FINISH CEILINGS. ISOLATE PARTITION FROM ALL PIPE AND DUCT PENETRATIONS BY STOPPING GYPSUM BOARD 1/2" MIN TO 1" MAX FROM PIPE OR DUCT. SEAL GAP BETWEEN GYPSUM BOARD AND PIPES/DUCTS WITH BACKER ROD AND ACOUSTICAL SEALANT SOUND ATTENUATION BATTS (NON-FACED, FRICTION FIT) IN STUD CAVITY. PROVIDE 2 1/2" THICK INSULATION WHERE STUD DEPTH IS 2 1/2"; PROVIDE 3 1/2" THICK INSULATION WHERE STUD DEPTH IS 3 5/8" OR GREATER. WHERE STUD DEPTH IS LESS THEN 2 1/2" DEEP, PROVIDE ADDITIONAL COMPONENT NO 4 INSTEAD	l		7. 8. 9.	IN SEE INI IN PR HE CC INI PL PR GY RE	Stui MI-R Dica Cavi Covie Govie Covie PSU Covie	D CA IGID TED ITY S DE CO (S) A NUOL TED SCHI DE LE M BC REME	VITY THEI BY M PAC ONTI ABOV JS BA PAR EDUL EAD L DARD ENTS	(ALUE RMAL IATRI E OF NUOI /E FIN ACKIN ACKIN ACKIN LINEE J. CO S WITI	. Insl X on Part JS Ba JS B IIS B N Tyf IIS SF O GYP Ordii H SPE	JLAT TYP TITIO ACKIN FLOC LATE PE IN HEET SUM NATE ECIFI	ION I E N (N OF NG PI R AS RUN ROC BOA E INS CATI	BOAF DR SI LATE S IND IS FL JM. F RD I TALL ON S	rd oi Pind Rring Icat Jll L Refei N Lie Atio Secti	FR-V LE FA ED IN ENGT R TO U OF N ON A	alue Astei I Ma ⁻ Th of Baci	= NER: [rix. - King	6		11. 12.	CON MET FACI PRO BELO	T ME AL SI NG. U VIDE DW F/	TAL IUDS JSE JSE CON ACE	Secu Bef Min (Itinu Laye	JRITY ORE (20 G/ JOUS ER OF	(MES Appi Age) Layi	ENETRATING ITEMS SH SPOT WELDED TO LICATION OF GYPSUN OR HEAVIER METAL S ER OF BALLISTIC SHE PSUM BOARD PER TH STRATED.
4.	PROVIDE ACOUSTICAL OUTLET BOX PADS AT ALL ELECTRICAL, TELEPHONE AND DATA OUTLET BOXES AS WELL AS AT ALL SWITCH BOXES. MOLD PAD CAREFULLY AROUND BOX AFTER BOX IS SECURELY ATTACHED TO STUD BEFORE GYPSUM BOARD IS INSTALLED. SEAL ALL OPENINGS WITH OUTLET BOX SEALANT MATERIAL				PE	NETI	RATI	UNS	PER	SPEC	JFIC,	α ΓΙΟ	N SE	CTIC	N XX	XXX)	ς.										

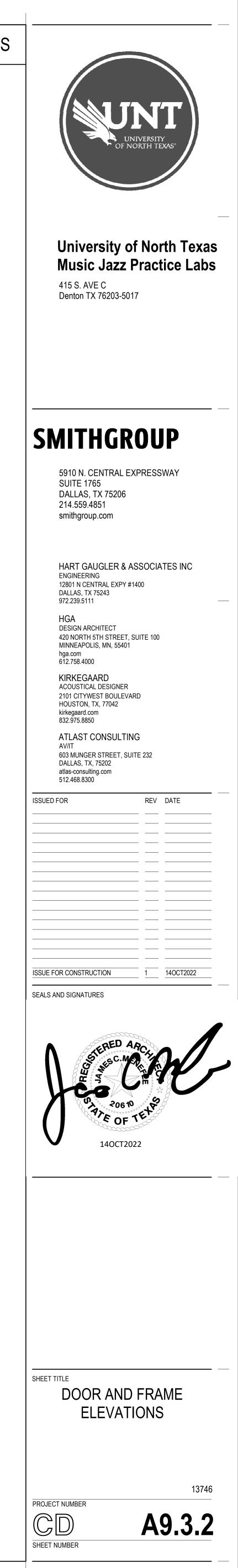


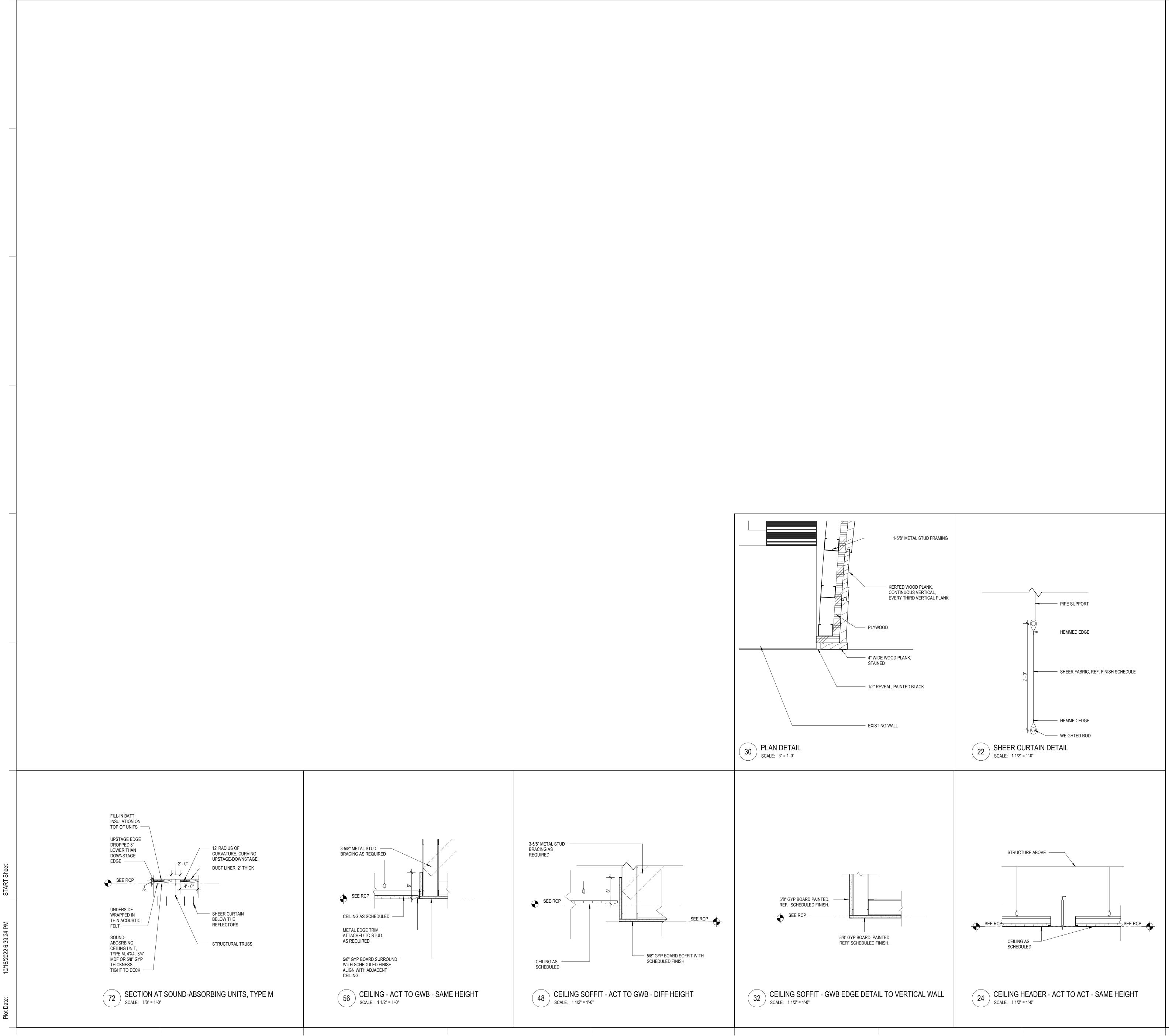




				Γ	DOOR A	ND INT	ERIOR	OPENIN	IG SCHEDULE
	FIRE RATING	S	ZE	DC	OR	FR/	AME	HARDWARE	
NUMBER	(MINUTES)	WIDTH	HEIGHT	ELEVATION	MATERIAL	ELEVATION	MATERIAL	SET	SPECIAL NOTES AND COMMENTS
LEVEL 1									
266.1	60 MIN	4' - 0"	7' - 0"	F	MANUFACTURER	A	MANUFACTURER	S701R	ACOUSTIC DOOR ASSEMBLY, REF SPECS, ACOUSTIC MATERIAL ATTACHED TO DOOR FACES, DOORS AND FRAMES SHALL MATCH RATING OF PARTITION
266.2		4' - 0"	7' - 0"	F	MANUFACTURER	A	MANUFACTURER	201R	PAINTED DOOR
266.3	60 MIN	4' - 0"	7' - 0"	F	MANUFACTURER	A	MANUFACTURER	S701R	ACOUSTIC DOOR ASSEMBLY, REF SPECS, ACOUSTIC MATERIAL ATTACHED TO DOOR FACES, PANIC HARDWARE, DOORS AND FRAMES SHALL MATCH RATING OF PARTITION
266.4		2' - 8"	7' - 0"	F	WD	A		301G	
266.5		2' - 8"	7' - 0"	F	WD	A		301G	
266.6		2' - 8"	7' - 0"	F	WD	A		301G	
266.7		2' - 8"	7' - 0"	F	WD	A		301G	
270.1		3' - 0"	7' - 0"	F	MATCH EXST	A		S701C	PANIC HARDWARE, FINISH TO MATCH EXISTING CORRIDOR DOORS
282.1	60 MIN	3' - 0"	7' - 0"	F	MANUFACTURER	A	MANUFACTURER	S701R	ACOUSTIC DOOR ASSEMBLY, REF SPECS, ACOUSTIC MATERIAL ATTACHED TO DOOR FACES, PANIC HARDWARE, DOORS AND FRAMES SHALL MATCH RATING OF PARTITION
282.2		2' - 0"	7' - 0"	F	MTL	A		401	MAINTENANCE DOOR, ACOUSTIC MATERIAL ATTACHED TO FACES
286		3' - 0"	7' - 0"	F	MATCH EXST	A		801	FINISH TO MATCH EXISTING CORRIDOR DOORS
286.1		3' - 0"	7' - 0"	F	MATCH EXST	A		801	FINISH TO MATCH EXISTING CORRIDOR DOORS
286.6		3' - 0"	7' - 0"	F	WD	A		301G	

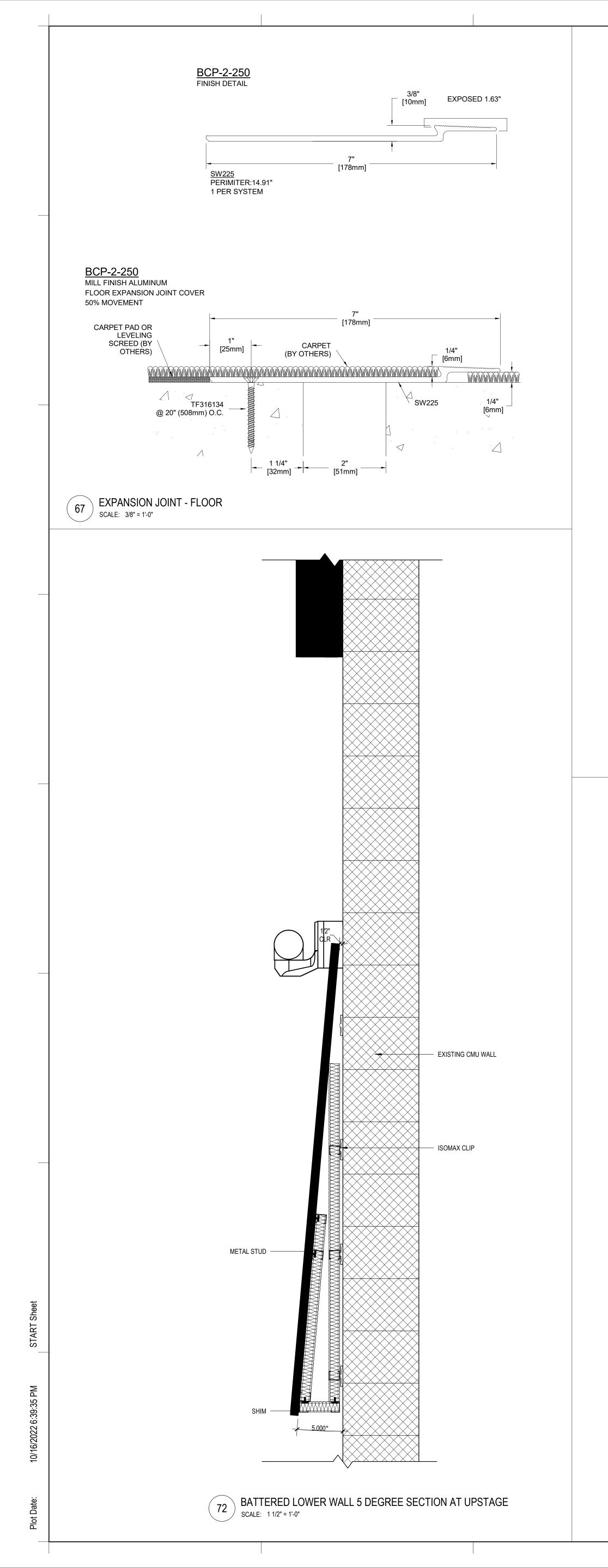
GENERAL SHEET NOTES

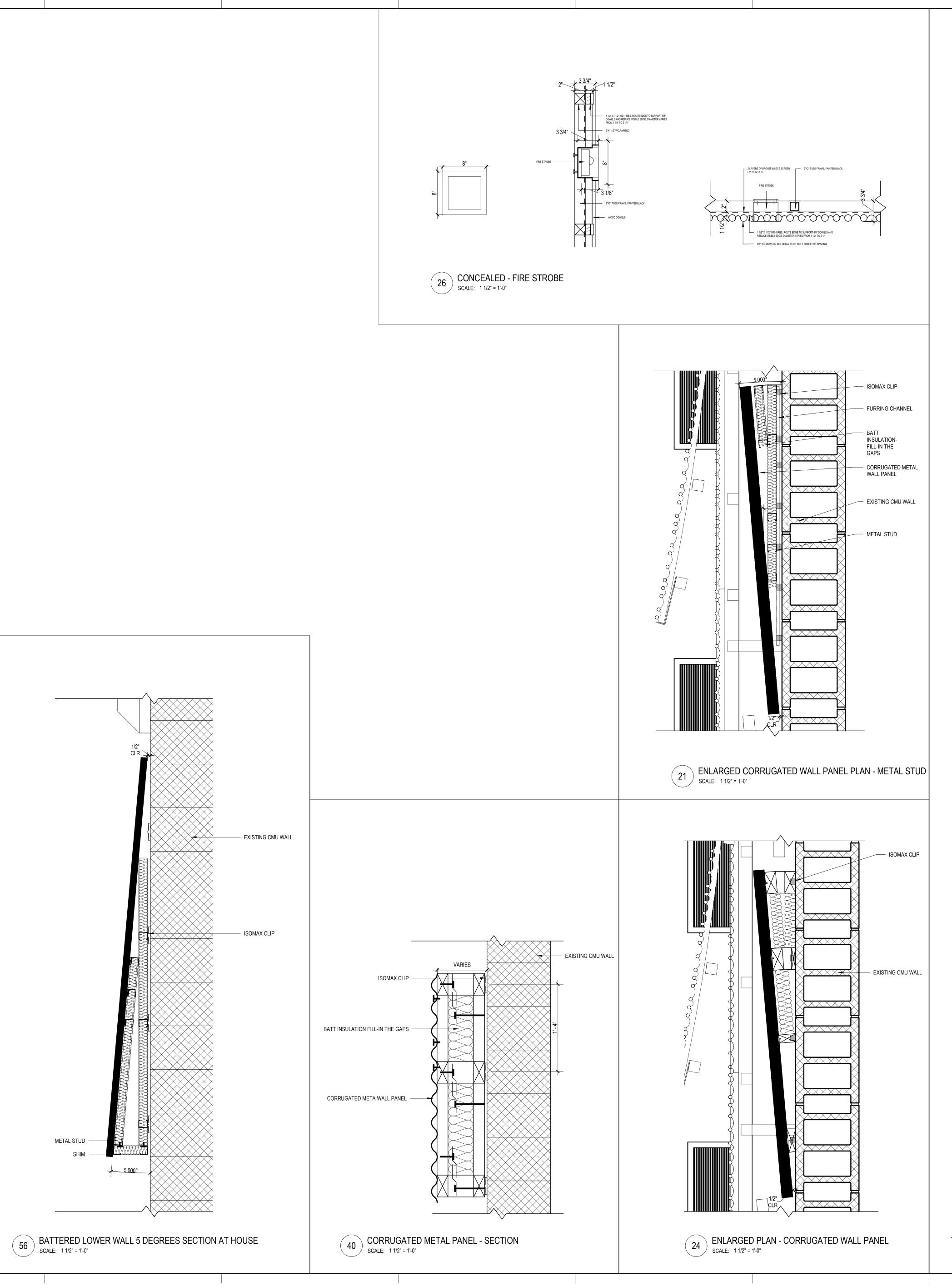




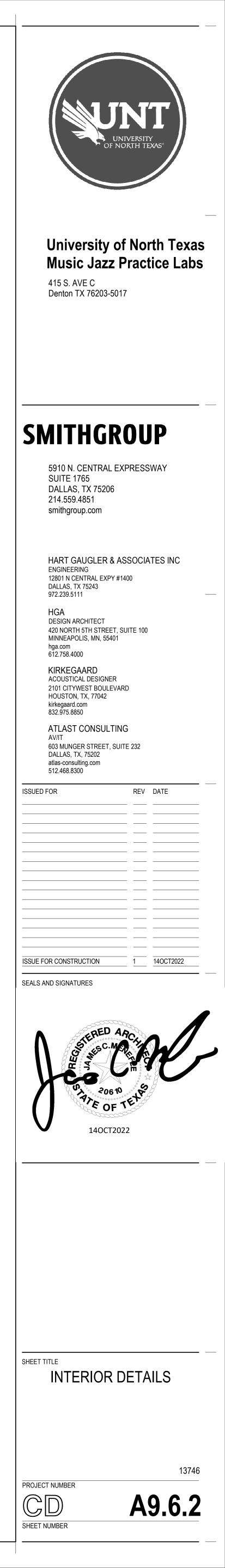




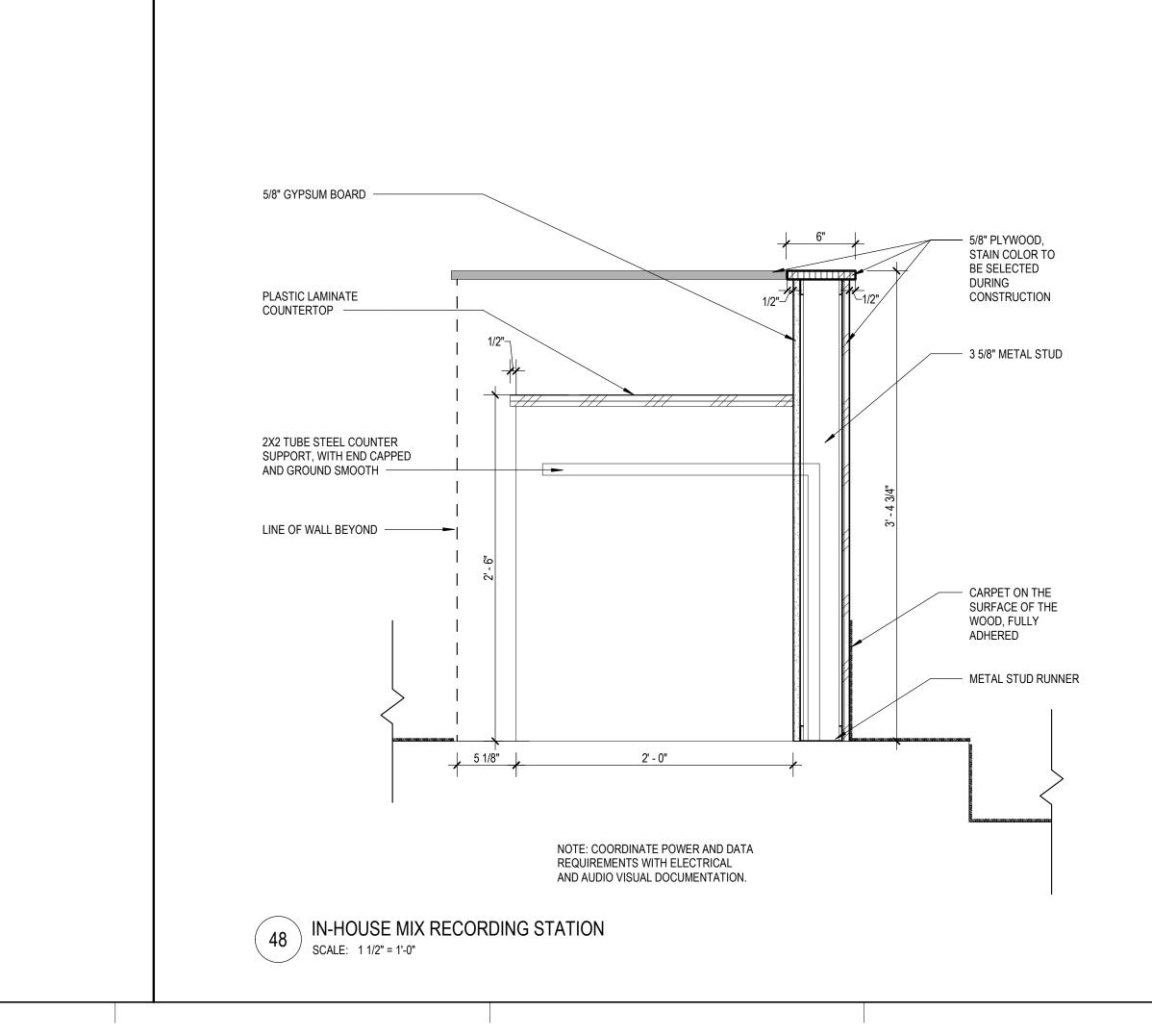


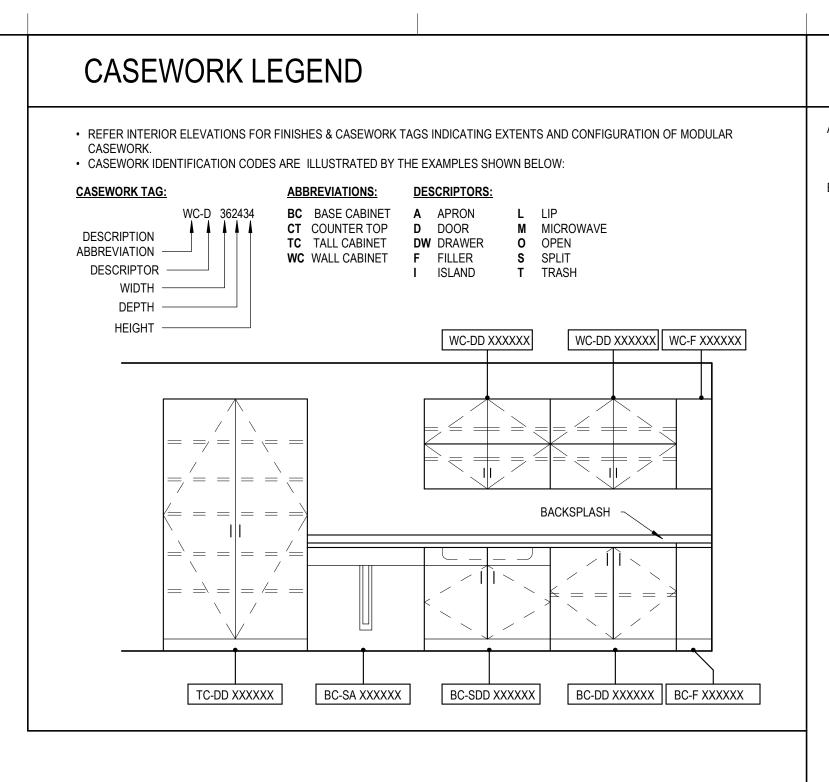


16' 8' 0' 16' GRAPHIC SCALE: 1/16" = 1'-0"



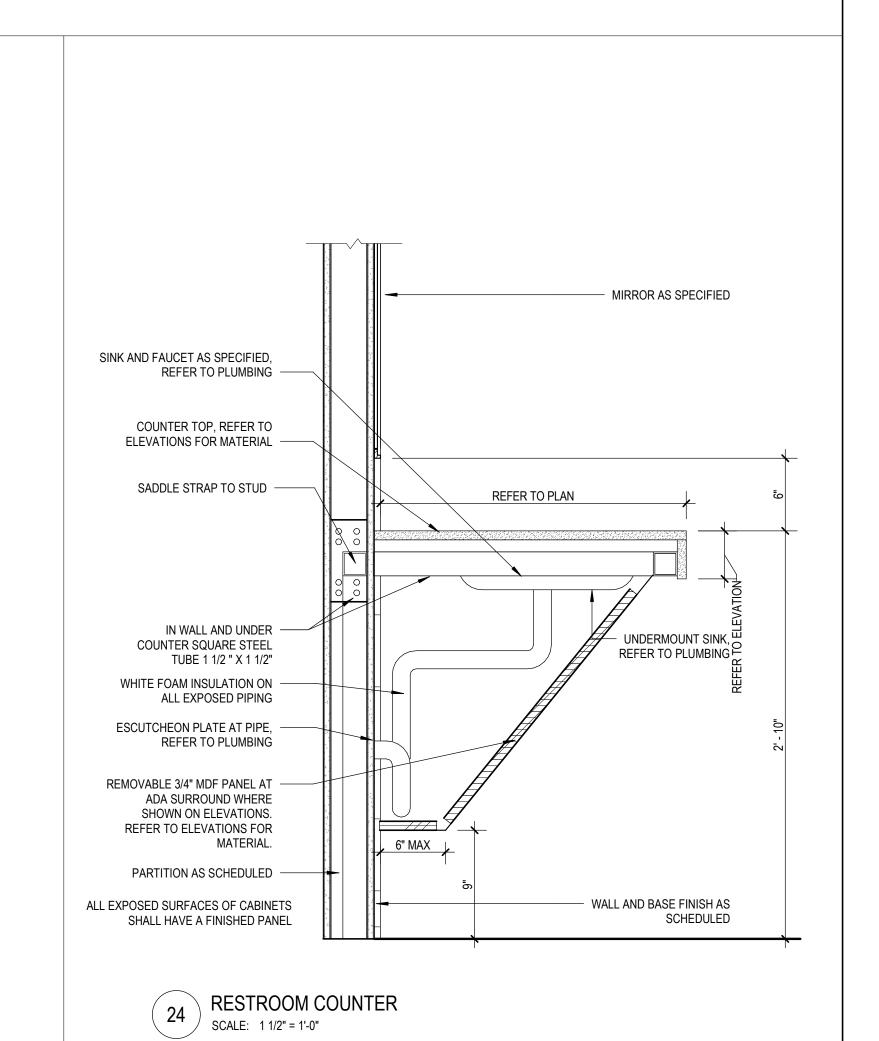
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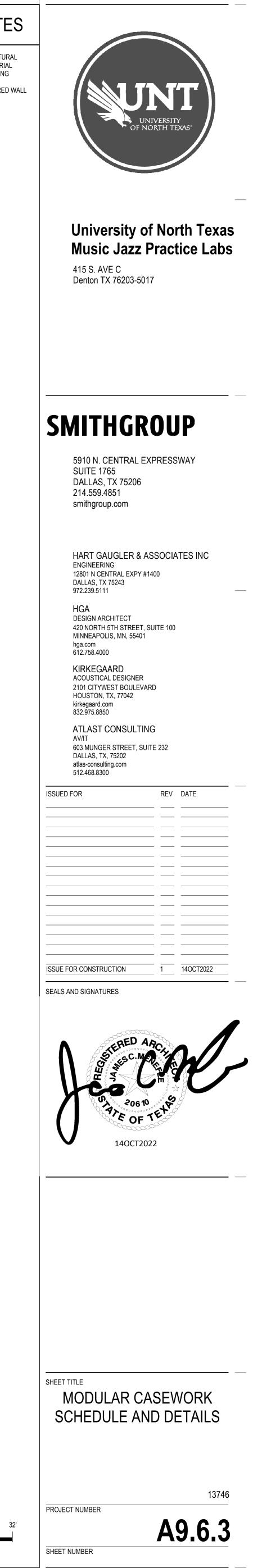


A. REFER TO THE A0.X SERIES SHEETS FOR ARCHITECTURAL GENERAL NOTES, DRAWING, REFERENCE AND MATERIAL SYMBOLS, ABBREVIATIONS, AS WELL AS DIMENSIONING CONVENTIONS USED ON THIS DRAWING.

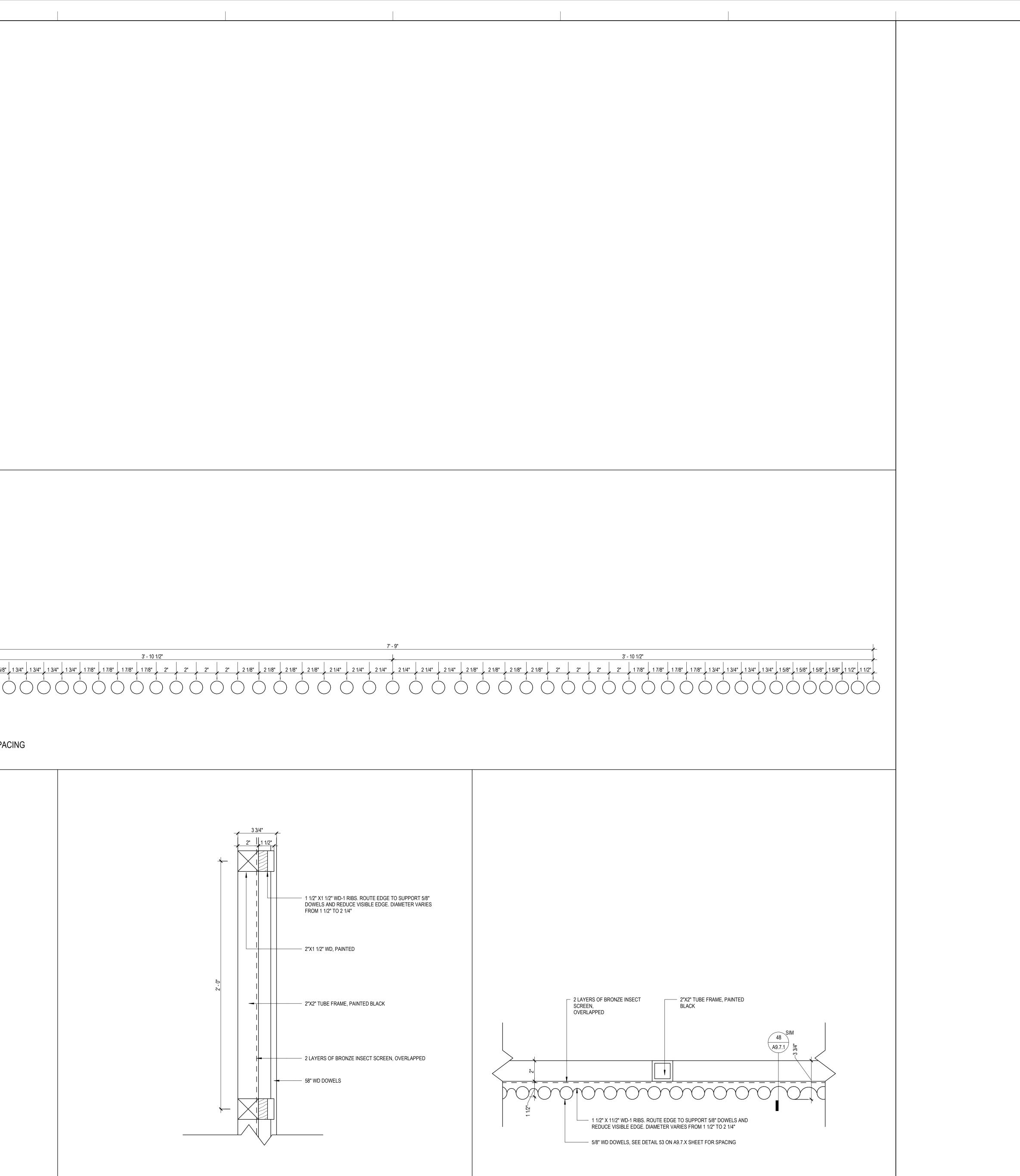
 B. REFER TO PARTITION SHEET A9 SERIES FOR REQUIRED WALL BLOCKING

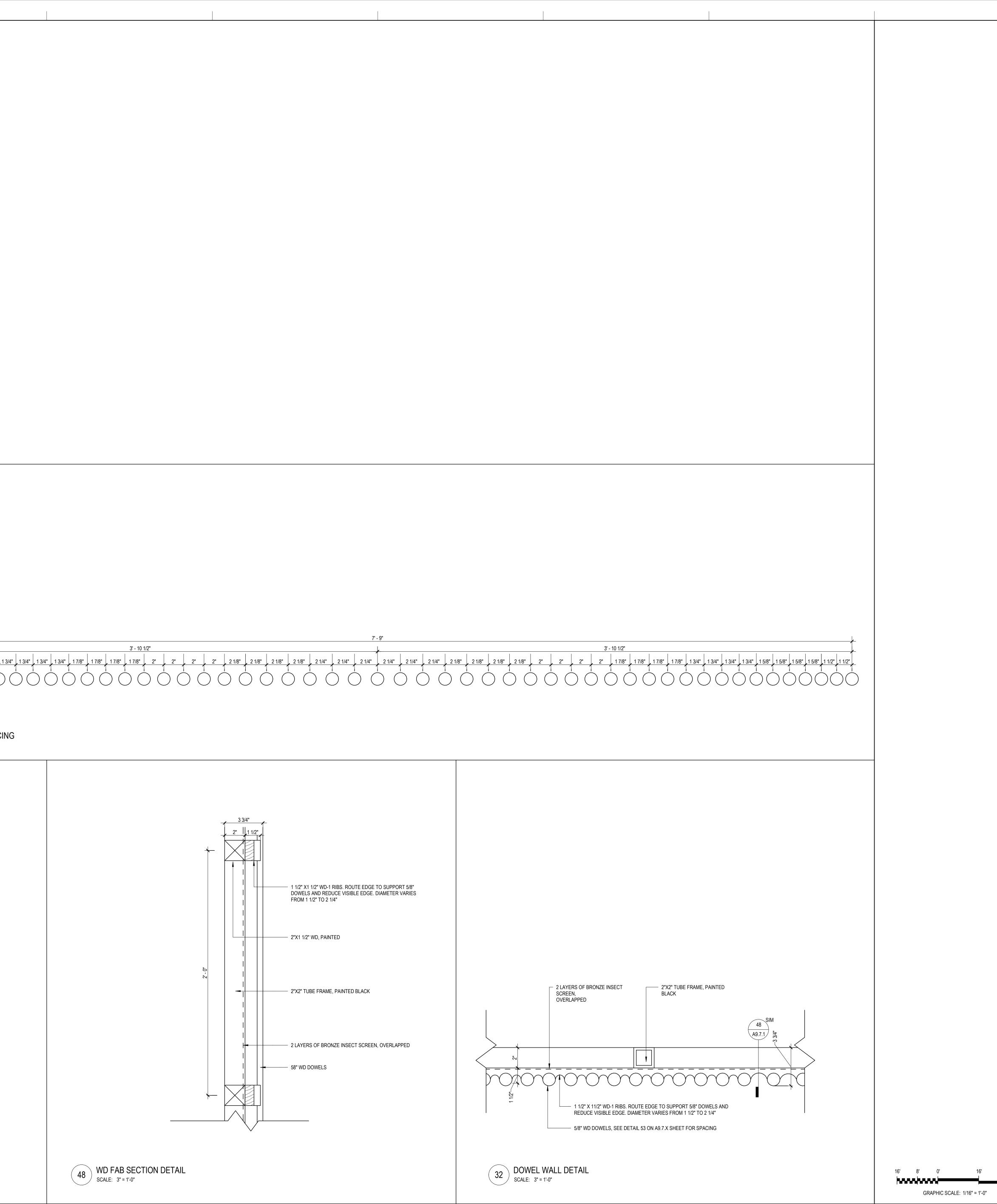


16' 8' 0' 16' GRAPHIC SCALE: 1/16" = 1'-0"



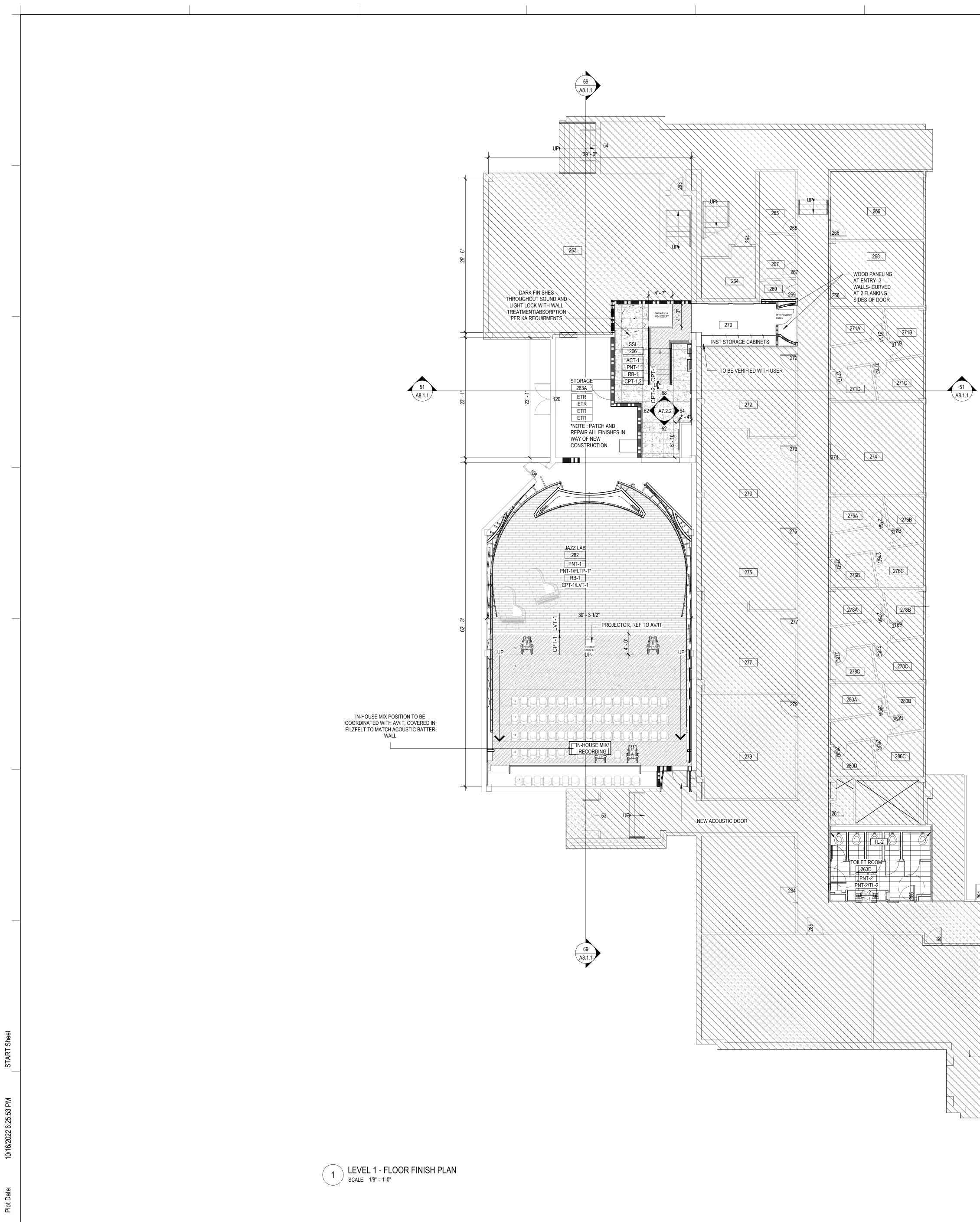
	1 1/2" 1 1/2" 1 5/8" 1 5/8" 1 5/8" 1 5/8"
	DOWEL WALL SPAC
	53 DOWEL WALL SPAC
	53 DOWEL WALL SPAC SCALE: 3" = 1'-0"
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10/16/2022 6:39:36 PM START Sheet	53 DOWEL WALL SPAC
START Sheet	53 DOWEL WALL SPAC SCALE: 3" = 1'-0"





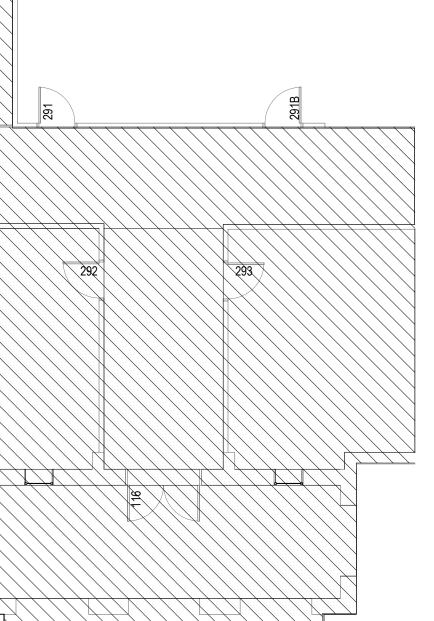


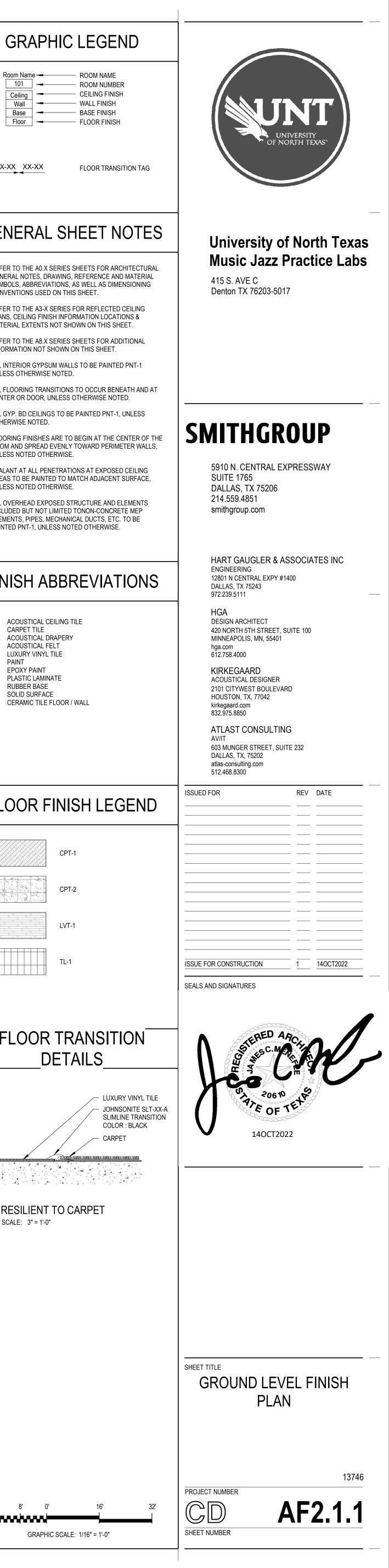
32'



	OORS	Room Name ROOM NAME 101 ROOM NUMBER Ceiling CEILING FINISH
CPT-1	BROADLOOM CARPET MFR : MOHAWK STYLE : LEARN & LIVE INTERPLAY GL415 COLOR : 979 ELEPHANT BACKER : ECOFLEX NXT SIZE : 12' WIDE INSTALLATION : BROADLOOM MONOLITHIC	Wall Base Base Base Base Floor Floor Floor Floor Wall Wal
CPT-2	LOCATION : REFER TO FINISH PLAN CARPET TILE MFR : MOHAWK STYLE : LEARN & LIVE SWIPE RIGHT GT418 COLOR : 969 BROOKWOOD BACKER : ECOFLEX NXT SIZE : 24" X 24" INSTALLATION : MONOLITHIC LOCATION : REFER TO FINISH PLAN	GENERAL SHEET NOT
LUXUR	<u>(VINYL TILE</u>	A. REFER TO THE A0.X SERIES SHEETS FOR ARCHITECT
LVT-1 <u>TILE</u> TL-1	LUXURY VINYL TILE MFR : TARKETT STYLE : WOOD / STONE CONTOUR SERIES - EXOTIC WOOD COLOR : KOA PCEX 3901 TK SIZE : 6" X 36" INSTALLATION : RANDOM OFFSET LOCATION : REFER TO FINISH PLAN PORCELAIN FLOOR TILE	 GENERAL NOTES, DRAWING, REFERENCE AND MATER SYMBOLS, ABBREVIATIONS, AS WELL AS DIMENSIONIN CONVENTIONS USED ON THIS SHEET. B. REFER TO THE A3-X SERIES FOR REFLECTED CEILING PLANS, CEILING FINISH INFORMATION LOCATIONS & MATERIAL EXTENTS NOT SHOWN ON THIS SHEET. C. REFER TO THE A8.X SERIES SHEETS FOR ADDITIONAL INFORMATION NOT SHOWN ON THIS SHEET. D. ALL INTERIOR GYPSUM WALLS TO BE PAINTED PNT-1 UNLESS OTHERWISE NOTED.
	MFR : NEMO TILE AND STONE SERIES : ALTA COLOR : BLACK SIZE : 12" X 24" INSTALLATION : STRAIGHT SET GROUT SIZE : 1/8" GROUT COLOR : LATICRETE 45 RAVEN LOCATION : RESTROOMS	 E. ALL FLOORING TRANSITIONS TO OCCUR BENEATH AN CENTER OR DOOR, UNLESS OTHERWISE NOTED. F. ALL GYP. BD CEILINGS TO BE PAINTED PNT-1, UNLESS OTHERWISE NOTED. G. FLOORING FINISHES ARE TO BEGIN AT THE CENTER OR ROOM AND SPREAD EVENLY TOWARD PERIMETER WA UNLESS NOTED OTHERWISE.
PAINT PNT-1	FIELD PAINT MFR : SHERWIN WILLIAMS COLOR : BLACK MAGIC SW6991 FINISH : EGGSHELL	 H. SEALANT AT ALL PENETRATIONS AT EXPOSED CEILING AREAS TO BE PAINTED TO MATCH ADJACENT SURFACT UNLESS NOTED OTHERWISE. I. ALL OVERHEAD EXPOSED STRUCTURE AND ELEMENT INCLUDED BUT NOT LIMITED TONON-CONCRETE MEP ELEMENTS, PIPES, MECHANICAL DUCTS, ETC. TO BE PAINTED PNT-1, UNLESS NOTED OTHERWISE.
PNT-2	RESTROOM FIELD PAINT MFR : SHERWIN WILLIAMS COLOR : KNITTING NEEDLES SW7672 FINISH : EGGSHELL	FINISH ABBREVIATION
FLTP-1	INISHES FELT PANEL MFR : FLTZFELT COLOR : 300 ANTHRAZIT SIZE : 3MM THICK INSTALLATION : DIRECT GLUE LOCATION : REFER TO FINISH PLANS AND ELEVATIONS	ACT ACOUSTICAL CEILING TILE CPT CARPET TILE DRAPE ACOUSTICAL DRAPERY FLTP ACOUSTICAL FELT LVT LUXURY VINYL TILE PNT PAINT PNTE EPOXY PAINT
<u>TILE</u> TL-2	CERAMIC WALL TILE MFR : DALTILE SERIES : VITRUVIAN COLOR : VV12 LIGHT GREY GLOSSY SIZE : 4" X 16" INSTALLATION : 1/2 OFFSET GROUT SIZE : 1/8" GROUT COLOR : LATICRETE 78 STERLING SILVER LOCATION : RESTROOMS	PNTE EPOXY PAINT PLAM PLASTIC LAMINATE RB RUBBER BASE SSM SOLID SURFACE TL CERAMIC TILE FLOOR / WALL
WALL B	ASE RESILIENT BASE MFR : TARKETT / JOHNSONITE COLOR : 40 BLACK B SIZE : 4" HIGH STRAIGHT BASE	FLOOR FINISH LEGEN
CE	ILINGS	СРТ-1
ACOUS	TICAL CEILING TILE ACOUSTICAL CEILING TILE MFR : ARMSTRONG STYLE : FINE FISSURED SCHOOL ZONE 1810 EDGE : SQUARE COLOR : TECH BLACK (BL)	CPT-2
	SIZE : 24" X 24" X 3/4" GRID PROFILE : T GRID GRID COLOR : BLACK LOCATION : REFER TO FINISH PLANS NOTES : ANY CUT EDGES TO BE PAINTED BLACK	TL-1
	LWORK	FLOOR TRANSITION
	<u>C LAMINATE</u> PLASTIC LAMINATE MFR : WILSONART COLOR : AMBER CHERRY 7919K-78 FINISH : FINEGRAIN FINISH WITH AEON SCRATCH RESISTANCE LOCATION : RESTROOMS	DETAILS – LUXURY VINYL – JOHNSONITE S SLIMLINE TRAM COLORED IN ACC
SSM-1	SURFACE SOLID SURFACE	COLOR : BLACK
55101-1	MFR : CORIAN COLOR : LAVA ROCK LOCATION : RESTROOMS	
SP	ECIALTY	2 RESILIENT TO CARPET SCALE: 3" = 1'-0"
	ACOUSTICAL HANGING DRAPERY MFR : KNOLL TEXTILES SERIES : BEWITCHED D2255/7 COLOR : MYSTIC SIZE : 60"W X 24"D NOTES : CHANNEL TO BE SEWED IN BOTTOM OF DRAPERY SIZED FOR WEIGHTED INSERT. REFER TO ARCHITECTURAL ELEVATIONS, REFLECTED CEILING PLAN, AND DETAILS FOR ADDITIONAL INFORMATION 2 ACOUSTICAL CURTAINS MFR : SERIES : COLOR : SIZE : FINISH : NOTES :	

FINISH LEGEND





CONDITIONING TVE CHILLED BEAM COOLED CHILLER COOLED CONDENSING UNIT SOLUTE CUBIC FEET PER MINUTE CONDITIONING UNIT CESS DOOR OVE FINISHED FLOOR FLOW MEASURING DEVICE FLOW MEASURING STATION HANDLING UNIT BIENT CESS PANEL PROXIMATE SEPARATOR LER AKE HORSEPOWER TTOM OF DUCT TTOM OF PIPE TISH THERMAL UNIT (PER HOUR) PACITY DLING COIL	LP LRA LVG LWT M MAX MBH MCA MCC MCC MD MECH MER MIN MISC MOCP MTG N (NRL) N.C N.C N.O. NC	LOW POINT LOCKED ROTOR AMPERES LEAVING LEAVING WATER TEMPERATURE MAXIMUM 1000 BTU/HR MAXIMUM CURRENT AMPACITY MOTOR CONTROL CENTER MOTORIZED DAMPER MECHANICAL MECHANICAL EQUIPMENT ROOM MINIMUM MISCELLANEOUS MAXIMUM OVER CURRENT PROTECTION MOUNTING	A ABBR ADA AFF AG AHJ AMB ANSI AP APPROX B	ABBREVIATION AMERICANS WITH DISABILITIES ACT ABOVE FINISHED FLOOR ABOVE GRADE AUTHORITY HAVING JURISDICTION AMBIENT AMERICAN NATIONAL STANDARDS INSTITUTE ACCESS PANEL APPROXIMATE
COOLED CHILLER COOLED CONDENSING UNIT COULTE CUBIC FEET PER MINUTE CONDITIONING UNIT CESS DOOR DVE FINISHED FLOOR FLOW MEASURING DEVICE FLOW MEASURING STATION HANDLING UNIT BIENT CESS PANEL PROXIMATE SEPARATOR LER AKE HORSEPOWER FTOM OF DUCT FTOM OF DICT FTOM OF PIPE TISH THERMAL UNIT (PER HOUR) PACITY DLING COIL	LWT M MAX MBH MCA MCC MD MECH MER MIN MISC MOCP MTG N (NRL) N.C N.O. NC	LEAVING WATER TEMPERATURE MAXIMUM 1000 BTU/HR MAXIMUM CURRENT AMPACITY MOTOR CONTROL CENTER MOTORIZED DAMPER MECHANICAL MECHANICAL EQUIPMENT ROOM MINIMUM MISCELLANEOUS MAXIMUM OVER CURRENT PROTECTION	AFF AG AHJ AMB ANSI AP APPROX B	ABOVE FINISHED FLOOR ABOVE GRADE AUTHORITY HAVING JURISDICTION AMBIENT AMERICAN NATIONAL STANDARDS INSTITUTE ACCESS PANEL
SOLUTE CUBIC FEET PER MINUTE CONDITIONING UNIT CESS DOOR DVE FINISHED FLOOR FLOW MEASURING DEVICE FLOW MEASURING STATION HANDLING UNIT BIENT CESS PANEL PROXIMATE SEPARATOR LER AKE HORSEPOWER TOM OF DUCT TTOM OF PIPE TISH THERMAL UNIT (PER HOUR) PACITY DLING COIL	MAX MBH MCA MCC MD MECH MER MIN MISC MOCP MTG N (NRL) N.C N.C N.O. NC	 1000 BTU/HR MAXIMUM CURRENT AMPACITY MOTOR CONTROL CENTER MOTORIZED DAMPER MECHANICAL MECHANICAL EQUIPMENT ROOM MINIMUM MISCELLANEOUS MAXIMUM OVER CURRENT PROTECTION 	AG AHJ AMB ANSI AP APPROX B	ABOVE GRADE AUTHORITY HAVING JURISDICTION AMBIENT AMERICAN NATIONAL STANDARDS INSTITUTE ACCESS PANEL
CONDITIONING UNIT CESS DOOR DVE FINISHED FLOOR FLOW MEASURING DEVICE FLOW MEASURING STATION HANDLING UNIT BIENT CESS PANEL PROXIMATE SEPARATOR LER AKE HORSEPOWER TTOM OF DUCT TTOM OF PIPE TISH THERMAL UNIT (PER HOUR) PACITY DLING COIL	MBH MCA MCC MD MECH MER MIN MISC MOCP MTG MTG N (NRL) N.C N.C N.O.	 1000 BTU/HR MAXIMUM CURRENT AMPACITY MOTOR CONTROL CENTER MOTORIZED DAMPER MECHANICAL MECHANICAL EQUIPMENT ROOM MINIMUM MISCELLANEOUS MAXIMUM OVER CURRENT PROTECTION 	AMB ANSI AP APPROX B	AMBIENT AMERICAN NATIONAL STANDARDS INSTITUTE ACCESS PANEL
OVE FINISHED FLOOR FLOW MEASURING DEVICE FLOW MEASURING STATION HANDLING UNIT BIENT CESS PANEL PROXIMATE SEPARATOR LER AKE HORSEPOWER TOM OF DUCT TTOM OF DUCT TTOM OF PIPE TISH THERMAL UNIT (PER HOUR) PACITY DLING COIL	MCC MD MECH MER MIN MISC MOCP MTG N (NRL) N.C N.C N.O. NC	MOTOR CONTROL CENTER MOTORIZED DAMPER MECHANICAL MECHANICAL EQUIPMENT ROOM MINIMUM MISCELLANEOUS MAXIMUM OVER CURRENT PROTECTION	AP APPROX B	ACCESS PANEL
FLOW MEASURING DEVICE FLOW MEASURING STATION HANDLING UNIT BIENT CESS PANEL PROXIMATE SEPARATOR LER AKE HORSEPOWER ITOM OF PUPE TISH THERMAL UNIT (PER HOUR) PACITY DLING COIL	MD MECH MER MIN MISC MOCP MTG NTG NC (NRL) N.C N.O.	MOTORIZED DAMPER MECHANICAL MECHANICAL EQUIPMENT ROOM MINIMUM MISCELLANEOUS MAXIMUM OVER CURRENT PROTECTION	APPROX B	
HANDLING UNIT BIENT CESS PANEL PROXIMATE SEPARATOR LER AKE HORSEPOWER ITOM OF DUCT ITOM OF DUCT ITOM OF PIPE TISH THERMAL UNIT (PER HOUR) PACITY DLING COIL	MER MIN MISC MOCP MTG N (NRL) N.C N.C N.O. NC	MECHANICAL EQUIPMENT ROOM MINIMUM MISCELLANEOUS MAXIMUM OVER CURRENT PROTECTION		
CESS PANEL PROXIMATE SEPARATOR LER AKE HORSEPOWER ITOM OF DUCT ITOM OF PIPE TISH THERMAL UNIT (PER HOUR) PACITY DLING COIL	MISC MOCP MTG N (NRL) N.C N.O. NC	MINIMUM MISCELLANEOUS MAXIMUM OVER CURRENT PROTECTION		
PROXIMATE SEPARATOR LER AKE HORSEPOWER TTOM OF DUCT TTOM OF PIPE TISH THERMAL UNIT (PER HOUR) PACITY DLING COIL	MOCP MTG N (NRL) N.C N.O. NC	MAXIMUM OVER CURRENT PROTECTION	BFP	BACKFLOW PREVENTOR (TYPE AS INDICATED)
LER AKE HORSEPOWER ITOM OF DUCT ITOM OF PIPE TISH THERMAL UNIT (PER HOUR) PACITY DLING COIL	N (NRL) N.C N.O. NC	MOUNTING	BFV BHP	BUTTERFLY VALVE BRAKE HORSEPOWER
AKE HORSEPOWER ITOM OF DUCT ITOM OF PIPE TISH THERMAL UNIT (PER HOUR) PACITY DLING COIL	(NRL) N.C N.O. NC		BLV	BALANCING VALVE
TTOM OF DUCT TTOM OF PIPE TISH THERMAL UNIT (PER HOUR) PACITY DLING COIL	N.O. NC	NEW LOCATION OF RELOCATED MATERIAL OR EQUIPMENT	BTU/H BV	BRITISH THERMAL UNIT PER HOUR BALL VALVE
TTOM OF PIPE TISH THERMAL UNIT (PER HOUR) PACITY DLING COIL	NC	NORMALLY CLOSED NORMALLY OPEN		
PACITY DLING COIL	110	NOISE CRITERIA	C CA	UTILITY COMPRESSED AIR (PRESSURE AS
DLING COIL	NIC NO.	NOT IN CONTRACT NUMBER	САР	INDICATED) CAPACITY
	NOM	NOMINAL	CFM	CUBIC FEET PER MINUTE
LD DUCT	NPLV NPSH	NON STANDARD PART LOAD VALUE NET POSITIVE SUCTION HEAD	CI CO	CAST IRON CLEANOUT
	NTS	NOT TO SCALE	COMP	COMPRESSOR
BIC FEET PER MINUTE	O OA	OUTSIDE AIR	COND CONT	CONDENSATE CONTINUATION
ST IRON MPRESSOR	OAD OD	OUTSIDE AIR DAMPER OUTSIDE DIAMETER	CV	CHECK VALVE DOMESTIC COLD WATER
NDENSATE	OPR	OPERATING	CVV	DOMESTIC COLD WATER
NTINUATION NDENSATE PUMP	OV P	OUTLET VELOCITY	D	DRINKING FOUNTAIN
AN STEAM	P	PUMP	DIA	DIAMETER
DLING TOWER BINET UNIT HEATER			DN DOM	DOWN DOMESTIC
NSTANT VOLUME/CONTROL VALVE	PG	PROPYLENE GLYCOL WATER SOLUTION	DWG	DRAWING
.D WATER				DOMESTIC WATER HEATER DRINKING WATER RETURN
P & TRAP	PRV	PRESSURE REGULATING VALVE	DWS	DRINKING WATER SUPPLY
CIBELS CIBELS (A-WEIGHTED SCALE)	PSI PSIG	POUNDS PER SQUARE INCH POUNDS PER SQUARE INCH - GAUGE	E	
BULB TEMPERATURE °F	Q		(E)	EXISTING MATERIAL OR EQUIPMENT
METER	R		EA ECO	EACH EXTERIOR CLEANOUT
WN FERENTIAL PRESSURE	(RL) RA	RELOCATED MATERIAL OR EQUIPMENT RETURN/RELIEF AIR	EEW	EMERGENCY EYE WASH
FERENTIAL PRESSURE SENSOR	RC	ROOF CONDUCTOR	EFW	EFFICIENCY EMERGENCY FACE WASH
V POINT TEMPERATURE °F AWING	RE RET	REFERENCE RETURN	EL FQ	ELEVATION EQUIVALENT
ECT EXPANSION	RF	RETURN FAN	ESH	EMERGENCY SHOWER
STING	RH RHC	RELATIVE HUMIDITY REHEAT COIL	ET EWC	EXPANSION TANK ELECTRIC WATER COOLER
CH/EXHAUST AIR	RLA	RUNNING LOAD AMPS	EWT	ENTERING WATER TEMPERATURE
ERING AIR TEMPERATURE ERGY EFFICIENCY RATIO	RPM RTU	REVOLUTIONS PER MINUTE ROOFTOP UNIT	EXP EXT	EXPANSION EXTERNAL
IAUST FAN	S			
ICIENCY IYLENE GLYCOL WATER SOLUTION	SA	SUPPLY AIR SHOCK ABSORBER	F	DEGREES FAHRENHEIT
	SA		FCO	FLOOR CLEANOUT
ERING	SCFM	STANDARD CUBIC FEET PER MINUTE	FL	FLOOR DRAIN FLOOR
		SMOKE DAMPER/SMOKE DETECTOR	FPM	FEET PER MINUTE FEET PER SECOND
ERNAL STATIC PRESSURE	SEER	SEASONAL ENERGY EFFICIENCY RATIO	FS	FLOOR SINK
ANSION TANK IAUST VALVE	SENS SF			FEET OR FOOT FOOTER DRAINAGE
CTRIC WATER COOLER	SG	SPECIFIC GRAVITY		
HAUST	SP	SOUND LINING STATIC PRESSUR (INCHES OF WATER)	G	NATURAL GAS (PRESSURE AS INDICATED)
PANSION	SPD		GAL	GALLON GAS COCK
	SPS	STATIC PRESSURE SENSOR	GPD	GALLONS PER DAY
IRENHEIT I COIL UNIT	SS STM	STAINLESS STEEL STEAM		GALLONS PER HOUR GALLONS PER MINUTE
E DAMPER	SV	SUPPLY VALVE	GV	GATE VALVE
/IE HOOD LL LOAD AMPERES	T T	TEMPERATURE	GW	GREASE WASTE
XIBLE CONNECTION	TAB	TESTING, ADJUSTING AND BALANCING	н	
W METER	TOD	TOILET EXHAUST FAN TOP OF DUCT		HOSE BIBB MERCURY
	TOP		HGT	HEIGHT
E & SMOKE DAMPER	TYP	TYPICAL	HP	HORSE POWER HIGH PRESSURE STEAM
T OF FOOT	U		HR HW/	HOUR DOMESTIC HOT WATER
	UON	UNLESS OTHERWISE NOTED	HWR	DOMESTIC HOT WATER RETURN
COL LONS	V V	VOLTAGE/VENT		
LONS PER HOUR	VAC	VACUUM	ID	INSIDE DIAMETER
AINS	VAV	VARIABLE AIR VOLUME VELOCITY		INVERT ELEVATION INCHES
CUT	VFD			
SE BIBB	VTR	VENT THRU ROOF	K kW	KILOWATTS
ATING COIL F DUCT	WW	WATTS/WIDTH		
RCURY	W/	WITH	LAV	LAVATORY
3 OUTLET RSE POWER	W/O WB	WITHOUT WET BULB TEMPERATURE	LGT LPG	LENGTH LIQUID PETROLEUM GAS
JR	WG	WATER GAUGE	LPS	LOW PRESSURE STEAM
MIDIFEIR RTZ	WIMS	WIRE WEST SUREEN	LWT	LEAVING WATER TEMPERATURE
IDE DIAMETER			M MAX	MAXIMUM
ERT ELEVATION			MBH	1000 BTU/HR
EGRAL FACE AND BY-PASS HES			MCA MIN	MINIMUM CURRENT AMPACITY MINIMUM
EGRATED PART LOAD VALUE			MISC	MISCELLANEOUS
DWATTS			MOCP MPS	MINIMUM OVER CURRENT PROTECTION MEDIUM PRESSURE STEAM
DWATT HOURS			MTG	MOUNTING
IGTH			N	
VING AIR TEMPERATURE JNDS			NA	NOT APPLICABLE
JNDS PER HOUR			NIC	NORMALLY CLOSED NOT IN CONTRACT
EXHAUST FAN			NO NOM	NORMALLY OPEN/ NUMBER NOMINAL
			NTS	NOT TO SCALE
A VECAVE ROOVER AND ENERGY AND	DENSATE ITINUATION DENSATE PUMP AN STEAM AN STEAM AN STEAM AN STEAM AN STEAM STOWER AN STEAM VOUME/CONTROL VALVE DIVATER STANT VOUME/CONTROL VALVE DUATER PAP BELS SUBSTANT VOUME/CONTROL VALVE DUATER PAP BELS BUB TEMPERATURE 'F COT DIGITAL PRESSURE SENSOR /POINT TEMPERATURE 'F COT EXPANSION COL EXPANSION STING HEXTAL PRESSURE SENSOR /POINT TEMPERATURE 'F COL EXPANSION STING THING AN TEMPERATURE SOLUTION AUST FAN COLENCY YLENE GLYCOL WATER SOLUTION AUST FAN COL UNATER COLER ERING WATER TEMPERATURE ERING WATER ERING WATER TEMPERATURE ERING WATER ERING WATER TEMPERATURE ERING WATER ERING WATER TEMPERATURE ERING WATER ERING WATER TEMPERATURE ERING WATER ERING WAT	DENSATEOPRDENSATE PUMPPAN STEAMPOLING TOWERPOUNSTEAMPOUNSTEAMPODATERPODATERPODATERPODATERPODATERPODATERPODATERPODATERPODATERPODATERPODATERPODATERPODELIS ENPERATURE *FPODELIS ENPERATURE *FREDILIS TEMPERATURE *FREPOINT TEMPERATURE *FREWINGRCPOINT TEMPERATURE *FREWINGRHCERING AR TEMPERATURE *FREWINGRHCERING AR TEMPERATURERHRENCE ENDORSASTINGSACIENCYSAYLENE CLYCOL WATER SOLUTIONSAVIALENTSDCRY PECOVERY UNITSDERING ANTER SOLUTIONSAVIALENTSDRENCESFRRENCESGERING WATER COOLERSGERING WATER COOLERSSCOLULUTITSDRENCESPDERING WATER COOLERSSCOLULUTITSDRENCESSCOLULUTITSSCOLULUTITSSCOLULUTITSSCOLULUTITSSCOLULUTITSNCOLULUTITVICCOLULUTVIC <td< td=""><td>DEFENSATEOPFOPFAINSDEFENSATEPDEFENSATEPDATESPNETAMPCPAINSDATESPCISION FORDIPATION NATESDATESPCISION FORDIPATION NATESDATESPCISION FORDIPATION NATESDATESPCISION FORDIPATION NATESDATESPCISION FORDIPATION NATESDATESPCISION FORDIPATION NATESDATESPCISION FORDIANCE SALAPDATESPCISION FORDIANCE SALAPDATESPCISION FORDIANCE SALAPDELS SAMENTESPCINIS PERSON FORDIANCE NATESDELS SAMENTESPCINIS PERSON FORDIANCE NATESNATESPCINIS PERSON FORDIANCE NATESPERSON FORDIANCE NATESPCINIS PERSON FORDIANCE NATESNATESPCINIS PERSON FORDIANCE NATESPERSON FORDIANCE NATESPCINIS PERSON FORDIANCE NATESPERSON FORDIANCE NATES<!--</td--><td>DBBARE DBBARE</td></td></td<>	DEFENSATEOPFOPFAINSDEFENSATEPDEFENSATEPDATESPNETAMPCPAINSDATESPCISION FORDIPATION NATESDATESPCISION FORDIPATION NATESDATESPCISION FORDIPATION NATESDATESPCISION FORDIPATION NATESDATESPCISION FORDIPATION NATESDATESPCISION FORDIPATION NATESDATESPCISION FORDIANCE SALAPDATESPCISION FORDIANCE SALAPDATESPCISION FORDIANCE SALAPDELS SAMENTESPCINIS PERSON FORDIANCE NATESDELS SAMENTESPCINIS PERSON FORDIANCE NATESNATESPCINIS PERSON FORDIANCE NATESPERSON FORDIANCE NATESPCINIS PERSON FORDIANCE NATESNATESPCINIS PERSON FORDIANCE NATESPERSON FORDIANCE NATESPCINIS PERSON FORDIANCE NATESPERSON FORDIANCE NATES </td <td>DBBARE DBBARE</td>	DBBARE DBBARE

IG ABBREVIATIONS

MECHANICAL DUCTWORK AND PIPING LEGEND

ACT	O OD	OUTSIDE DIAMETER
ACT		
ACT	OD	
	00	
	OD	OVERFLOW ROOF DRAIN
	OFCI	OWNER FURNISHED CONTRACTOR INSTALLED
NC	OFL	OVERFLOW
	OFOI	OWNER FURNISHED OWNER INSTALLED
S INSTITUTE	OSD	OPEN SITE DRAIN
	Р	
	Р	PUMP
	PC	PUMPED CONDENSATE
S INDICATED)	PD	PUMPED DISCHARGE (TYPE AS INDICATED)
•	PDI	PLUMBING DRAINAGE INSTITUTE
	PH	PHASE (ELECTRICAL)
	PPM	PARTS PER MILLION
R	PRESS	PRESSURE
	PRV	PRESSURE REDUCING VALVE
	PSI	POUNDS PER SQUARE INCH
	PSIG	POUNDS PER SQUARE INCH - GAUGE
	PV	PLUG VALVE
SURE AS		
	PW	PROCESS WATER
	R	
	RD	ROOF DRAIN
	REF	REFERENCE
	RL	RELOCATED MATERIAL OR EQUIPMENT
	RPM	REVOLUTIONS PER MINUTE
	RV	PRESSURE RELIEF VALVE
	0	
	S	
	SAN	SANITARY OR WASTE
	SCFM	STANDARD CUBIC FEET PER MINUTE
	SCW	SOFTENED COLD WATER
	SE	SEWAGE EJECTOR
	SG	SPECIFIC GRAVITY
	SP	SUMP PUMP
	SPEC	SPECIFICATION
	SQ. FT.	SQUARE FEET
	SS	STAINLESS STEEL
	SSD	SUB-SOIL DRAINAGE
	ST	STORM (RAINWATER)
	STD	STANDARD
INT	STM	STEAM
	SV	SOLENOID VALVE
	_	
	T	
	TEMP	TEMPERATURE
	TP	TRAP PRIMER
	TPU	TRAP PRIMER UNIT
	TPV	TEMPERATURE AND PRESSURE RELIEF VALVE
	TW	TEMPERED WATER
	TYP	TYPICAL
-	U	
_	UON	UNLESS OTHERWISE NOTED
	UUN	UNLESS OTTERWISE NOTED
	V	
	V	VOLTAGE/VENT
	VAC	VACUUM
	VEL	VELOCITY
	VTR	VENT THRU ROOF
	W	
	W/	WITH
	W/O	WITHOUT
	WC	WATER CLOSET
	WCO	WATER CLOSET
	WCO	WALL CLEAN OUT
	WCO WG	WALL CLEAN OUT WATER GAUGE
	WCO	WALL CLEAN OUT

YD YARD

Y

_____ SA _____

SUPPLY AIR **RETURN AIR** TOILET EXHAUST

CHECK VALVE CHECK VALVE 2-WAY PNEUMATIC CONTROL VALVE 3-WAY PNEUMATIC CONTROL VALVE 2-WAY ELECTRIC CONTROL VALVE 3-WAY ELECTRIC CONTROL VALVE SOLENOID VALVE AUTOMATIC FLOW CONTROL VALVE PLUG VALVE (ISOLATION OR THROTTLING) ELEF ACTUATING TYPE DIFFERENTIAL		ISOLATION VALVE	T
Image: Check Valve 2:Way PNEUMATIC CONTROL VALVE () Image: Control Valve 3:Way PNEUMATIC CONTROL VALVE () Image: Control Valve 1 1	` X [THROTTLING VALVE	T
2-WAY PNEUMATIC CONTROL VALVE () 3-WAY PNEUMATIC CONTROL VALVE () M 2-WAY ELECTRIC CONTROL VALVE M 2-WAY ELECTRIC CONTROL VALVE M 3-WAY ELECTRIC CONTROL VALVE M 3-WAY ELECTRIC CONTROL VALVE M 3-WAY ELECTRIC CONTROL VALVE SOLENOID VALVE 1 AUTOMATIC FLOW CONTROL VALVE 1 VALVE (ISOLATION OR THROTTLING) 5 SELF ACTUATING TYPE DIFFERENTIAL PRESSURE CONTROL VALVE (IPCV) PRESSURE REGULATING VALVE, FLANGED 1 PRESSURE REGULATING VALVE, FLANGED 1 PRESSURE REGULATING VALVE, THREADED 1 PRESSURE REDUCING VALVE 1 PRESSURE REQUERT REDUCING VALVE 1 PRESSURE REQUERT REDUCING VALVE 1 PRESSURE C		ANGLE VALVE	02
3-WAY PNEUMATIC CONTROL VALVE M 2-WAY ELECTRIC CONTROL VALVE M 3-WAY ELECTRIC CONTROL VALVE SoleNoid VALVE AUTOMATIC FLOW CONTROL VALVE Image: SoleNoid VALVE (SOLATION OR THROTTLING) Image: SoleNoid VALVE (SOLATION OR THROTTLING) Image: SoleNoid VALVE (SOLATION OR THREADED Image: SoleNoid VALVE (SOLATING VALVE, FLANGED Image: SoleNet Regulating VALVE, FLANGED Image: SoleNet Regulating VALVE, THREADED Image: SoleNet Regulating VALVE		CHECK VALVE	
2-WAY ELECTRIC CONTROL VALVE 3-WAY ELECTRIC CONTROL VALVE SOLENOID VALVE SOLENOID VALVE AUTOMATIC FLOW CONTROL VALVE PLUG VALVE (ISOLATION OR THROTTLING) SELF ACTUATING TYPE DIFFERENTIAL PRESSURE CONTROL VALVE (IPCV) AUTOMATIC DPCV PRESSURE REGULATING VALVE, FLANGED PRESSURE REGULATING VALVE, THREADED PRESSURE REGULATING VALVE SAFETY RELIEF VALVE PRESSURE CONNECTION PRESSURE CONNECTION PREDUCER - ECCENTRIC PREDUCER - CONCENTRIC <t< td=""><td></td><td>2-WAY PNEUMATIC CONTROL VALVE</td><td>Н</td></t<>		2-WAY PNEUMATIC CONTROL VALVE	Н
2-WAY ELECTRIC CONTROL VALVE 3-WAY ELECTRIC CONTROL VALVE 1-WAY		3-WAY PNEUMATIC CONTROL VALVE	
3-WAY ELECTRIC CONTROL VALVE SOLENOID VALVE AUTOMATIC FLOW CONTROL VALVE INDICATES RECTANGULAR DUCT WITH		2-WAY ELECTRIC CONTROL VALVE	FS
SOLENOID VALVE AUTOMATIC FLOW CONTROL VALVE Image: Sole of the second s		3-WAY ELECTRIC CONTROL VALVE	SP
Image: Plug valve (isolation or throttling) Image: Plug valve (isolation or throttling) Image: Plug valve control valve (DPCV) Image: Plug valve control valve (D	<u>s</u> ————————————————————————————————————	SOLENOID VALVE	HC
SELF ACTUATING TYPE DIFFERENTIAL ++++ PRESSURE CONTROL VALVE (DPCV) ++++ AUTOMATIC DPCV		AUTOMATIC FLOW CONTROL VALVE	ST
PRESSURE CONTROL VALVE (DPCV) IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII		PLUG VALVE (ISOLATION OR THROTTLING)	Ø
AUTOMATIC DPCV Image: Constraint of the second	<u>—</u>		-++++++
Image: Pressure regulating valve, threaded Image: Pressure reducing valve Image: Pressering valve			
PRESSURE REDUCING VALVE FLOW INDICATING BALANCE VALVE Image: Safety Relief Valve Im		PRESSURE REGULATING VALVE, FLANGED	
Image: Second state of the second s	—Ā—	PRESSURE REGULATING VALVE, THREADED	M
SAFETY RELIEF VALVE		PRESSURE REDUCING VALVE	
S AIR SEPARATOR S BASKET STRAINER H STRAINER H MECHANICAL EXPANSION JOINT Image: Strain Expansion of the strain Expansion Expansion of the strain Expansion of the strain Expansion of the strain Expansion Expansin Expansin Expansion Expansin Expansion Expansion Exp		FLOW INDICATING BALANCE VALVE	
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$\begin{array}{c c} & & & & & & \\ \hline & & & & \\ \hline & & & & \\ \hline & & & &$		ORIFICE PLATE	
$\begin{array}{c c} & & & & & \\ \hline & & & & \\ \hline & & & & \\ \hline \\ \hline$		REDUCER - CONCENTRIC	
18x6 18x6	<u> </u>	REDUCER - ECCENTRIC	ı
INCHES DEEP. SIZE PERTAINS TO		PIPE UNION	
INCHES DEEP. SIZE PERTAINS TO			
		INCHES DEEP. SIZE PERI	TAINS TO THE
	18x6~		

ENDS AND EQUIPMENT SCHEDULES FOR ADDITIONAL ATIONS, SYMBOLS, AND LEGENDS SHOWN ON THIS ARILY USED.

MECHANICAL GENERAL NOTES
 THESE GENERAL NOTES APPLY TO ALL MP SERIES DRAWINGS FIELD VERIEY ALL EXISTING CONDITIONS BEFORE BIDDING OF A PROJECT. BRING TO THE ATTENTION OF THE ARCHITECT/ENGINEER ANY INFORMATION CONFLICTS WITHIN THE SPECIFICATIONS AND DRAWIN THE CONTRACTOR(S) SHALL NOT FROCED WITH ANY WORK, EXCEPT AT ITS OWN RISK, NUTL ALL CONFLICTS ARE RESOLVED AND THE CLARIFYING INFORMATION IS ISSUED TO THE CONTRACTOR(S) BY THE ARCHITECT/ENGINEER. ALL SPECIFICIONS AND DRAWING IC G ARCHITACTURAL, STRUCTURAL, CIVIL, MECHANICAL, ELECTRICAL, PLUMBING AND FIRE PROTECTION, MUST BE USED TO OBTAIN ALL CONSTRUCTION INFORMATION. VERIEY ALL EDIJMEMENT CONNECTIONS WITH MANUFACTURERS CERTIFIED DRAWINGS, FIELD VERIEY ALL DIMENSIONS BEFORE FABRICATION OF WORK, PROVIDE TRANSITIONS AND MAKE FINAL CONNECTION EDIUMPMENT UNLESS OTHERWISE INDICATED COORDINATE WITH ELECTRICAL CONTRACTOR FOR ALL EQUIPMENT SHOWN IN MECHANICAL DRAWINGS TO BE PROVIDED ELECTRICAL CONNECTIONS ACCORDING TO MANUFACTURERS RECOMMENDATIONS. COORDINATE EXACT LOCATION OF DIFFUSERS, GRILLES AND REGISTERS WITH THE CELLING TYPES. PROVIDE FRAME TYPE THAT MATCHES CELING CONFIGURATION. PROVIDE OFFSETS AND TRANSITIONS IN DUCTWORK AND PIPING AS REQUIRED TO AVOID INTERFREENCE AT NO ADDITIONAL COST TO THE OWNER. DUCT CORSTRUCTION SHALL COMPLY WITH THE LATES WITH THE CELLING TYPES. PROVIDE FRAME TYPE THAT MATCHES CELING CONFIGURATION. PROVIDE OFFSTEST AND TRANSITIONS IN DUCTWORK AND PIPING AS REQUIRED TO AVOID INTERFREENCE AT NO ADDITIONAL COST TO THE OWNER. DUCT CONSTRUCTION SHALL COMPLY WITH THE LATES ONT REXTLE DUCTWORK MAND PIPING AS REQUIRED TO AVOID INTERFREENCE AT NO ADDITIONAL COST TO THE OWNER. PROVIDE OFFSTERS AND TRANSITIONS IN DUCTWORK AND PIPING AS REQUIRED TO AVOID INTERFREENCE AT NO ADDITIONAL COST TO THE OWNER. DUCT CONSTRUCTION SHALL COMPLY WITH THE LATES ONT REVISICING CONNECTIONS. PROVIDE CONCENTRATE DUCTWORK ADA DEGREE TAPS FO
PLUMBING GENERAL NOTES
 OBTAIN COMPLETE CONSTRUCTION DOCUMENTS WHICH INCLUDE BUT ARE NOT LIMITED TO ARCHITECTURAL, STRUCTURAL, MECHANICAL, PLUMBING, ELECTRICAL, AND FIRE PROTECTION DRAWINGS. ALSO OBTAIN A COMPLETE SET OF SPECIFICATIONS. DURING THE COORDINATION PROCESS BRING TO THE ATTENTION OF THE ARCHITECT AND ENGINEER(S) ANY CONFLICTS. THE CONTRACTOR SHALL NOT PROCEED WITH ANY INSTALLATION EXCEPT AT HIS O RISK UNTIL ALL CONFLICTS ARE RESOLVED AND THE CLARIFVING INFORMATION ISSUED TO THE CONTRACTOR BY THE ARCHITECT. THE CONTRACTOR SHALL VERIFY AND COORDINATE THE LOCATION OF ALL STRUCTURAL MEMBERS FOR CONFLICTS WITH PIPING. THE CONTRACTOR SHALL NOTIFY THE ARCHITECT IMMEDIATELY IF A CONFI IS DETERMINED. PROVIDE CLEANOUTS WHERE INDICATED ON DRAWINGS AND WHERE REQUIRED BY THE APPLICABLE CODES. FIRE STOP ALL OPENINGS IN COMPLIANCE WITH THE UL. LISTING OF THE METHOD USED TO MAINTAIN THE APPROPRIATE FIRE RATING AS REQUIRED BY CODE. COORDINATE ALL PIPING INSTALLED WITH ALL OTHER TRADES (I.E. STRUCTURAL, MECHANICAL, AND FIRE PROTECTION) TO ENSURE THAT ALL SYSTEMS ARE INSTALLED ABOVE THE CEILING OR A CONCEALED LOCATION. ALL CEILING HEIGHTS ARE INDICATED ON THE ARCHITECTURAL AND/OR INTERIOR DESIGN DRAWINGS. MAINTAIN MINIMUM CLEARANCES REQUIRED BY THE APPLICABLE CODES THROUGHOUT OUT THE BUILDING. PROVIDE TAPA PRIMERS AND DISTRIBUTION UNITS OR A MECHANICAL ALTERNATIVE I.E. TRAP GAURD AS INDICATED ON DRAWINGS. INSTALL DISTRIBUTION UNITS LEVEL AND LOCATED IN AN ACCESSIBLE AN PROTECTED LOCATION. PROVIDE TAPA PRIMERS AND DISTRIBUTION UNITS OR A MECHANICAL ALTERNATIVE I.E. TRAP GAURD AS INDICATED ON DRAWINGS. INSTALL DISTRIBUTION UNITS LEVEL AND LOCATED IN AN ACCESSIBLE AN PROTECTED LOCATION. PROVIDE TAPA PRIMMERS ARRESTORS WHERE OUICK CLOSING VALVES ARE UTILIZED LOCATE ARRESTORS PER MANUFACTURER'S INSTRUCTIONS. ARRESTOR SHALL BE ACCESSIBLE. INSULATE ALL DRAINAGE AND WATER PIPING INCOMPLIANCE WITH ANSI 117.1, LOCAL CODES AN

MECHANICAL SYMBOLS

				∇	
T	ROOM THERMOSTAT/SENSOR	\square	SUPPLY		COMBINATION FIRE & SMOKE DAMPER
TD	DUCT MOUNTED THERMOSTAT/SENSOR		RETURN AIR SYSTEMS		
CO2	CARBON DIOXIDE SENSOR		EXHAUST		RFI SHIELD DAMPER
H	HUMIDITY SENSOR/HUMIDISTAT		SIDE WALL SUPPLY DIFFUSER		SECURITY BARS
FS	FLOW SWITCH		SIDE WALL RETURN or EXHAUST GRILLE/REGISTER		DIRECTION OF FLOW
SP	STATIC PRESSURE SENSOR		MATERIAL OR EQUIPMENT EXISTING TO REMAIN		ACOUSTICALLY LINED DUCT
HC	HOSE CONNECTION			Q	
ST	STEAM TRAP		MATERIAL OR EQUIPMENT TO BE DEMOLISHED	; <u> </u>	HUMIDIFIER
X	TEST PORT (PRESSURE / TEMPERATURE)		RETURN OR EXHAUST AIRFLOW		
+++++++++++++++++++++++++++++++++++++++	FLEXIBLE DUCT OF SIZE AS SHOWN	Y			VERTICAL DUCT RISE
	FLEXIBLE DUCT CONNECTION		SUPPLY OR OUTSIDE AIRFLOW		
M	AUTOMATIC DAMPER (MOTORIZED)		POINT OF CONNECTION		
	VOLUME DAMPER (MANUAL)		POINT OF DISCONNECT		VERTICAL DUCT DROP
Y	FIRE DAMPER	\bigcirc	PUMP (RISER)		
\bigtriangledown			FAN (RISER)		DIRECTION OF FLOW
	SMOKE DAMPER	<u> </u>			DIRECTION OF PIPE PITCH
———————————————————————————————————————	ELBOW - TURNED UP/RISER CONNECTION	——————————————————————————————————————			REDUCED PRESSURE BACKFLOW
——Э	ELBOW - TURNED DOWN		ALIGNMENT GUIDE	\$	PREVENTER
	TEE OUTLET - DOWN	 	PRESSURE GAUGE WITH COCK	——————————————————————————————————————	MANUAL AIR VENT WITH VALVE
—0—	TEE OUTLET - UP	<u> </u>	THERMOMETER	<u> </u>	AUTOMATIC AIR VENT
—ე—	CONNECT OUT OF TOP	——C	QUICK COUPLING	X	FLOW METER
	DROP OR RISE]	CAP OR PLUG		
DUCT WITH DUCT S	SIZE 18 INCHES WIDE (IN PLANE OF DRAWING) AND 6 RUN OF DUCT UNLESS OTHERWISE NOTED.			G - CFM MMFNT FACE SIZE	

-(TAG)CFM

- TAG

#.# MBH #.# GPM

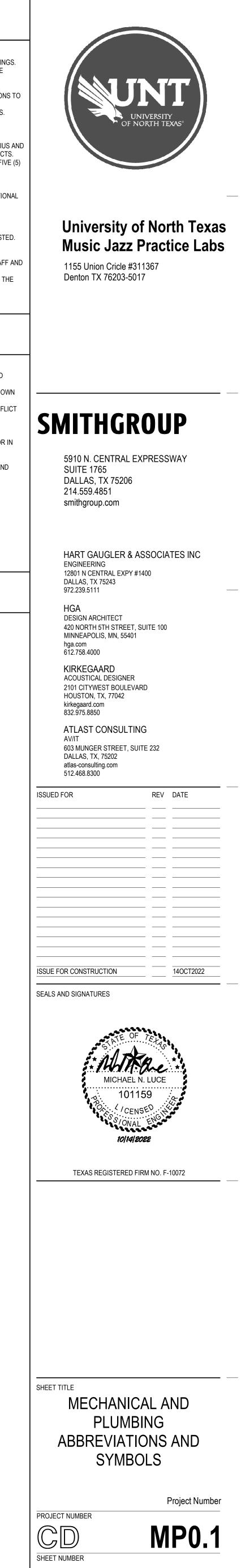
CFM

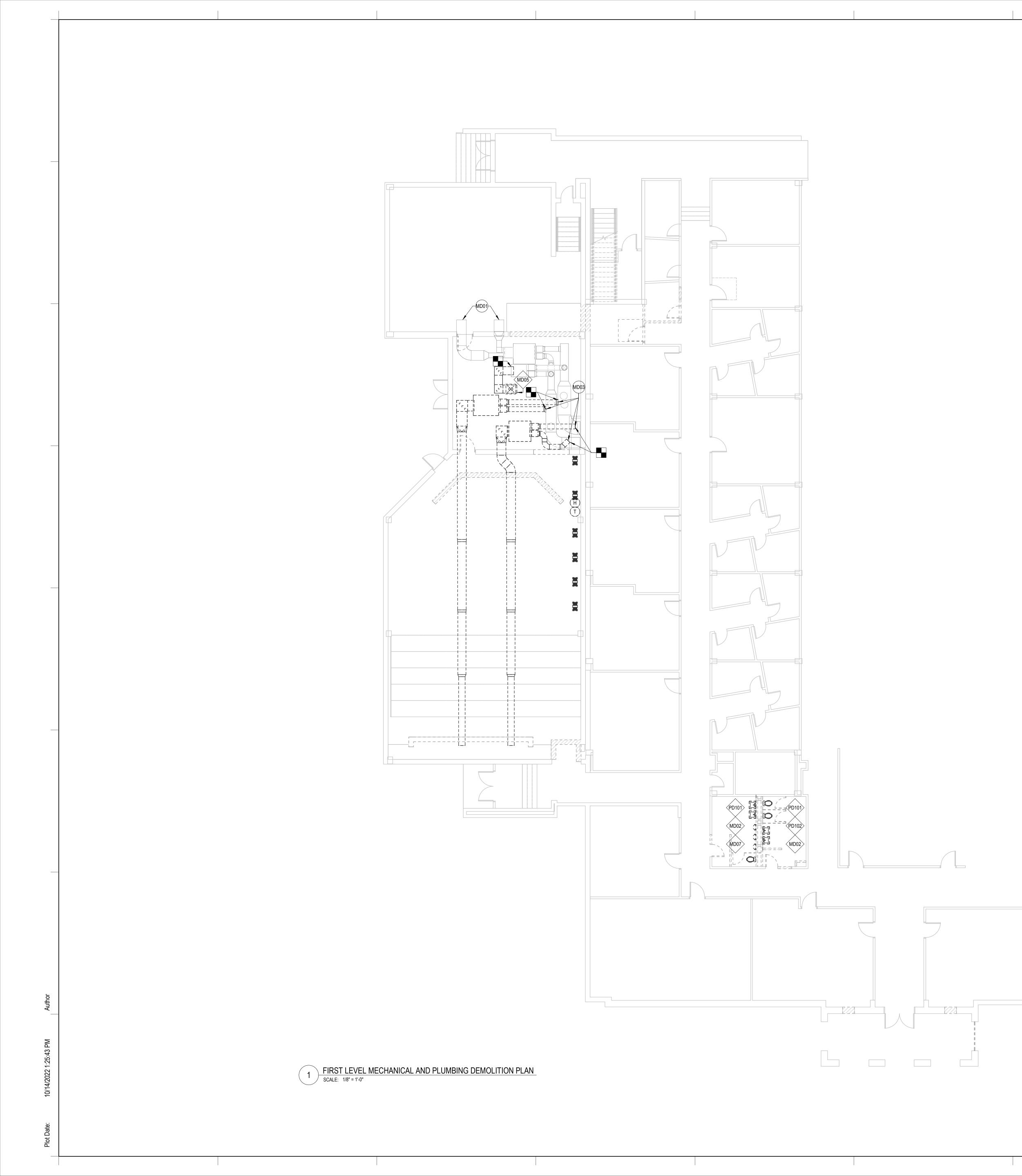
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 \square

T WITH DUCT SIZE 18 INCHES WIDE (IN PLANE OF DRAWING) AND 6 INCHES DEEP. SIZE PERTAINS TO THE ENTIRE RUN OF DUCT UNLESS OTHERWISE NOTED.

18Ø INDICATES ROUND DUCT WITH DUCT SIZE OF 18 INCHES IN DIAMETER. SIZE PERTAINS TO THE ENTIRE RUN OF DUCT (FROM DUCT ORIGIN AT TAP TO END OF DUCT) UNLESS OTHERWISE NOTED.





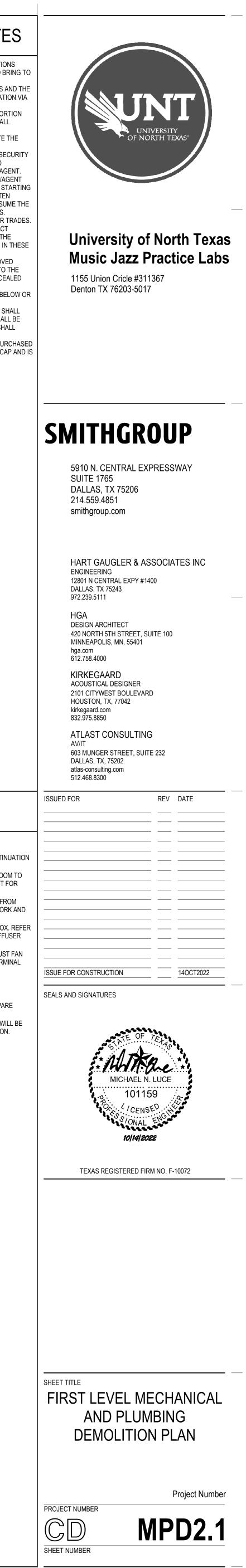
- THE CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS DURING THE CONTRACTOR'S PRE-BID SITE VISIT(S) AND BRING TO THE ATTENTION OF THE ARCHITECT/ENGINEER ANY DISCREPANCIES BETWEEN THE CONTRACT DOCUMENTS AND THE ACTUAL SITE CONDITIONS PRIOR TO BID FOR CLARIFICATION VIA
- PRE-BID RFI. THE REQUIRED DEMOLITION IS NOT LIMITED TO THAT PORTION INDICATED ON THE PLANS ALONE, BUT SHALL INCLUDE ALL NECESSARY WORK INDICATED ELSEWHERE IN THE SPECIFICATIONS WHICH ARE NECESSARY TO COMPLETE THE
- INTENT OF THE CONTRACT DOCUMENTS.
 THE CONTRACTOR SHALL NOT VIOLATE THE PHYSICAL SECURITY OF THE BUILDING DURING DEMOLITION OR ASSOCIATED OPERATIONS. COORDINATE DEMOLITION WITH OWNER/AGENT.
- THE CONTRACTOR SHALL SCHEDULE WITH THE OWNER/AGENT ANY INTERRUPTIONS OF EXISITNG UTILITIES. PRIOR TO STARTING WORK THE CONTRACTOR SHALL HAVE OBTAINED WRITTEN PERMISION TO PROCEED. THE CONTRACTOR SHALL ASSUME THE BUILDING IS OCCUPIED AND OPERATIONAL AT ALL TIMES.
 THE CONTRACTOR SHALL COORDINATE WITH ALL OTHER TRADES.
- IT IS UNDERSTOOD THAT WORK UNDER THESE CONTRACT DOCUMENTS MAY EXTEND PAST THE LIMITS OF WORK. THE OWNER SHALL BE NOTIFIED PRIOR TO WORK STARTING IN THESE AREAS AND PROVIDE A SCHEDULE.
 ALL FIXTURES AND EQUIPMENT INDICATED TO BE REMOVED
- SHALL HAVE ALL ASSOCIATED PIPING REMOVED BACK TO THE NEAREST BRANCH, MAIN, RISER AND CAPPED IN A CONCEALED LOCATION.
 8. "CONCEALED LOCATION" IS DEFINED AS BEING ABOVE, BELOW OR BEHIND A FINISHED PLANE.
- ALL FIXTURES, EQUIPMENT, PIPING AND APPURTANCES SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE REMOVED IN A TIMELY MANNER. THE SALVAGE VALUE SHALL APPEAR AS A CREDIT IN THE BID.
 ANY PIPE SHALL BE CAPPED USING A COMMERCIALLY PURCHASED CAP. A VALVE OR CRIMPING SHALL NOT CONSTITUTE A CAP AND IS

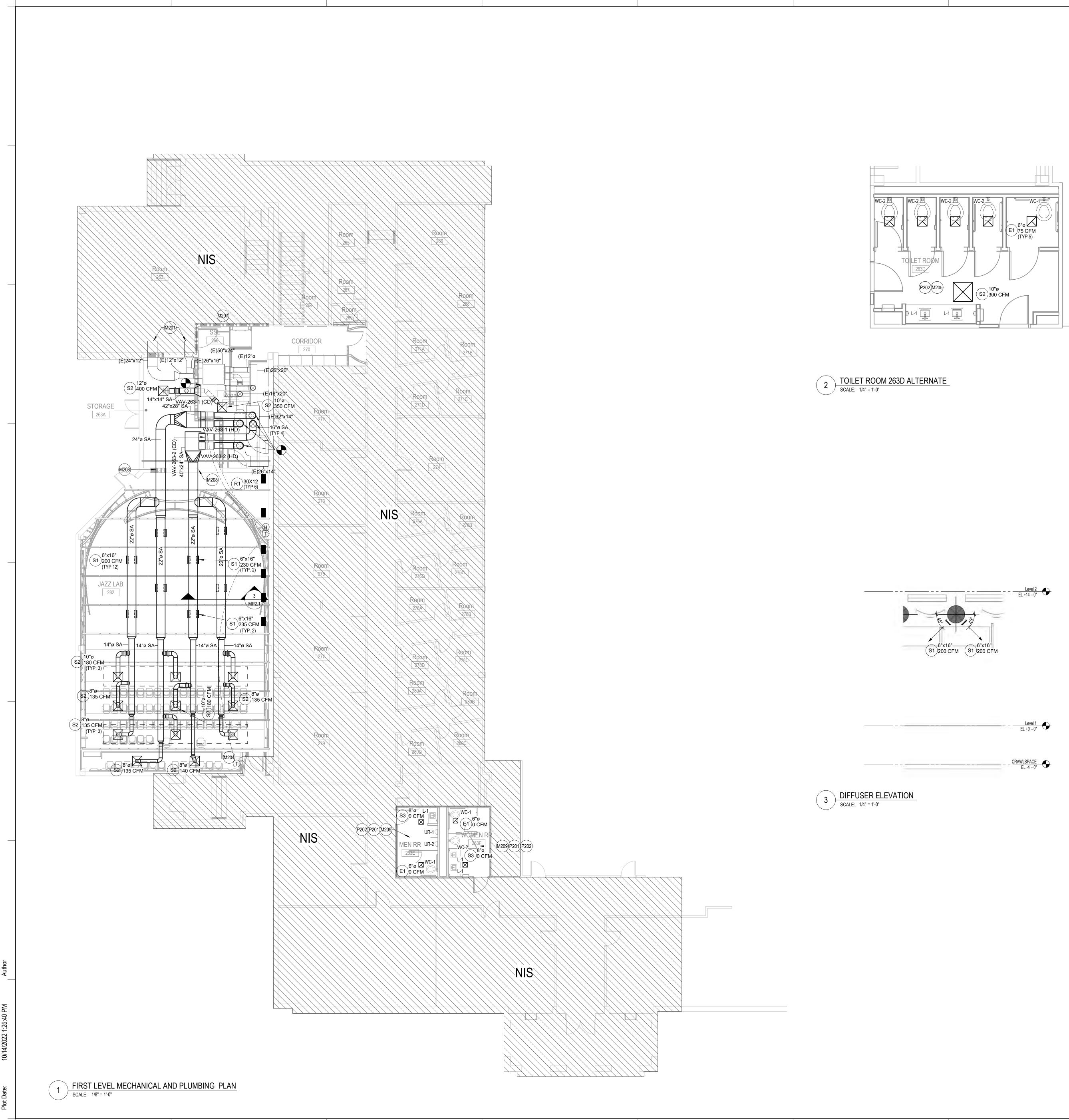
UNACCEPTABLE.

MECHANICAL DE	EMOLITION
MD01	SEE BASE BUILDING DRAWINGS FOR CONTIN AND MORE INFORMATION.
MD02	ALL DIFFUSERS AND GRILLES IN TOILET ROO BE DEMOLISHED. PREPARE EXISTING DUCT F NEW DIFFUSERS.
MD03	DISCONNECT TERMINAL BOX DUCTWORK FR DUCT MAIN. SEAL AND PATCH ALL DUCTWOR INSULATION.
MD05	DEMOLISH DUCTWORK BACK TO MIXING BOX TO M2.1 FOR NEW DUCT ROUTING AND DIFFU LOCATION.
MD07	PRIOR TO ANY DEMOLITION VERIFY EXHAUS CAPACITY, SUPPLY AIR CAPACITY AND TERM UNIT LOCATION.
	OLITION
PD101	DEMO ALL FIXTURES WITHIN SPACE. PREPAR

DEMO ALL FIXTURES WITHIN SPACE. PREPARE PIPING FOR NEW FIXTURES. IF ALTERNATE IS CHOSEN, PIPE ROUTING WILL BE REQUIRED PRIOR TO FIXTURE INSTALLATION.

PD102





- A. REFER TO COVER SHEET FOR MECHANICAL ABBREVIATIONS, SYMBOLS, AND GENERAL NOTES.
- CONTRACTOR TO FIELD VERIFY LOCATIONS OF DESIGN DUCTWORK. PROVIDE YOUNG REGULATOR BOWDEN CABLE CONTROL FOR
- DIFFUSERS/GRILLES PLACED IN GYPSUM CEILINGS OR OUT-OF-REACH AREAS TO REMOTELY BALANCE AIRFLOW. . ALL THERMOSTATS SHALL BE MOUNTED ON INSULATION WHEN ON
- AN EXTERIOR WALL. ALL GRILLES, DUCTS, AND FITTINGS TO BE PAINTED MATTE BLACK.
- SEE ARCHITECTURAL DRAWINGS FOR MORE INFORMATION. SUPPLY AND RETURN GRILLE SIZES TO MATCH DUCTWORK SIZES ACCORDING TO FLOOR PLAN.
- B. DUCTWORK SIZES AS SHOWN ON PLAN ARE INTERNAL DIMENSIONS.
- H. ALL DUCTWORK TO BE INTERNALLY LINED. REFER TO SPECIFICATION SECTION 233113 FOR DETAILS.

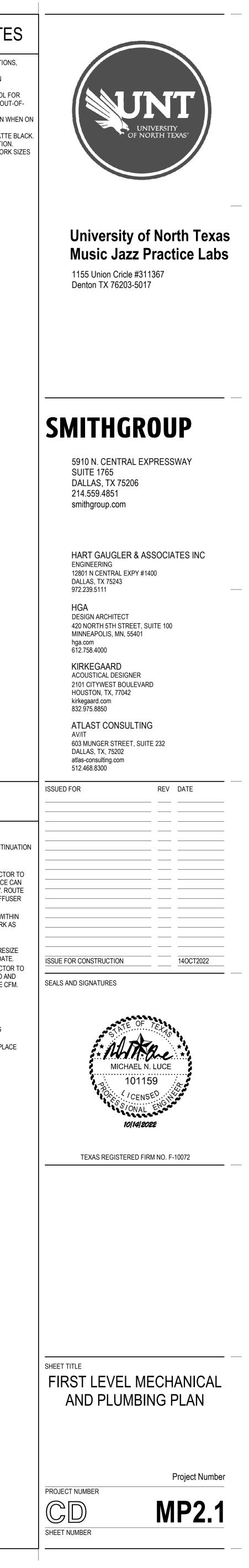
◯ SHEET KEYNOTES

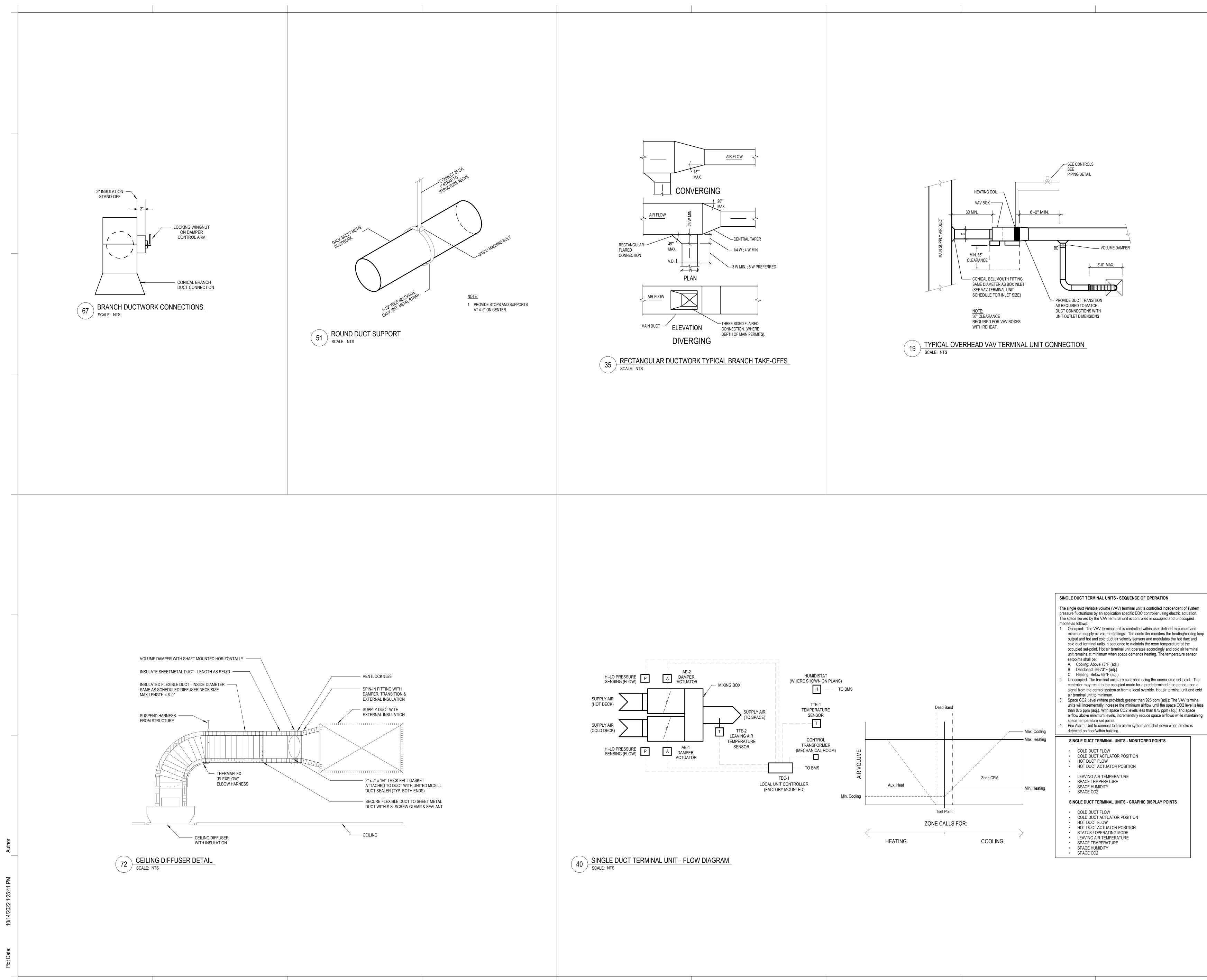
ECHANICAL NE	W WORK
//201	SEE BUILDING BASE DRAWINGS FOR CONTIN AND MORE INFORMATION.
//204	THERMOSTAT TO BE HIGH-LIMIT.
1205	ALTERNATE DIFFUSER LAYOUT. CONTRACTO VERIFY EXHAUST FAN SERVING THIS SPACE ACCOMMODATE THE DESIGNED AIRFLOW. RU DUCTWORK ACCORDINGLY BASED ON DIFFU LAYOUT.
//207	RETURN GRILLES TO BE RELOCATED TO WIT PRACTICE LAB SPACE. EXTEND DUCTWORK / NEEDED FOR NEW LOCATION.
/208	PROVIDE VIBRO-ACOUSTICS MODEL #24XCD-LV-F1X48 SOUND ATTENUATOR. RES EXISTING PENETRATIONS TO ACCOMMODAT
/209	REPLACE DIFFUSERS IN PLACE. CONTRACTO FIELD VERIFY AIR FLOWS PRIOR TO DEMO AI BALANCE NEW AIR DEVICES TO THE SAME C
LUMBING NEW \	NORK

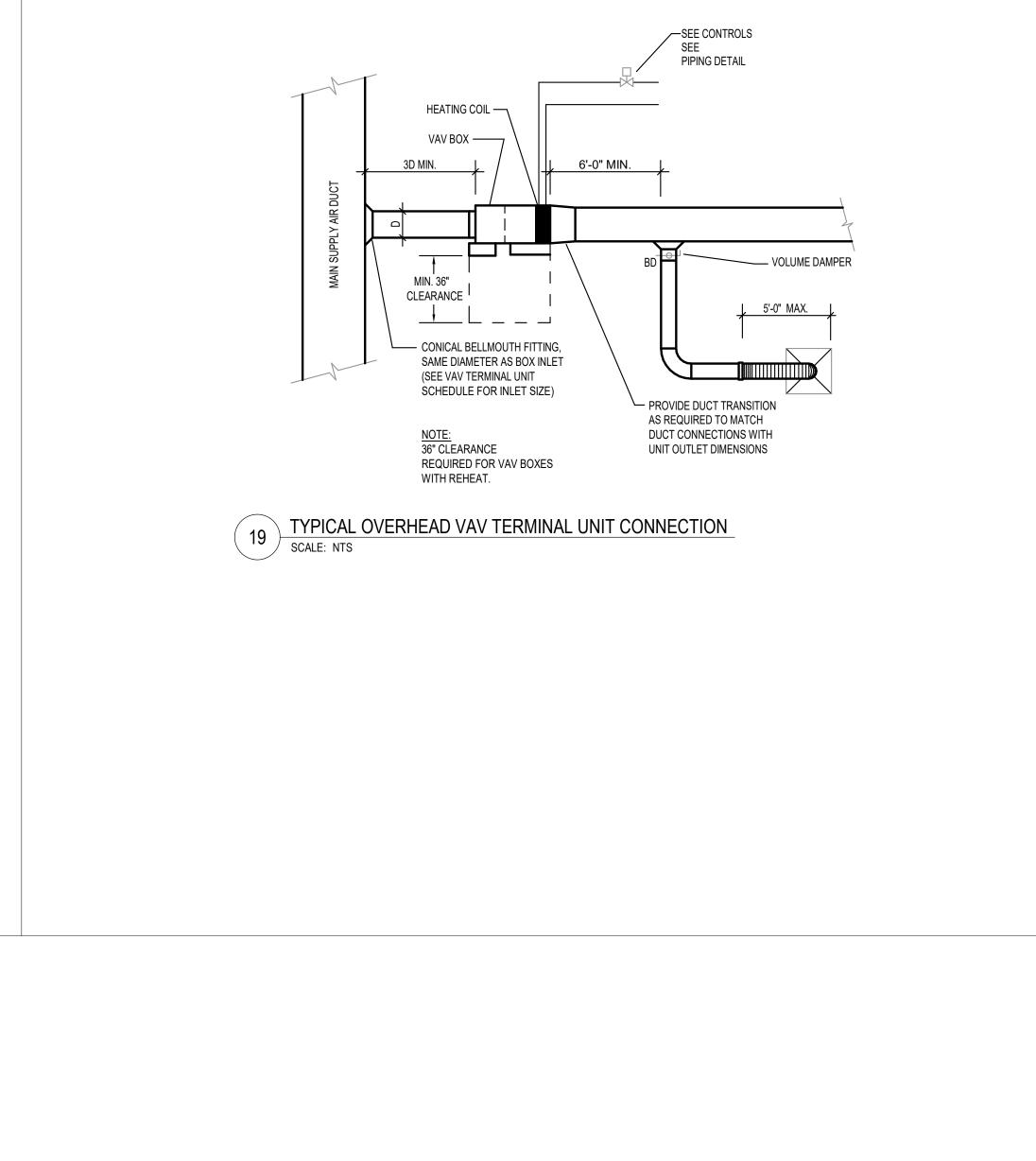
P201

P202

RECONNECT NEW FIXTURES TO EXISTING SANITARY, DOMESTIC, AND VENT. EXISTING FLOOR DRAINS TO REMAIN. REPLACE FLOOR DRAIN COVERS WITH NEW.









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TAG	FIXTURE	APPROVED		ROUG	6H-IN SIZE	Ξ	DESCRIPTION
IAO		MANUFACTURERS	WASTE	VENT	CW	HW	
WC-1	WATER CLOSET ADA COMPLIANT	KOHLER ELJER	4"	2"	1 1/4"	-	WATER CLOSET (ACCESSIBLE) - (WALL MOUNT, FLUSH VALVE). KOHLER KINGSTON K-4325 (WHITE) WATER CLOSET WITH EVERCLEAN, LOW CONSUMPTION 1.28 GPF, TOP SPUD, EXPOSED WATER CLOSET. MOUNT PER ADA/TAS REQUIREMENTS. SLOAN ROYAL 111-1.28 ESS-TMO WITH EL-154 WITH OVERRIDE BUTTON. BATTERY-OPERATED, SENSOR OPERATED FLUSHOMETER, CHROME PLATED, FAIL SAFE, HIGH BACK PRESSURE VACUUM BREAKER FLUSH CONNECTION WITH ONE-PIECE BOTTOM HEX COUPLING NUT, 1" I.P.S. SCREWDRIVER BACK-CHECK ANGLE STOP, FREE SPINNING, VANDAL RESISTANT STOP CAP, ADJUSTABLE TAILPIECE, SPUD COUPLING AND FLANGE FOR 1 1/2" TOP SPUD, APPROVED MANUFACTURERS ARE AMERICAN STANDARD AND ZURN. MOUNT CONTROL ON WIDE SIDE OF THE TOILET. CHURCH 5321.112 WHITE, OPEN FRONT SEAT LESS COVER AND SELF-SUSTAINING STAINLESS STEEL CHECK HINGES. APPROVED MANUFACTURERS ARE CHURCH, BENEKE AND OLSONITE. ADJUSTABLE CARRIERS, EQUIP WITH FLUSH VALVE SUPPORT FOR EXPOSED FLUSH VALVES. APPROVED MANUFACTURERS ARE JR SMITH, WADE AND JOSAM.
WC-2	WATER CLOSET ADA COMPLIANT	KOHLER ELJER	4"	2"	1 1/4"	-	SAME AS WC-1, EXCEPT MOUNT AT STANDARD HEIGHT.
UR-1	ADA URINAL	KOHLER ELJER	2"	2"	3/4"	-	URINAL (ACCESSIBLE) - (WALL MOUNTED FLUSH VALVE) KOHLER BARDON K-4991-ET WALL HUNG URINAL, VITREOUS CHINA, 3/4" TOP SPUD, WASHOUT, 0.125 GALLONS PER FLUSH. MOUNT PER ADA/TAS REQUIREMENTS. SLOAN 186-0.25-ESS-TMO WITH EL-154 WITH OVERRIDE BUTTON. BATTERY-OPERATED, SENSOR OPERATED FLUSHOMETER, CHROME PLATED, FAIL SAFE, HIGH BACK PRESSURE VACUUM BREAKER FLUSH CONNECTION WITH ONE-PIECE BOTTOM HEX COUPLING NUT, 3/4" I.P.S. SCREWDRIVER BACK-CHECK ANGLE STOP, FREE SPINNING, VANDAL RESISTANT STOP CAP, ADJUSTABLE TAILPIECE, SPUD COUPLING AND FLANGE FOR 3/4" TOP SPUD, APPROVED MANUFACTURERS ARE AMERICAN STANDARD AND ZURN. WADE W-451 CONCEALED CARRIER WITH BEARING PLATE WITH A FLUSH VALVE SUPPLY SUPPORT FOR EXPOSED FLUSH VALVE. APPROVED MANUFACTURERS ARE JR SMITH, WADE AND JOSAM.
UR-2	URINAL	KOHLER ELJER	2"	2"	3/4"	-	SAME AS UR-1, EXCEPT MOUNT AT STANDARD HEIGHT.
L-1	LAVATORY, UNDERMOUNT	AMERICAN STANDARD KOHLER ELJER	1 1/2"	1 1/2"	1/2"	1/2"	UNDERMOUNT, ACCESSIBLE, LAVATORY AMERICAN STANDARD "OVALYN" 0495.221, ADA COMPLIANT, WHITE VITREOUS CHINA, UNDERMOUNT, OVAL LAVATORY. FAUCET HOLES ON 8-INCH CENTERS AND EQUIPPED WITH INTEGRAL FRONT OVERFLOW PORT. COLOR AS SELECTED BY ARCHITECT. SLOAN ETF-700 WITH EL-154, BATTERY-OPERATED, DECK MOUNTED, WITH 4" TRIM PLATE, AUTOMATIC INFRARED SENSOR ACTIVATED FAUCET WITH GOOSENECK SPOUT, ANTI-SCALD THERMAL MIXING CHAMBER, 0.17 GPM FLOW RATE. FAUCET SHALL MEET THE REQUIREMENTS OF ADA, ANSI A117.1 AND THE STATE OF TEXAS ACCESSIBILITY STANDARDS (TAS). BY APPROVAL ONLY. MCGUIRE 155WC, ADA COMPLIANT, CHROME PLATED OFFSET LAVATORY TAILPIECE WITH HEAVY CAST BRASS GRID STRAINER DRAIN, HEAVY CAST BRASS ELBOW AND 1-1/4 INCH 17-GAUGE TUBULAR BRASS OFFSET TAILPIECE. CHICAGO FAUCET 1006 SUPPLIES, WITH LOOSE KEY ANGLE STOPS, LOCK SHIELD CAPS, 1/2" I.P. FEMALE INLETS 12" LONG, 1/2" O.D. FLEXIBLE RISERS, WALL FLANGES, AND 1/2" O.D. FLEXIBLE TUBE RISERS WITH BULL-NOSE OUTLETS. APPROVED MANUFACTURER IS T&S BRASS. AMERICAN STANDARD 7723.018/MCGUIRE 8088 WITH 1127 NIPPLE GRID DRAIN, 1-1/4" INLET AND 1-1/4" OUTLET ADJUSTABLE CAST BRASS P-TRAPS WIT CLEANOUT PLUG, BRASS THREADED NIPPLE FROM TRAP TO TAPPED SANITARY TEE BEHIND WALL, CHROME-PLATED COVER TUBING TO WALL AND CHROME PLATED WALL ESCUTCHEON. APPROVED MANUFACTURERS ARE KOHLER AND ELJER. INSULATE ALL EXPOSED DRAIN AND SUPPLY PIPING WITH PLUMBEREX SPECIALTY PRODUCTS "HANDY SHIELD.
 PLUN PLUN PLUN COM PLUN PLUN PLUN 	PLUMBING FIXTURES SHAL MBING CONTRACTOR SHAL MBING CONTRACTOR SHAL MBING CONTRACTOR SHAL IPLIANCE. MBING CONTRACTOR SHAL	L INSTALL FLUSH CONTROL LEV LL PROVIDE TRAP GUARDS AT AL LL INSTALL TRUEBRO PIPE (SUPF LL INSTALL ALL PLUMBING FIXTU LL REFERENCE AND COORDINAT	ERS/HANDLES (L FLOOR DRAIN PLY AND DRAIN) RES AND ACCES	on Wide NS, Floc Covers Ssories	SIDE OF R SINKS S AND OF ACCORI	TOILET , AND HU FFSET DF DING TO	E CODES. ALL FIXTURES SHALL BE LISTED IN THE STATE OF TEXAS WATER COMMISSION LIST OF APPROVED PLUMBING FIXTURES FOR ALL WATER CLOSETS TO ENSURE ADA COMPLIANCE. IB DRAINS (WHETHER SHOWN ON DRAWINGS OR NOT). RAIN CONNECTIONS FOR ALL SINKS AND LAVATORIES (IF REMOVABLE PROTECTIVE PANEL IS NOT PROVIDED BY ARCHITECT) TO ENSURE ADA AND/OR IN COMPLIANCE WITH TEXAS ACCESSIBILITY STANDARDS (TAS). G HEIGHTS WITH ARCHITECTURAL DRAWINGS BEFORE PURCHASING AND/OR INSTALLING ANY FIXTURES AND ACCESSORIES AND BEFORE

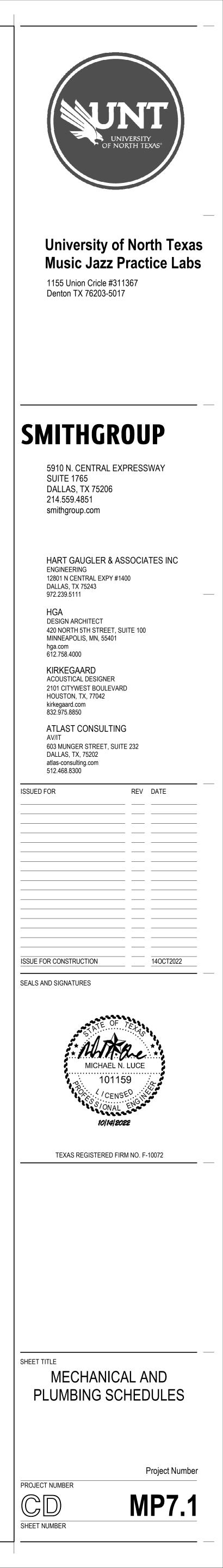
							SIN	IGLE-DL	JCT TE	RMINAL	UNIT S	SCHEDL	JLE						
									SOUND LE	VEL LIMITS									
	AREA		OUTLET		DESIGN	MINIMUM	OCTAVE	OCTAVE	OCTAVE	OCTAVE	OCTAVE	OCTAVE			RADIATED	DISCHARGE			
TAG	SERVED	INLET SIZE	SIZE	MIN CFM	AIRFLOW	INLET SP	BAND 2	BAND 3	BAND 4	BAND 5	BAND 6	BAND 7	VOLTAGE	PHASE	SOUND (NC)	SOUND (NC)	MANUFACTURER	MODEL	REMARKS
VAV-263-1 (CD)	JAZZ LAB	16	24x18	315 CFM	2500 CFM	0.80 in-wg	57	51	45	43	41	33	120 V	1	18	21	TITUS	DESV	1-3
VAV-263-1 (HD)	JAZZ LAB	16	24x18	315 CFM	2500 CFM	0.80 in-wg	57	51	45	43	41	33	120 V	1	18	21	TITUS	DESV	1-3
VAV-263-2 (CD)	JAZZ LAB	16	24x18	315 CFM	2500 CFM	0.80 in-wg	57	51	45	43	41	33	120 V	1	18	21	TITUS	DESV	1-3
VAV-263-2 (HD)	JAZZ LAB	16	24x18	315 CFM	2500 CFM	0.80 in-wg	57	51	45	43	41	33	120 V	1	18	21	TITUS	DESV	1-3

1. PROVIDE FACTORY MOUNTED 120V/24V CONTROL TRANSFORMER WITH INTEGRAL DISCONNECT SWITCH FOR SINGLE POINT POWER CONNECTION. 2. PROVIDE EXTERNAL DIFFERENTIAL PRESSURE TAPS FOR AIRFLOW MEASUREMENT.

3. UNIT SHALL BE CONSTRUCTED FROM MINIMUM 12 GAGE GALVENIZED STEEL.

	(GRILLE	, REGIS	STER, ANI) DIFF	USER SC	HEDUL	E							
	BASIS OF DESIGN														
TAG	SYSTEM	FACE SIZE	MATERIAL	BORDER	FINISH	MANUFACTURER	MODEL	REMARKS							
E1	EXHAUST AIR	12x12	ALUMINUM	LAY-IN	WHITE	PRICE	SPD	1							
R1	RETURN AIR	30X12	STEEL	FLOOR MOUNT	BLACK	PRICE	LFG	1							
S1	SUPPLY AIR	SEE PLANS	STEEL	DUCT MOUNT	BLACK	PRICE	SDG	1							
S2	SUPPLY AIR	24x24	STEEL	LAY-IN	BLACK	PRICE	SPD	1							
S3	SUPPLY AIR	12x12	ALUMINUM	LAY-IN	WHITE	PRICE	SPD	1							

REMARKS: 1. SCHEDULE DOES NOT LIST QUANTITIES OF DEVICES. REFER TO PLAN SHEETS FOR QUANTITIES.



ELECTRICAL ABBREVIATIONS Q III AMPERES MCA MINIMUM CIRCUIT AMPACITY Α 000 ALTERNATING CURRENT MCB MAIN CIRCUIT BREAKER AMPERE FRAME (BREAKER RATING) AF MCC MOTOR CONTROL CENTER AFC ABOVE FINISHED COUNTER MECH MECHANICAL MFR AFF ABOVE FINISHED FLOOR MANUFACTURER AFG ABOVE FINISHED GRADE MANHOLE AHU AIR HANDLING UNIT MINIMUM MIN AMPERE INTERRUPTING CAPACITY MISC MISCELLANEOUS ALT ALTERNATE MLO MAIN LUGS ONLY ARCH ARCHITECT MOCP MAXIMUM OVERCURRENT PROTECTION AMPERES TRIP MTD AT MOUNTED AUTOMATIC TRANSFER SWITCH ATS MTG MOUNTING AUTO MTS AUTOMATIC MANUAL TRANSFER SWITCH MEDIUM VOLTAGE (OVER 600V LESS THAN AUX AUXILIARY AWG AMERICAN WIRE GAUGE 35KV) $\overline{\otimes}$ (B) NEUTRAL BLDG BUILDING NORMALLY CLOSED BRKR, BKR BREAKER NC NEC NATIONAL ELECTRICAL CODE NEMA NATIONAL ELECTRICAL MANUFACTURERS (C) ASSOCIATION CONDUIT NOT IN CONTRACT NIC CATV CABLE TELEVISION NORMALLY OPEN CIRCUIT BREAKER CB NO., NUM. # NUMBER CCTV CLOSED CIRCUIT TELEVISION NTS NOT TO SCALE CKT CIRCUIT CLG CEILING COM, COMM COMMUNICATIONS ON CENTER OC CONTROL PANEL CP OCPD OVERCURRENT PROTECTION DEVICE CONTROL POWER TRANSFORMER CPT OWNER FURNISHED, CONTRACTOR OFCI CURRENT TRANSFORMER CT INSTALLED COPPER CU OFOI OWNER FURNISHED, OWNER INSTALLED OVERHEAD (D) OVERHEAD ELECTRIC/TELEPHONE OHE/T DC DIRECT CURRENT OPP OPPOSITE DISC DISCONNECT DIST DISTRIBUTION DIVISION DIV POLE DOWN DN PUBLIC ADDRESS DISTRIBUTION PANEL DP PULL BOX DPDT DOUBLE POLE DOUBLE THROW PDP POWER DISTRIBUTION PANEL DPST DOUBLE POLE SINGLE THROW PHOTO ELECTRIC DWG DRAWING POWER FACTOR

PH, Ø

PNL

PRI

PT

PVC

PWR

R, RE

RCLP

RCPT

REF

RI A

RM

RSC

SEC

SPD

SPDT

SPKR

SPST

STD

SW

SWBD

SWGR

SYM

TBB

TC

UGP

UGS

UGT

UL

UON

UPS

VA

W/O

WHM

WP

XFMR

VFD

TEL, TELE

TELECOM

SPEC(S)

SCH, SCHED

(F)

EG

ELEC

EMT

ENCL

EWC

EWH

FA

FAAP

FACP

FAEP

FC

FDR

FLA

FLEX

FLUOR

FT

G, GND, GRD

(G)

GEN

GFI

(H)

Н

HH

HP

HR

HT

HTR

HVAC

ΗZ

IG

INCAND

JB, JBOX

(K)

K

Kcmil

KV

KVA

kW

KWH

L-G

L-N

LAN

LP

LSIA

LSIG

LTG

LV

LSI

LC, LCP

LA

HOA

HPS

FL, FLR

EQ, EQIP

ELEV

EM. EMEG

E, EX, EXIST

EXISTING

ELEVATOR

EMERGENCY

ENCLOSURE

EQUIPMENT

FIRE ALARM

FOOT CANDLE

FULL LOAD AMPS

FLUORESCENT

FOOT / FEET (')

GENERATOR

HAND HOLE

HOUR

HEIGHT

HEATER

HERTZ

HORSEPOWER

CONDITIONING

ISOLATED GROUND

INCH / INCHES (")

INCANDESCENT

JUNCTION BOX

KEY INTERLOCK

VOLT-AMPS)

KILOWATT-HOURS

LINE TO GROUND

LINE TO NEUTRAL

LIGHTING PANEL

ONLY

LIGHTING

LIGHTNING ARRESTOR

LOCAL AREA NETWORK

LIGHTING CONTROL PANEL

LONG-TIME, SHORT-TIME,

LONG-TIME, SHORT-TIME,

INSTANTANEOUS, GROUND-FAULT

LOW VOLTAGE (BELOW 50 VOLTS)

LONG-TIME, SHORT-TIME, INSTANTANEOUS

INSTANTANEOUS, GROUND-FAULT ALARM

LINE TO LINE

1000 CIRCULAR mils

KILOVOLTS (THOUSAND VOLTS)

KILOVOLTS-AMPERES (THOUSAND

KILOWATTS (THOUSAND WATTS)

FEEDER

FLEXIBLE

GROUND

FLOOR

FUSE

EQUIPMENT GROUND

ELECTRIC, ELECTRICAL

ELECTRIC METALLIC CONDUIT

ELECTRIC WATER COOLER

ELECTRIC WATER HEATER

FIRE ALARM ANNUNCIATOR PANEL

FIRE ALARM CONTROL PANEL

FIRE ALARM EXTENDER PANEL

GROUND FAULT INTERRUPTER

HORIZONTAL MOUNTING

HAND-OFF-AUTOMATIC

HIGH PRESSURE SODIUM

HEATING VENTILATION AND AIR

PHASE

PANEL

PRIMARY

POWER

QUANTITY

RECEPTACLE

ROOM

SCHEDULE

SPEAKER

STANDARD

SWITCHBOARD

SWITCHGEAR

SYMMETRICAL

TIME CLOCK

TELEPHONE

TELEVISION

TYPICAL

VOLTS

WIRE

WITH

WITHOUT

WATT HOUR METER

WEATHERPROOF

REMOVE DEVICE

TRANSFORMER

PERCENT IMPEDANCE

VOLT-AMPERES

TAMPERPROOF

UNDERGROUND

UNDERGROUND PRIMARY

UNDERGROUND SECONDARY

UNDERWRITER'S LABORATORY

UNINTERRUPTIBLE POWER SUPPLY

VARIABLE FREQUENCY DRIVE/ VARIABLE

FREQUENCY MOTOR CONTROLLER

UNDERGROUND TELEPHONE

UNLESS OTHERWISE NOTED

TERMINAL BLOCK

TELEPHONE BACKBOARD

TELECOMMUNICATIONS

SWITCH

SECONDARY

SQUARE FOOT

SPECIFICATION(S)

REFRIGERATOR

RADIO FREQUENCY

POTENTIAL TRANSFORMER

POLYVINYL CHLORIDE

RELOCATE AS SHOWN

REMOTE CONTROL LIGHTING PANEL

RATED (RUNNING) LOAD AMPS

RECEPTACLE PANELBOARD

SURGE PROTECTIVE DEVICE

SINGLE POLE DOUBLE THROW

SINGLE POLE SINGLE THROW

RIGID STEEL CONDUIT

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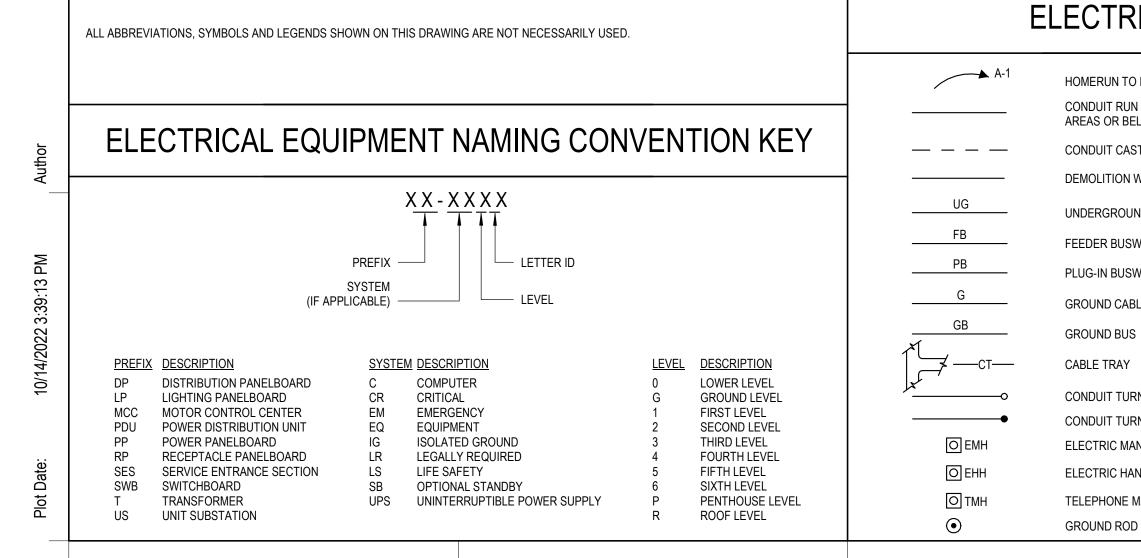
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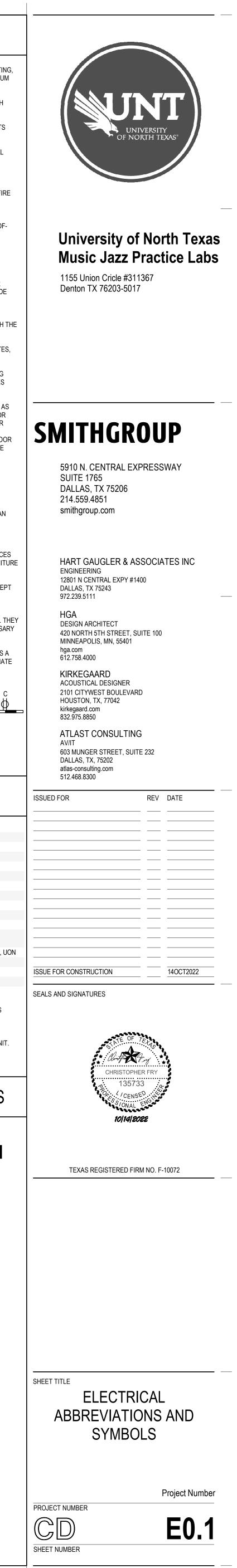
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<u>```</u>	SWITCH - SING
	FUSED SWITC
	TRANSFORME
	POTENTIAL T
─────────────────────────────────────	CONTROL PO
- m-	CURRENT TR/
\bigtriangleup	DELTA CONNE
Υ <u>Γ</u>	WYE CONNEC
E	ELECTRIC INT
— К	KEY INTERLO
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	DRAWOUT TY
	STATIONARY
	FUSE
ATS	AUTOMATIC T
$\Box \!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!$	BUS DUCT PL
	LIGHTNING AF
Ŧ	GROUND
	STRESS CON
EMU EMU	ELECTRONIC
SPD	SURGE PROT
	DISTRIBUTION
	PANELBOARD
LCP	LIGHTING COI
LRP	LOW VOLTAG
	MOTOR CONT
UPS	UNINTERRUP
TBB	TELECOMMUN
RP-XXXX	SYMBOL INDIC ARE TO BE CO
GAP	GENERATOR
G	GENERATOR
	ELECTR
A-1	HOMERUN TO
	CONDUIT RUN AREAS OR BEI



EL	ECTRICAL LIGHTING SYMBOLS		ELECTRICAL POWER SYMBOLS
]	WALL MOUNTED LIGHTING FIXTURE- TYPE AS INDICATED	Φ Ø	SINGLE RECEPTACLE, 20A, 125V, 2P, 3W. (SLASH INDICATES MOUNTING ABOVE FINISH COUNTER)
a	LIGHTING FIXTURE - TYPE AS INDICATED (SUBSCRIPT INDICATES SWITCH CONTROL)	φ \$	DUPLEX RECEPTACLE, 20A, 125V, 2P, 3W. (SLASH INDICATES MOUNTING ABOVE FINISH COUNTER)
	LIGHTING FIXTURE - TYPE AS INDICATED	ф ф	GFI, DUPLEX RECEPTACLE, 20A, 125V, 2P, 3W. (SLASH INDICATES MOUNTING ABOVE FINISH COUNT
	WALLWASH LIGHT FIXTURE	↓ ↓	QUADRUPLEX RECEPTACLE, (2)20A, 125V, 2P, 3W, DUPLEX RECEPTACLES WITH A COMMON FACEPLATE. (SLASH INDICATES MOUNTING ABOVE FINISH COUNTER)
	SHADING INDICATES FIXTURE [W/ BATTERY/INVERTER UNIT (SWITCHED)]	<i>⊕ \$</i> #	SINGLE ISOLATED GROUND RECEPTACLE, 20A, 125V, 2P, 3W. (SLASH INDICATES MOUNTING ABOVE FINISH COUNTER)
]	SHADING INDICATES FIXTURE [W/ BATTERY/INVERTER UNIT (UNSWITCHED)]	<b>⊕ ∯</b>	DUPLEX ISOLATED GROUND RECEPTACLE, 20A, 125V, 2P, 3W. (SLASH INDICATES MOUNTING ABOVE FINISH COUNTER)
, 1	LIGHTING TRACK - "X" DENOTES TYPE EXIT LIGHT - WALL/CEILING MOUNTED - DIRECTIONAL ARROWS AS INDICATED SHADING INDICATES ILLUMINATED	+ + +	QUADRUPLEX ISOLATED GROUND RECEPTACLE, (2)20A, 125V, 2P, 3W, DUPLEX ISOLATED GROUND RECEPTACLES WITH A COMMON FACEPLATE. (SLASH INDICATES MOUNTING ABOVE FINISH COUNTER)
	FACE SITE LIGHTING FIXTURE TYPE AS INDICATED	$\begin{tabular}{c} \bullet & \bullet \\ \bullet$	FULLY CONTROLLED DUPLEX/QUADRUPLEX RECEPTACLE. PROVIDE ALL WIRING, EQUIPMENT, POWER PACKS, AND OCCUPANCY SENSOR INTEGRATION REQUIRED
	LIGHTING FIXTURE TYPE DESIGNATION - "XX" INDICATES SPECIFIC TYPE	4 4 H	TO TURN OFF RECEPTACLE(S) WHEN SPACE IS UNOCCUPIED. HALF CONTROLLED DUPLEX/QUADRUPLEX RECEPTACLE. PROVIDE ALL WIRING,
	BUTTON STATION LIGHT SWITCH		EQUIPMENT, POWER PACKS, AND OCCUPANCY SENSOR INTEGRATION REQUIRED TO TURN OFF HALF OF RECEPTACLE(S) WHEN SPACE IS UNOCCUPIED.
	SINGLE POLE SWITCH (SUBSCRIPT INDICATES FIXTURES CONTROLLED)	•	HALF SWITCHED DUPLEX RECEPTACLE, 20A, 125V, 2P, 3W.
	THREE-WAY SWITCH (S3P-THREE-WAY SWITCH WITH PILOT LIGHT)	•	EMERGENCY DUPLEX RECEPTACLE, 20A, 125V, 2P, 3W. (SHADING INDICATING EMERGENCY RECEPTACLE TYPICAL FOR ALL OTHER RECEPTACLE TYPES)
	FOUR - WAY SWITCH	Ф	COMBINATION USB DUPLEX RECEPTACLE, 20A, 125V, 2P, 3W WITH (2) 5VDC, 2.1A USB CHARGING PORTS
	SINGLE POLE SWITCH WITH PILOT LIGHT		SPECIAL PURPOSE RECEPTACLE. TYPE AS INDICATED ON DRAWINGS.
	KEY OPERATED SWITCH DUAL LEVEL SWITCHING. PROVIDE BALLASTS/DRIVERS REQUIRED TO	$\bigcirc$	COORDINATE RECEPTACLE TYPE WITH ACTUAL EQUIPMENT PRIOR TO INSTALLATION. CEILING MOUNTED SINGLE RECEPTACLE, 20A, 125V, 2P, 3W.
	PROVIDE DUAL LEVEL SWITCHING. LOW VOLTAGE SWITCH		CEILING MOUNTED SINGLE ISOLATED GROUND RECEPTACLE, 20A, 125V, 2P, 3W.
	SINGLE ZONE LOW VOLTAGE ON/OFF SWITCH		CEILING MOUNTED DUPLEX RECEPTACLE, 20A, 125V, 2P, 3W.
	SINGLE ZONE LOW VOLTAGE DIMMER SWITCH		("CR" SUBSCRIPT INDICATES CORD REEL) CEILING MOUNTED DUPLEX ISOLATED GROUND RECEPTACLE, 20A, 125V, 2P, 3W.
	2 ZONE LOW VOLTAGE ON/OFF SWITCH		CEILING MOUNTED QUADRUPLEX RECEPTACLE, (2) 20A, 125V, 2P, 3W, DUPLEX RECEPTACLES
	2 ZONE LOW VOLTAGE DIMMER SWITCH 4 ZONE LOW VOLTAGE ON/OFF SWITCH		
	4 ZONE LOW VOLTAGE DIMMER SWITCH		CEILING MOUNTED QUADRUPLEX ISOLATED GROUND RECEPTACLE, (2)20A, 125V, 2P, 3W, DUPLEX ISOLATED GROUND RECEPTACLES WITH A COMMON FACEPLATE.
	DIMMER SWITCH		RECEPTACLES MOUNTED ABOVE THE CEILING.
	OCCUPANCY SENSOR WALL SWITCH	ſΦ	SINGLE RECEPTACLE, 20A, 125V, 2P, 3W., FLOOR MTD SERVICE FITTING, FLUSH TYPE UON ("S" DENOTES SURFACE TYPE)
	PASSIVE INFRARED OCCUPANCY SENSOR (WALL/CEILING)	$  \Phi  $	SINGLE IG RECEPTACLE, 20A, 125V, 2P, 3W., FLOOR MTD SERVICE FITTING, FLUSH TYPE UON
			("S" DENOTES SURFACE TYPE) DUPLEX RECEPTACLE, 20A, 125V, 2P, 3W., FLOOR MTD SERVICE FITTING, FLUSH TYPE UON
	PASSIVE INFRARED/ULTRASONIC OCCUPANCY SENSOR (WALL/CEILING)		("S" DENOTES SURFACE TYPE)
	COMBINATION PHOTOCELL/OCCUPANCY SENSOR		DUPLEX IG RECEPTACLE, 20A, 125V, 2P, 3W., FLOOR MTD SERVICE FITTING, FLUSH TYPE UON ("S" DENOTES SURFACE TYPE)
	PHOTOCELL SENSOR		QUADRUPLEX RECEPTACLE, (2) 20A, 125V, 2P, 3W., FLOOR MTD SERVICE FITTING, FLUSH TYPE
ISTR	IBUTION AND DIAGRAM SYMBOLS		UON ("S" DENOTES SURFACE TYPE) QUADRUPLEX IG RECEPTACLE, (2) 20A, 125V, 2P, 3W., FLOOR MTD SERVICE FITTING, FLUSH TYPE
	SWITCH - SINGLE THROW		UON ("S" DENOTES SURFACE TYPE)
_	FUSED SWITCH		WHERE INDICATED IN AN EXISTING FLOOR, PROVIDE CORE DRILL PACKAGE TO MAINTAIN FIRE RATING OF FLOOR. EXTEND CONDUIT AND WIRING IN CEILING SPACE OF FLOOR BELOW TO ELECTRICAL CLOSET OR PANELBOARD.
]	TRANSFORMER - TYPE AND RATING AS INDICATED	FBX	FLOOR BOX ("X" DENOTES TYPE AS SPECIFIED)
_	POTENTIAL TRANSFORMER	PTX	POKE-THROUGH ASSEMBLY ("X" DENOTES TYPE AS SPECIFIED)
 CPT	CONTROL POWER TRANSFORMER	AFX	ACCESS FLOOR BOX ("X" DENOTES TYPE AS SPECIFIED)
			JUNCTION BOX (CEILING, FLOOR OR WALL MOUNTED) INDICATED IN POWER, LIGHTING &
	DELTA CONNECTION WYE CONNECTION - SOLID GROUND		FIRE ALARM SYSTEMS PLANS.
_	ELECTRIC INTERLOCK SYSTEM	•	
_	KEY INTERLOCKING SYSTEM	PPFP	POWER SERVICE FITTING (CEILING, FLOOR OR WALL MOUNTED) FOR CONNECTION TO FURNITURE SYSTEM AS SPECIFIED.
_	DRAWOUT TYPE, CIRCUIT BREAKER	SR-X	SURFACE RACEWAY ("X" DENOTES TYPE AS SPECIFIED)
_	STATIONARY CIRCUIT BREAKER	HE HE	ADA DOOR ACTUATOR
— TS	FUSE AUTOMATIC TRANSFER SWITCH		COMBINATION POWER AND TELECOMMUNICATIONS BOX (CEILING, FLOOR OR WALL MOUNTED) FOR POWER AND DATA CONNECTION INDICATED IN POWER & SPECIAL SYSTEMS PLANS.
15	BUS DUCT PLUG-IN UNIT		ELECTRICAL EQUIPMENT SYMBOLS
þ	LIGHTNING ARRESTOR		
	GROUND		
_	STRESS CONE	N	MOTOR AND CONNECTION
U	ELECTRONIC METERING UNIT		DISCONNECT SWITCH, NON-FUSED PROVIDE SWITCH AMPACITY EQUAL TO OR GREATER THAN FEEDER AMPACITY, UON
	SURGE PROTECTIVE DEVICE DISTRIBUTION PANELBOARD		DISCONNECT SWITCH, FUSED. PROVIDE SWITCH AND FUSE AMPACITY EQUAL TO OR GREATER THAN FEEDER AMPACITY, UON
	PANELBOARD - (FLUSH/SURFACE)	СВ	CIRCUIT BREAKER IN NEMA 1 ENCLOSURE (FLUSH/SURFACE)
	LIGHTING CONTROL PANEL, SURFACE MTD. UON.		COMBINATION MOTOR STARTER WITH DISCONNECT SWITCH.
	LOW VOLTAGE LIGHTING RELAY PANEL, SURFACE MTD. UON		PROVIDE SWITCH AND FUSE AMPACITY EQUAL TO OR GREATER THAN FEEDER AMPACITY, UON HAND-OFF-AUTO SELECTOR SWITCH WITH PILOT LIGHT
	MOTOR CONTROL CENTER	Ş [™]	MANUAL MOTOR STARTER WITH PILOT LIGHT AS INDICATED.
		PC	PACKAGE CONTROL UNIT (PROVIDED BY EQUIPMENT SUPPLIER)
-	TELECOMMUNICATIONS BACKBOARD SYMBOL INDICATES TO WHICH PANELBOARD INDICATED CIRCUITS IN THE ROOM	VFD	VARIABLE FREQUENCY DRIVE/VARIABLE FREQUENCY MOTOR CONTROLLER
	ARE TO BE CONNECTED.		PUSHBUTTON STATION
	GENERATOR ANNUNCIATOR (DERANGEMENT) PANEL GENERATOR		EMERGENCY POWER OFF
			CONTACTOR GROUNDING BUS BAR
El	_ECTRICAL WIRING SYMBOLS	_	
A-1	HOMERUN TO PANEL WITH CIRCUIT NUMBER(S) AS INDICATED		
	CONDUIT RUN CONCEALED IN FINISHED AREAS, EXPOSED IN UNFINISHED AREAS OR BELOW ACCESS FLOORS		SPECIAL SYSTEM OUTLET SYMBOLS
	CONDUIT CAST IN CONCRETE OR BELOW SLAB DEMOLITION WORK	HTV	COMBINATION TV OUTLET AND DUPLEX RECEPTACLE ON SINGLE FACEPLATE
	UNDERGROUND CONDUIT/DUCTBANK		MICROPHONE OUTLET - CEILING MTD
	FEEDER BUSWAY	HM	MICROPHONE OUTLET - WALL MTD
	PLUG-IN BUSWAY	M	MICROPHONE OUTLET - FLOOR MTD
	GROUND CABLE, SIZE AS INDICATED		PA VOLUME CONTROL
	GROUND BUS CABLE TRAY	Hsp Sp	SPEAKER - WALL MTD SPEAKER - CEILING MTD
_0	CABLE TRAT	HR HR	RECORDING OUTLET
-•	CONDUIT TURNED DOWN	HVP	COMBINATION VIDEO PROJECTOR OUTLET AND DUPLEX RECEPTACLE
	ELECTRIC MANHOLE ELECTRIC HANDHOLE	н©	CLOCK OUTLET, W/RECPT AND HANGER
	TELEPHONE MANHOLE	ю	CLOCK OUTLET, MASTER CLOCK
	GROUND ROD	Ю _{ЕТ}	CLOCK OUTLET, ELAPSED TIME
		I	Ι

## GENERAL NOTES PROVIDE 1#12 + 1#12N + 1#12G FOR 20A BRANCH CIRCUITING, UON; MAXIMUM OF THREE CIRCUITS PER CONDUIT; MINIMUM CONDUIT SIZE OF 3/4" C, UON. PROVIDE A DEDICATED NEUTRAL WIRE FOR EACH BRANCH JNTER) CIRCUIT. COORDINATE DEVICE LOCATIONS AND MOUNTING HEIGHTS WITH ARCHITECTURAL DRAWINGS PRIOR TO ROUGH-IN. PROVIDE FIRE STOPPING FOR CONDUITS AND ELECTRICAL EQUIPMENT FOR FLOOR SLABS, WALLS AND CEILINGS TO MAINTAIN FIRE RATING. INSTALL ELECTRICAL WORK IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE AND LOCAL BUILDING AND FIRE CODES, IN A NEAT AND WORKMANLIKE MANNER. LIMIT VOLTAGE DROP TO 2% FOR FEEDERS AND 3% FOR BRANCH CIRCUITS. INCLUDE DERATING FACTOR FOR ROOF-MOUNTED CONDUITS. REFER TO ARCH. REFLECTED CEILING PLANS FOR EXACT LOCATION OF CEILING MOUNTED DEVICES AND LIGHT FIXTURES, UNLESS OTHERWISE INDICATED. WHERE MULTIPLE SWITCHES, RECEPTACLES, AND OTHER OUTLETS (EXCEPT WALL PHONES) ARE INDICATED PROVIDE MULTI-GANG BACK BOXES WITH GANG BARRIERS AND A COMMON FACEPLATE. WHERE DIFFERENT RECESSED ELECTRICAL DEVICES WITH THE SAME MOUNTING HEIGHTS ARE INDICATED SIDE-BY-SIDE, MOUNT THE DEVICES SO THAT THERE IS FOUR INCHES BETWEEN ADJACENT VERTICAL EDGES OF THE FACEPLATES, UON. WHERE ELECTRICAL DEVICES WITH DIFFERENT MOUNTING HEIGHTS ARE LOCATED IN THE SAME AREA ALIGN DEVICES VERTICALLY THROUGH THEIR CENTERLINES, UON. WHERE EXIT SIGNS ARE INDICATED ABOVE DOOR MOUNT AS FOLLOWS, CENTER THE EXIT SIGN BETWEEN TOP OF DOOR FRAME AND CEILING IF DISTANCE BETWEEN TOP OF DOOR FRAME AND CEILING IS 24 INCHES OR LESS; OTHERWISE MOUNT BOTTOM OF EXIT SIGN 6 INCHES FROM TOP OF DOOR FRAME, MOUNT OTHER WALL MOUNTED EXIT SIGNS IN THE SAME AREA AT THE SAME HEIGHT. COORDINATE WITH ARCHITECTURAL DETAILS. EXIT SIGNS ARE TO BE TYPE "X1", UON. M. PROVIDE SEPARATE NEUTRALS FOR DIMMING CIRCUITS. I. PROVIDE FEEDERS AND BRANCH CIRCUITS WHICH HAVE AN AMPACITY EQUAL TO OR GREATER THAN THE CIRCUIT OVERCURRENT PROTECTIVE DEVICE RATING, U.O.N. FURNITURE LAYOUTS ARE FOR REFERENCE ONLY. COORDINATE THE FINAL LOCATION OF ELECTRICAL DEVICES AND OUTLETS WITH ARCHITECT, OWNER AND FINAL FURNITURE PLANS PRIOR TO INSTALLATION. MOUNT DEVICES FLUSH WITH CONCEALED CONDUIT, EXCEPT AS NOTED ON THE DRAWINGS AND IN MECHANICAL AND ELECTRICAL EQUIPMENT ROOMS. 2. THE DRAWINGS REPRESENT ELECTRICAL DESIGN INTENT. THEY ARE DIAGRAMMATIC. PROVIDE ALL COMPONENTS NECESSARY FOR COMPLETE OPERATING ELECTRICAL SYSTEMS. WHEN MORE THAN ONE 20A., 1P., 120 VOLT CIRCUIT FEEDS A SURFACE RACEWAY CONNECT RECEPTACLES TO ALTERNATE CIRCUITS AS FOLLOWS - U.O.N. MOUNTING HEIGHTS ACCESS CONTROL DEVICES 3'-6" AFF CLOCK OUTLETS 7'-0" AFF DIMMERS 3'-6" AFF DISCONNECT SWITCHES 5'-6" AFF INDIVIDUAL CIRCUIT BREAKERS 5'-6" AFF INTERCOM 3'-6" AFF MOTOR STARTERS 5'-6" AFF PANELBOARDS & CABINETS 6'-0" AFF TO TOP PUSHBUTTONS 3'-6" AFF RECEPTACLES 1'-6" AFF RECEPTACLES ABOVE FINISHED 8" AFC COUNTER VANITY LIGHT IN TOILET 6" ABOVE THE MIRROR, UON VOLUME CONTROLS 3'-6" AFF WALL SWITCHES 3'-6" AFF TV OUTLETS 5'-0" AFF MOUNTING HEIGHT NOTES: ALL ELEVATIONS ARE TO CENTER LINE OF DEVICE, UNLESS OTHERWISE NOTED. REFER TO EQUIPMENT ELEVATION DRAWINGS FOR COORDINATION WITH CASEWORK. MOUNT MANUAL MOTOR STARTER ADJACENT TO OR ON UNIT. REFER TO ARCHITECTURAL A0 SERIES FOR ADDITIONAL ELECTRICAL DEVICE MOUNTING HEIGHTS AND DEVICE ALIGNMENT RULES. **REFERENCE SYMBOLS** SECTION NUMBER E0.1 - DRAWING NUMBER WHERE DRAWN DETAIL NUMBER $\sim$ ____<del>`</del>__ - DRAWING NUMBER WHERE DRAWN EXXX KEY NOTE



## OVERCURRENT PROTECTIVE DEVICE SETTING SCHEDULE

BREAKER IDENT.	RATING PLUG (AMPS)	CURRENT SETTING (LONG TIME PICK-UP)	Long Time Delay	Short Time Pick-up	SHORT TIME DELAY	SHORT TIME It ²	INSTANT- ANEOUS	ground Fault Pick-up	GROUND FAULT DELAY	GROUN FAULT It 2

<u>NOTE:</u>

THE SETTINGS INDICATED ARE BASED ON (GENERAL ELECTRIC CO.) (SIEMENS ENERGY & AUTOMATION INC.) (SQUARE D CO.) (CUTLER HAMMER ELECTRIC CORP.) BREAKER SERIES (.....)

									480V.	, THRI	EE PH	IASE	CIRCL	IIT LE	NGTH	I TABL	.E									
BREAKER AMPACITY	MAX. CIRCUIT	MAXIM	UM LENG	STH IN FE	ET																					
(AMPS)	LOAD (AMPS)	NO.12	NO.10	NO.8	NO.6	NO.4	NO.2	NO.1	1/0	2/0	3/0	4/0	250	350	500	2-3/0	2-4/0	2-250	2-350	2-500	3-300	3-400	4-350	5-400	6-400	6-500
20	16	253	403	642	1019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30	24	-	269	428	679	1079	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
40	32	-	-	321	509	809	1293	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
50	40	-	-	-	408	648	1034	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
60	48	-	-	-	-	540	862	1083	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
70	56	-	-	-	-	-	739	928	1169	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
80	64	-	-	-	-	-	646	812	1023	1286	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
90	72	-	-	-	-	-	574	722	909	1143	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
100	80	-	-	-	-	-	-	650	818	1029	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
125	100	-	-	-	-	-	-	-	655	823	1043	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
150	120	-	-	-	-	-	-	-	546	689	869	1107	-	-	-	-	-	-	-	-	-	-	-	-	-	-
175	140	-	-	-	-	-	-	-	-	588	745	949	1110	-	-	-	-	-	-	-	-	-	-	-	-	-
200	160	-	-	-	-	-	-	-	-	-	652	830	971	1360	-	-	-	-	-	-	-	-	-	-	-	-
225	180	-	-	-	-	-	-	-	-	-	-	738	863	1209	1743	-	-	-	-	-	-	-	-	-	-	-
250	200	-	-	-	-	-	-	-	-	-	-	-	777	1088	1569	1043	-	-	-	-	-	-	-	-	-	-
300	240	-	-	-	-	-	-	-	-	-	-	-	-	907	1307	869	1107	-	-	-	-	-	-	-	-	-
350	280	-	-	-	-	-	-	-	-	-	-	-	-	-	1120	745	949	1110	-	-	-	-	-	-	-	-
400	320	-	-	-	-	-	-	-	-	-	-	-	-	-	-	652	830	971	1360	-	-	-	-	-	-	-
450	360	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	738	863	1209	-	-	-	-	-	-	-
500	400	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	777	1088	1569	-	-	-	-	-	-
600	480	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	907	1307	1165	-	-	-	-	-
700	560	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1120	999	1346	-	-	-	-
800	640	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	874	1177	1360	-	-	-
1000	800	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	942	1088	1569	-	-
1200	960	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	907	1307	-	-
1600	1200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	980	1226	1307
1800	1440	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1089	1177
2000	1600	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	980	1137

208V.	SINGLE	PHASE		UIT L	ENGT	TH TA	BLE
BREAKER AMPACITY	MAX. CIRCUIT CURRENT	MAX. CIRCUIT LOAD		MAXIMUN	I LENGTH	H IN FEET	-
(AMPS)	(AMPS)	(VA)	NO.12	NO.10	NO.8	NO.6	NO.4
20	4	832	380	605	964	-	-
	8	1664	190	302	482	765	-
	12	2496	127	202	321	510	810
	16	3328	95	151	241	382	607
30	24	4992	-	101	161	255	405
40	32	6656	-	-	121	191	304
50	40	8320	-	-	-	153	243
60	48	9984	-	-	-	-	202

CIRCUIT MAXIMUM DISTANC
CIRCUIT MAXIMUM DISTANC

120V. SINGLE PHASE CIRCUIT LENGTH TABLE BREAKER MAX. MAX. AMPACITY CIRCUIT CIRCUIT CIRCUIT MAXIMUM LENGTH IN FEET (AMPS) CURRENT LOAD (AMPS) (VA) NO.12 NO.10 NO.8 NO.6 NO.4 20 4 480 220 349 556 882 8 960 110 174 278 441 701 12 1440 73 116 185 294 467 16 | 1920 | 55 | 87 | 139 | 221 | 350 30 24 2880 - 58 93 147 234 40 32 3840 - 70 110 175

88 140

- 117

4800

50 40

60 48 5760

UND ILT 2	

### FEEDER & BRANCH CIRCUIT SIZING SCHEDULE -NONLINEAR LOADS (NOTES 1 & 2)

			(NOTES	1 & 2)		
OVERCURRENT	WIRE SIZE - A	WG OR KCMIL		CONDUIT SIZE	E	
DEVICE RATING (AMPERES)	PHASE & NEUTRAL	E.G.	4 WIRE (2PH & 2N)	5 WIRE (NOTE-7)	6 WIRE (3PH & 3N)	NOTE
15-20	12	12	3/4"	3/4"	3/4"	
25-30	10	10	3/4"	3/4"	3/4"	
35-40	8	10	3/4"	1"	1"	
45-50	8(6)	10	3/4"(1")	1"	1"(1 1/4")	
60	6(4)	10	1"(1 1/4")	1"(1 1/4")	1 1/4"	
70	6(4)	8	1"(1 1/4")	1"(1 1/4")	1 1/4"	
80-90	4(2)	8	1 1/4"	1 1/4"(1 1/2")	1 1/4"(1 1/2")	
100	3(2)	8	1 1/4"	1 1/2"	1 1/2"	
110	2(1)	6	1 1/2"	2"	2"	
125	1(1/0)	6	1 1/2"(2")	2"	2"	
150	1/0	6	2"	2"	2"	
175	2/0	6	2"	2"	2 1/2"	
200	3/0	6	2"	2 1/2"	2 1/2"	
225	4/0	4	2 1/2"	2 1/2"	3"	
250	250	4	3"	3"	3"	
300	350	4	3"	3 1/2"	3 1/2"	
350	500	3	3 1/2"	4"	4"	
400	2-3/0	2-3	2-2"	2-2 1/2"	2-2 1/2"	
450	2-4/0	2-2	2-2 1/2"	2-2 1/2"	2-3"	
500	2-250	2-2	2-3"	2-3"	2-3"	
600	2-350	2-1	2-3"	2-3 1/2"	2-3 1/2"	
700	2-500	2-1/0	2-3 1/2"	2-4"	2-4"	
800	3-300	3-1/0	3-3"	3-3 1/2"	3-3 1/2"	
1000	3-400	3-2/0	3-3"	3-3 1/2"	3-4"	
1200	4-350	4-3/0	4-3"	4-3 1/2"	4-3 1/2"	
1600	5-400	5-4/0	5-3"	5-3 1/2"	5-4"	
2000	6-400	6-250	6-3"	6-3 1/2"	6-4"	

## FEEDER & BRANCH CIRCUIT SIZING SCHEDULE -GENERAL PURPOSE (NOTES 1 & 2)

			•	S 1 & 2)	·r	
OVERCURRENT DEVICE RATING (AMPERES)	WIRE SIZE - A PHASE & NEUTRAL	E.G.	2 WIRE	CONDUIT SIZ 3 WIRE	4 WIRE	NOTE
15-20	12	12	3/4"	3/4"	3/4"	
25-30	10	10	3/4"	3/4"	3/4"	
35-40	8	10	3/4"	3/4"	3/4"	
45-50	8(6)	10	3/4"	3/4"	3/4"(1")	
60	6(4)	10	3/4"(1")	3/4"(1")	1"(1 1/4")	
70	6(4)	8	3/4"(1")	3/4"(1")	1"(1 1/4")	
80-90	4(2)	8	1"	1"(1 1/4")	1 1/4"	
100	3(2)	8	1"(1 1/4")	1 1/4"	1 1/4"	
110	2(1)	6	1 1/4"	1 1/4"(1 1/2")	1 1/4"(1 1/2")	
125	1(1/0)	6	1 1/4"	1 1/2"	1 1/2"(2")	
150	1/0	6	1 1/4"	1 1/2"	2"	
175	2/0	6	1 1/2"	2"	2"	
200	3/0	6	1 1/2"	2"	2"	
225	4/0	4	2"	2"	2 1/2"	
250	250	4	2"	2 1/2"	2 1/2"	
300	350	4	2 1/2"	3"	3"	
350	500	3	3"	3"	3 1/2"	
400	2-3/0	2-3	2-2"	2-2"	2-2"	
450	2-4/0	2-2	2-2"	2-2"	2-2 1/2"	
500	2-250	2-2	2-2"	2-2 1/2"	2-2 1/2"	
600	2-350	2-1	2-2 1/2"	2-3"	2-3"	
700	2-500	2-1/0	2-3"	2-3"	2-3 1/2"	
800	3-300	3-1/0	3-2 1/2"	3-3"	3-3"	
1000	3-400	3-2/0	3-2 1/2"	3-3"	3-3"	
1200	4-350	4-3/0	4-2 1/2"	4-3"	4-3"	
1600	5-400	5-4/0	5-2 1/2"	5-3"	5-3"	
2000	6-400	6-250	6-2 1/2"	6-3"	6-3"	

		CIRCUIT S				
MOTOR HP		CIRCUIT	STARTER	C	CONDUIT &	NIRE
	SWITCH/FUSE	BREAKER	SIZE/TYPE	PHASE	E.G.	CONDUIT
1/2	30/3A.	15A	1	12	12	3/4"
3/4	30/3A.	15A	1	12	12	3/4"
1	30/6A.	15A	1	12	12	3/4"
1 1/2	30/6A.	15A	1	12	12	3/4"
2	30/6A.	15A	1	12	12	3/4"
3	30/10A.	15A	1	12	12	3/4"
5	30/15A.	20A	1	12	12	3/4"
7 1/2	30/20A.	25A	1	12	12	3/4"
10	30/25A.	35A	1	12	12	3/4"
15	60/40A.	50A	2	10	10	3/4"
20	60/50A.	60A	2	8	10	3/4"
25	60/60A.	80A	2	6	8	3/4"
30	100/70A.	100A	3	6	8	3/4"
40	100/100A.	125A	3	4	6	1"
50	200/125A.	150A	3	3	6	1 1/4"
60	200/150A.	175A	4	1	6	1 1/4"
75	200/175A.	225A	4	1/0	4	1 1/2"
100	400/225A.	300A	4	2/0	4	2"
125	400/300A.	350A	5	3/0	3	2"
150	400/350A.	450A	5	4/0	2	2"
200	600/450A.	600A	5	350	1	2 1/2"

## 208V. THREE PHASE CIRCUIT LENGTH TABLE

BREAKER AMPACITY			MAXIMUM LENGTH IN FEET				
(AMPS)	(AMPS)	(VA)	NO.12	NO.10	NO.8	NO.6	NO.4
20	4	1440	439	698	1113	-	-
	8	2880	220	349	557	883	-
	12	4320	127	233	371	589	935
	16	5760	95	175	278	442	701
30	24	8640	-	116	186	294	468
40	32	11520	-	-	139	221	351
50	40	14400	-	-	-	177	281
60	48	17280	-	-	-	-	234

## 277V. SINGLE PHASE CIRCUIT LENGTH TABLE

BREAKER AMPACITY	N	IAXIMUM	LENGTH IN FEET
(AMPS)	NO.12	NO.10	
20	200	300	

NCE TABLE NOTES:

NCE IS BASED ON NEC CHAPTER 9, TABLE 8 CONDUCTOR D COPPER CONDUCTORS AT 75 DEGREES CELSIUS.

CIRCUIT SIZING SCHEDULES NOTES:

- 1. BASED ON THHN/THWN, 90°., 600V., INSULATED, COPPER WIRE APPLIED AT 75°FOR TERMINATIONS RATED AT 60°C/75°C AND 75°C. FOR TERMINATIONS RATED AT 60°C PROVIDE WIRE AND CONDUIT SIZES INDICATED IN PARENTHESIS.
- 2. BASED ON WIRE OUTSIDE DIAMETERS AND RIGID METALLIC CONDUIT INSIDE DIAMETERS AS PROVIDED IN THE NEC. DO NOT REDUCE CONDUIT SIZE FOR NON-RIGID METALLIC APPLICATION. REFER TO NEC FOR CONDUIT TYPES MORE RESTRICTIVE THAN RIGID METALLIC. BASED ON MOTOR FULL LOAD AMPERES AS PROVIDED BY THE NEC.
- 4. BASED ON MOTOR RUNNING OVERLOAD PROTECTION PROVIDED BY THERMAL OVERLOAD RELAYS.
- 5. MOTOR STARTING TYPE BASED ON 460V., 3 PHASE, FULL VOLTAGE NON-REVERSING EXCEPT FOR MOTORS SIZED 75HP OR GREATER WHICH ARE BASED ON 460V., 3 PHASE, PART WINDING REDUCED VOLTAGE STARTING. 6. TRANSFORMER CIRCUITS BASED ON 480V TO 208/120V., 3 PHASE, 4 WIRE, DRY TYPE.
- 7. PROVIDE THREE PHASE WIRES AND ONE DOUBLE AMPACITY NEUTRAL FOR 110 AMPACITY CIRCUITS AND LESS. PROVIDE THREE PHASE WIRES AND TWO NEUTRAL WIRES, SIZES AS INDICATED FOR 125 AMPACITY CIRCUITS AND GREATER.

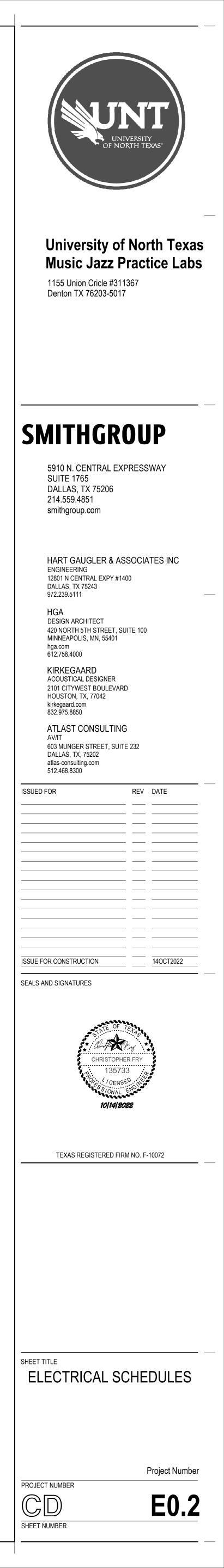
MOTOR CIRCUIT SIZING SCHEDULE (FOR 208V, 3 PHASE MOTORS NOTES 3,4,5)							
MOTOR HP SWITCH/FUSE		CIRCUIT	STARTER		CONDUIT & WIRE		
MOTORTIF	SWITCH/FUSE	BREAKER	SIZE/TYPE	PHASE	E.G.	CONDUIT	
1/2	30/4A.	15A	1	12	12	3/4"	
3/4	30/6.25A.	15A	1	12	12	3/4"	
1	30/8A.	15A	1	12	12	3/4"	
1 1/2	30/15A.	20A	1	12	12	3/4"	
2	30/15A.	20A	1	12	12	3/4"	
3	30/20A.	25A	1	12	12	3/4"	
5	30/30A.	40A	1	10	10	3/4"	
7 1/2	60/45A.	60A	1	8	10	3/4"	
10	60/60A.	70A	2	8	8	3/4"	
15	100/90A.	110A	3	4	6	1"	
20	200/110A.	125A	3	3	6	1 1/4"	
25	200/150A.	175A	3	2	6	1 1/4"	
30	200/175A.	200A	4	1	6	1 1/4"	
40	200/200A.	250A	4	1/0	4	1 1/2"	
50	400/250A.	350A	5	3/0	3	2"	
60	400/300A.	400A	5	4/0	3	2"	
75	400/400A.	500A	5	300	2	2 1/2"	
100	600/500A.	600A	6	500	1	3"	
125	800/700A.	800A	6	2-4/0	2-1/0	2-2"	
150	800/700A.	800A	6	2-250	2-1/0	2-2"	
200	1200/1000A	1200A	7	2-400	2-3/0	2-2 1/2"	

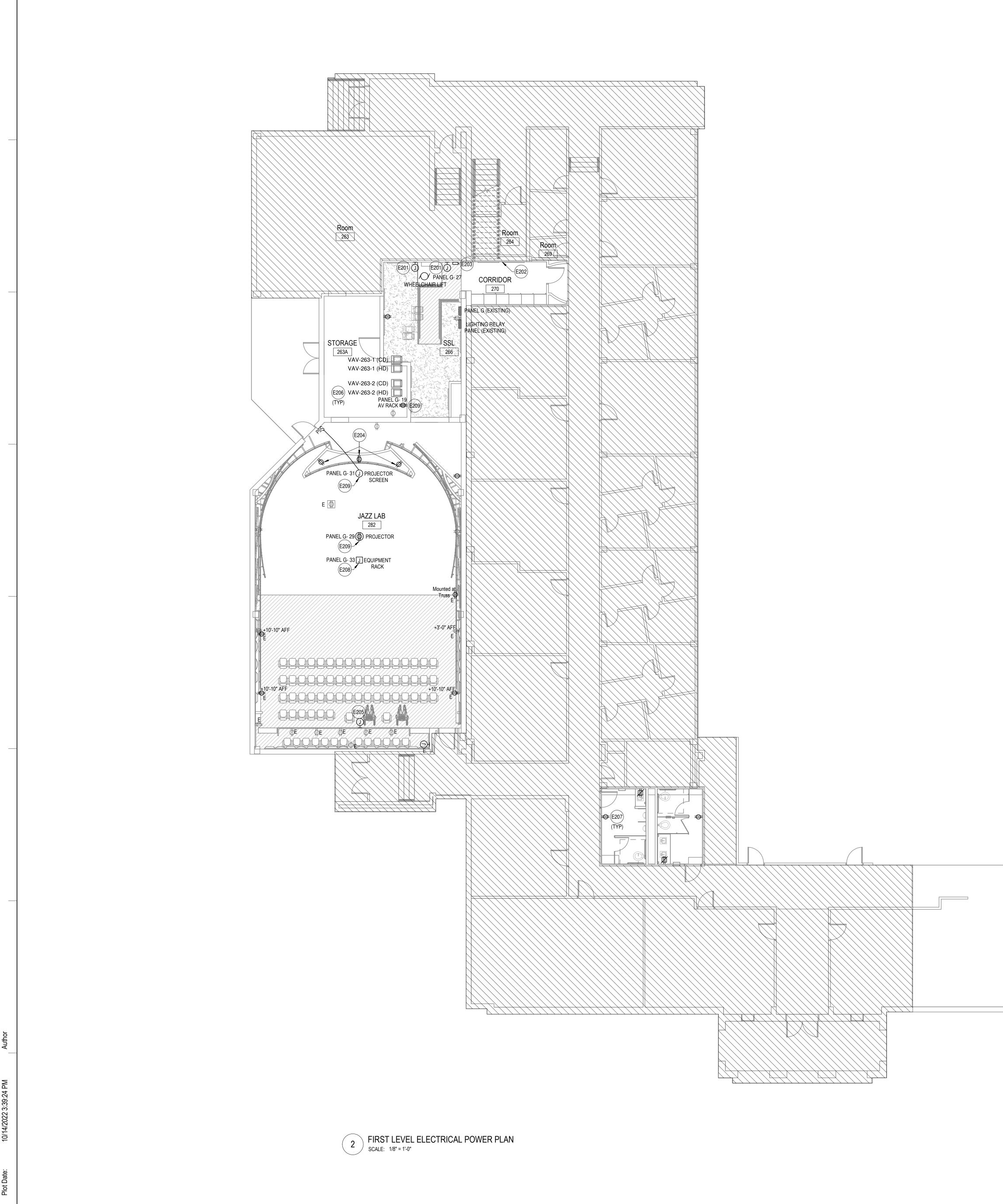
TRANSFORMER CIRCUIT SIZING SCHEDULE - GENERAL PURPOSE TYPE (NOTE 6)

TRANSF. KVA	PRIMARY CIF	RCUIT (480V.)	SECONDARY CIRCUIT (208/120V.)			
INANSE. NVA	SWITCH/FUSE OR CIRCUIT BREAKER	PRIMARY FEEDER	SWITCH/FUSE OR CIRCUIT BREAKER	SYSTEM/EQUIPMENT BONDING JUMPER (GROUND WIRE)	SECONDARY FEEDER	
9	30/20A.	20A., 3W.	30/30A.	#8	30A., 4W.	
15	30/25A.	25A., 3W.	60/60A.	#8	60A., 4W.	
30	60/45A.	45A., 3W.	100/100A.	#8	100A., 4W.	
45	100/70A.	70A., 3W.	200/175A.	#4	175A., 4W.	
75	200/125A.	125A., 3W.	400/300A.	#2	300A., 4W.	
112 1/2	200/175A.	175A., 3W.	400/400A.	#1/0	400A., 4W.	
150	400/225A.	225A., 3W.	600/600A.	#2/0	600A., 4W.	
225	400/350A.	350A., 3W.	800/800A.	#3/0	800A., 4W.	
300	600/500A.	500A., 3W.	1200/1000A.	#3/0	1000A., 4W.	

TRANSFORMER CIRCUIT		
	SIZING SCREDULE -INUN	LINEAR LUAD TIFE

			(NOTE 6)			
	PRIMARY CIR	CUIT (480V.)	SECONDARY CIRCUIT (208/120V.)			
TRANSF. KVA	SWITCH/FUSE OR CIRCUIT BREAKER	PRIMARY FEEDER	SWITCH/FUSE OR CIRCUIT BREAKER	SYSTEM/EQUIPMENT BONDING JUMPER (GROUND WIRE)	SECONDARY FEEDER	
9	30/20A.	20A., 3W.	30/30A.	#8	30A., 5WNL	
15	30/25A.	25A., 3W.	60/60A.	#8	60A., 5WNL	
30	60/45A.	45A., 3W.	100/100A.	#8	100A., 5WNL	
45	100/70A.	70A., 3W.	200/175A.	#4	175A., 5WNL	
75	200/125A.	125A., 3W.	400/300A.	#2	300A., 5WNL	
112 1/2	200/175A.	175A., 3W.	400/400A.	#1/0	400A., 5WNL	
150	400/225A.	225A., 3W.	600/600A.	#2/0	600A., 5WNL	
225	400/350A.	350A., 3W.	800/800A.	#3/0	800A., 5WNL	





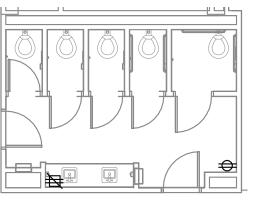
- . SEE DRAWING E0.1 FOR ABBREVIATIONS, SYMBOLS, GENERALNOTES AND DEVICE MOUNTING HEIGHT OF WALL
- MOUNTED DEVICES, UON. COORDINATE ALL DEVICE LOCATIONS AND MOUNTING HEIGHTS WITH ARCHITECTURAL DRAWINGS PRIOR TO ROUGH-IN.
- . THE CONTRACTOR SHALL COORDINATE EXACT LOCATION OF EQUIPMENT POWER CONNECTIONS WITH EQUIPMENT
- INSTALLER PRIOR TO ROUGH-IN. . SEE MECHANICAL EQUIPMENT SCHEDULE FOR ASSOCIATED OVERCURRENT DEVICES, DISCONNECT SWITCHES,
- STARTERSAND WIRES. . CONTRACTOR SHALL BE RESPONSIBLE FOR SUPPLYING ANY REQUIRED TRANSFORMER/POWER SUPPLIES FOR DOOR HARDWARE. COORDINATE WITH ARCHITECTURAL AND SECURITY DRAWINGS FOR DOOR HARDWARE. PROVIDE 120V POWER AS REQUIRED.
- . X-RAY EXISTING FLOORS TO COORDINATE ALL WIRING DEVICE AND CORE DRILL LOCATIONS WITH ARCHITECTURAL DRAWINGS PRIOR TO ROUGH IN. LOCATION TO BE DETERMINED IN CONJUNCTION WITH FURNITURE SELECTION. 6. CONTRACTOR SHALL COORDINATE AND FIELD VERIFY
- REQUIREMENT OF NEUTRAL CONDUCTOR FOR ALL EQUIPMENT AND PROVIDE NEUTRAL CONDUCTOR AS NECESSARY. H. FOR WORKSTATION CIRCUITS SHARING A NEUTRAL, PROVIDE TIE APPROVED TIE BREAKERS AS PER NEC.
- TRIPPING OF GFCI RECEPTACLES SHALL NOT AFFECT THE DOWNSTREAM RECEPTACLES. NO MORE THAN 3 CIRCUITS MAY SHARE A HOMERUN.
- K. FOR ALL MECHANICAL EQUIPMENT, PROVIDE ADDITIONAL 120V CONNECTIONS REQUIRED BY MANUFACTURER. . FOR EACH AIR HANDLING UNIT, PROVIDE (1)120V CONNECTION FOR LIGHTING AND RECEPTACLES. CIRCUIT TO MECHANICAL PANEL WITHIN THE SPACE.
- M. PROVIDE 120V CIRCUITS FOR CONTROL PANELS AS REQUIRED BY CONTROL VENDOR. CIRCUIT TO MECHANICAL PANEL WITHIN THE SPACE.
- N. ALL UNUSED WALL OUTLETS TO BE COVERED WITH BLANK PLATE. ALL BLANK PLATE COLORS TO MATCH WALL COLOR. . SEE ANY COMMUNICATIONS PATHWAY PLAN AND AV DRAWINGS, FOR ADDITIONAL CONDUIT TO BE PROVIDED BY ELECTRICAL CONTRACTOR.
- ALL CONDUIT ROUTED WITHIN SLAB SHALL COMPLY WITH GUIDELINES LISTED IN STRUCTURAL DRAWINGS. Q. FOR DEVICES LABELED WITH RECTANGULAR TAG, REFER TO KITCHEN EQUIPMENT SCHEDULE ON E7 SERIES CONNECTIONS, CIRCUITS AND DEVICE TYPES.
- . UNLESS OTHERWISE NOTED, ALL SWITCHED RECEPTACLES TO BE CONTROLLED BY OCCUPANCY SENSOR OR CONTACTORS. SEE CONTROLS SCHEDULES ON AND DETAILS ON FOR ADDITIONAL CONNECTION INFORMATION.
- COORDINATE FINAL LOCATION OF MECHANICAL AND PLUMBING EQUIPMENT AND ASSOCIATED DISCONNECT SWITCHES, STARTERS, VFDS, CONTROL POWER AND OTHER POWER REQUIREMENTS WITH DIV 22 AND 23. . CONTRACTOR IS RESPONSIBLE FOR ALL WIRING FROM VFDs
- AND DISCONNECTS SHOWN IN DRAWINGS TO THE EQUIPMENT AND IS TO COORDINATE WITH EQUIPMENT MANUFACTURER AND INSTALLATION INSTRUCTIONS. I. WALL MOUNTED AND CEILING MOUNTED TRANSFORMERS SHALL BE MOUNTED SUCH THAT THE TRANSFORMER
- ENCLOSURE AND ALL ELEMENTS OF THE HANGER SUPPORT SYSTEM ARE LOCATED ABOVE THE MINIMUM WORKING SPACE HEIGHT IN COMPLIANCE WITH NEC 110.26. . ANY CIRCUITS NO LONGER UTILIZED AFTER DEMOLITION AND NEW DEVICES SHALL BE MARKED AS SPARE ON FINAL TYPE-WRITTEN PANEL SCHEDULE AND PROVIDED TO OWNER.

CIRCUIT BREAKER AT PANEL TO BE SWITCHED OFF.

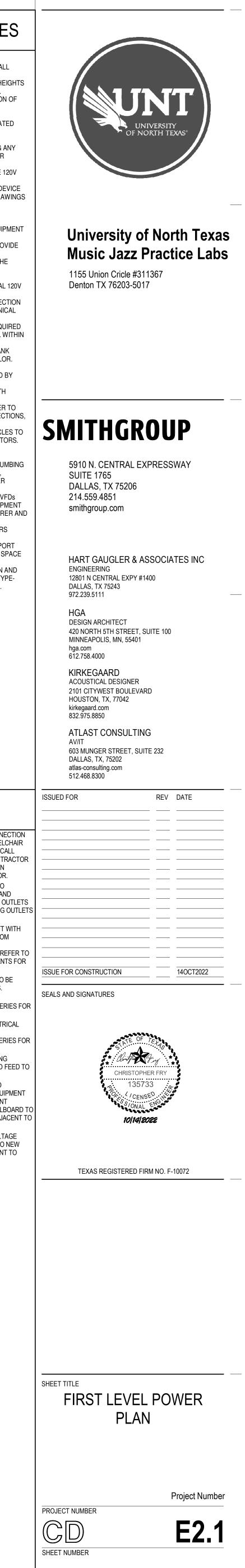


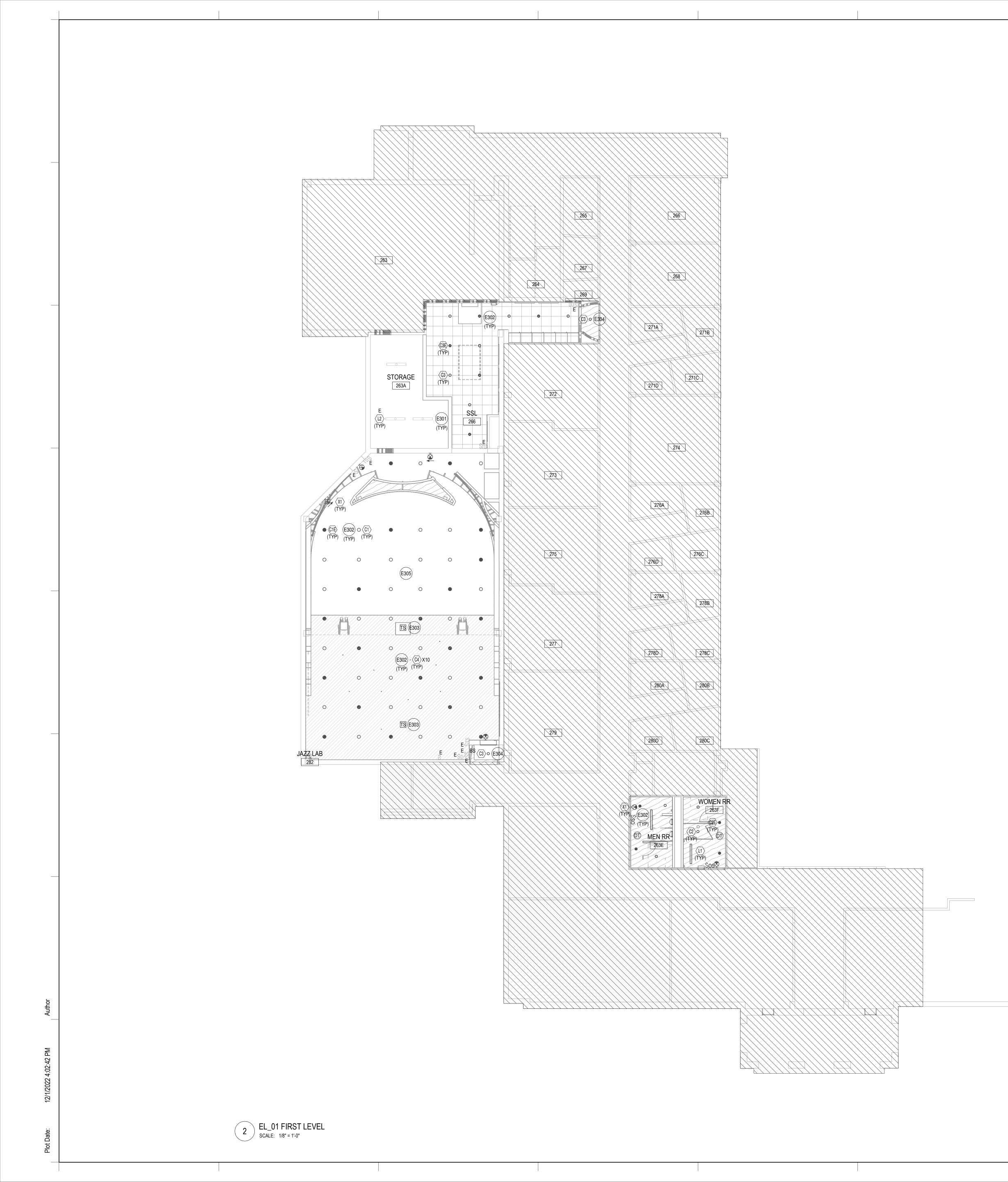
01	JUNCTION BOX TO SERVE AS POINT OF CONNE FOR WHEELCHAIR LIFT CALL STATION, WHEELC LIFT TO BE ORDERED WITH WALL MOUNTED CA STATION AT UPPER AND LOWER LEVEL. CONTR TO REFER TO MANUFACTURER INSTALLATION REQUIREMENTS FOR CONNECTION TO MOTOR.
02	EXISTING WALL TO REMAIN. CONTRACTOR TO PRESERVE OUTLETS IN PLACE OR REMOVE ANI REINSTALL. CONTRACTOR TO REPLACE ANY OL DAMAGED DURING CONSTRUCTION. EXISTING ( TO BE PAINTED MATTE BLACK.
03	CONTRACTOR TO PROVIDE WHEELCHAIR LIFT M ELECTRICAL DISCONNECT AS AVAILABLE FROM MANUFACTURER. DISCONNECT SHOWN FOR INSTALLATION ROUGH-IN. CONTRACTOR TO RE MANUFACTURER INSTALLATION REQUIREMENT ADDITIONAL INFORMATION.
04	EXISTING CONDUIT AND CONDUCTOR ARE TO E REUSED FOR NEW RECEPTACLE LOCATIONS.
05	LOCATION OF NEW RECORDING STATION. CONTRACTOR TO REFER TO AV AND DATA SER ADDITIONAL INFORMATION.
06	CONTRACTOR TO CONNECT EXISTING ELECTRI POINT OF CONNECTION TO NEW LOCATION. CONTRACTOR TO REFER TO MECHANICAL SERI EXISTING AND NEW LAYOUT.
07	CONTRACTOR TO USE SAME CIRCUIT SERVING EXISTING ELECTRICAL DEVICES AND EXTEND F NEW LAYOUT OF ELECTRICAL DEVICES.
08	CONTRACTOR TO UTILIZE EXISTING FEED TO EQUIPMENT STATION FOR FEED TO NEW EQUIP RACK. CONTRACTOR TO INSTALL A TRANSIENT VOLTAGE SURGE SUPPRESSOR FROM PANELBO NEW DEVICE LOCATION, WALL MOUNTED ADJAC PANELBOARD.

PANELBOARD. CONTRACTOR TO INSTALL A TRANSIENT VOLTAGE SURGE SUPPRESSOR FROM PANELBOARD TO NEW DEVICE LOCATION, WALL MOUNTED ADJACENT TO PANELBOARD.



1 TOILET ROOM 263D ALTERNATE SCALE: 1/8" = 1'-0"





SOS (XI) (TYP)

1 TOILET ROOM 263D ALTERNATE SCALE: 1/8" = 1'-0"

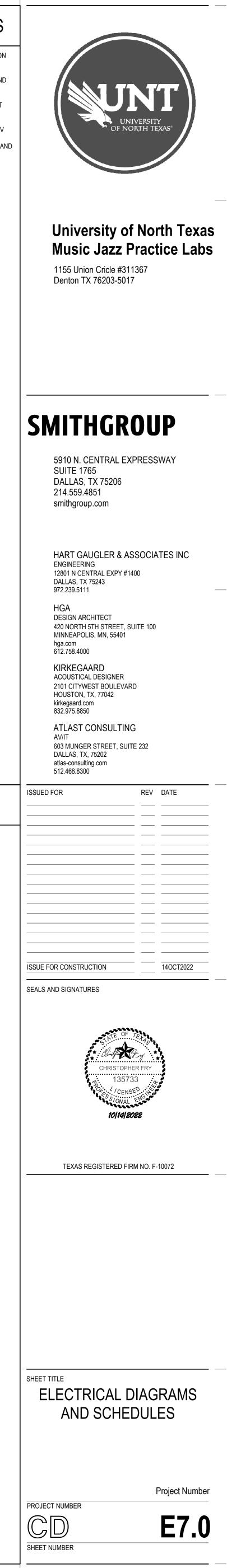
GENERAL SHEET NOTES	
<ul> <li>SEE DRAWING E0.1 FOR ABBREVIATIONS, SYMBOLS, AND GENERAL NOTES.</li> <li>SEE SCHEDULE ON SHEET E7.1 FOR CONTROL PANEL (LIGHTING &amp; RECETACLE) INFORMATION.</li> <li>COORDINATE ALL DEVICE LOCATIONS AND MOUNTING HEIGHTS WITH ARCHITECTURAL DRAWINGS PRIOR TO ROUGH-IN.</li> <li>REFER TO ARCHITECTURAL REFLECTED CEILING PLANS FOR</li> </ul>	UNT
<ul> <li>EXACT LOCATION OF LIGHT FIXTURES AND OTHER CEILING MOUNTED DEVICES.</li> <li>PROVIDE DEDICATED NEUTRALS FOR EACH DIMMING CIRCUIT.</li> <li>ALL LIGHTING BRANCH CIRCUIT WIRING SHALL BE A MINIMUM SIZE OF #10 AWG. COORDINATE FINAL WIRE SIZE REQUIRED WITH SCHEDULES ON SHEET E0.02.</li> <li>FIXTURES INDICATED ON PLANS WITH BOTH EMERGENCY AND NORMAL POWER CIRCUIT NUMBERS SHALL BE CONNECTED TO AUTOMATIC TRANSFER DEVICE TO ALLOW FOR EMERGENCY FIXTURES TO BE CONTROLLED BY INDICATED</li> </ul>	UNIVERSITY OF NORTH TEXAS®
RELAY OR SWITCH DURING NORMAL POWER, AND SWITCH TO EMERGENCY POWER CIRCUIT (FULL OUTPUT) DURING NORMAL POWER LOSS. PROVIDE # OF DEVICES AND ALL ACCESSORIES AND WIRING REQUIRED PER MANUFACTURER'S WIRING INSTRUCTIONS. FOR TRANSFER DEVICES CONTROLLING MULTIPLE FIXTURES, LOCATE CLOSE TO FIRST EMERGENCY FIXTURE IN CONTROL ZONE IN NEAREST ACCESSIBLE LOCATION. COORDINATE PROPER WIRE TYPE AND QUANTITY WITH MANUFACTURER.	University of North Texas Music Jazz Practice Labs
<ul> <li>AUTOMATIC TRANSFER DEVICES SHALL BE WIRED SUCH THAT EXIT SIGNS WILL NOT BE SWITCHED WITH EMERGENCY LIGHTING TO MAINTAIN CONTINUOUS ON OPERATION. CONNECT EXIT SIGNS TO NEAREST 277V EMERGENCY CIRCUIT ON FLOOR.</li> <li>CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING PROPER WIRE TYPE AND QUANTITY WITH MANUFACTURER.</li> <li>LOWERCASE ALPHABETICAL SUBSCRIPT ON FIXTURES/DEVICES INDICATES SWITCHING ZONE WITHIN</li> </ul>	Denton TX 76203-5017
SPACE. WHERE MORE THAN ONE SWITCH IS SHOWN AT ANY ONE LOCATION, GANG ALL SWITCHES UNDER ONE PLATE. PROVIDE BARRIERS BETWEEN SWITCHES CONNECTED TO DIFFERENT CIRCUITS. WHERE MORE THAN ONE DIMMER IS SHOWN AT ANY ONE LOCATION, MOUNT IN A MANNER TO GIVE THE APPEARANCE OF GANG MOUNTED UNDER ONE PLATE. FOLLOW MANUFACTURERS INSTRUCTIONS FOR DISTANCES AND DERATING.	
COORDINATE ALL WALL MOUNTED WIRING DEVICE LOCATIONS WITH ARCHITECTURAL ELEVATIONS AND LIGHTING FIXTURE LOCATIONS WITH ARCHITECTURAL REFLECTED CEILING PLAN ON SHEET. REFER TO ARCH. REFLECTED CEILING PLANS FOR EXACT LOCATION OF LIGHT FIXTURES AND OTHER CEILING MOUNTED DEVICES. I. COORDINATE FIXTURES WITH ARCHITECTURAL CEILING AND WALL TYPES. THE LIGHTING CIRCUITING IS DIAGRAMMATIC. PROVIDE	5910 N. CENTRAL EXPRESSWAY SUITE 1765 DALLAS, TX 75206
<ul> <li>SWITCH LEGS, UNSWITCHED PHASE WIRES AND TRAVELLERS AS NECESSARY.</li> <li>ARCHITECT HAS FINAL APPROVAL OVER ALL FINISHES.</li> <li>FOR ALL CEILING MOUNTED OCCUPANCY SENSORS AND EXIT SIGNS MOUNTED IN OPEN CEILINGS, LOCATE AT HEIGHT SO THAT TOP OF DEVICE IS ALIGNED WITH LOWEST ADJACENT CEILING TO MAINTAIN INTENDED OPERATIONAL RANGE AND VISIBILITY.</li> <li>WHERE GENERAL PURPOSE RECEPTACLES ARE SHOWN</li> </ul>	214.559.4851 smithgroup.com HART GAUGLER & ASSOCIATES INC
<ul> <li>WITHIN 2' OF A LIGHTING CONTROL DEVICE, ALIGN DEVICES</li> <li>VERTICALLY IN ELEVATION. COORDINATE LOCATIONS OF</li> <li>MECHANICAL THERMOSTATS AND ALIGN WITH LIGHTING</li> <li>CONTROL.</li> <li>FOR ALL LIGHTING CONTROL DEVICE SYMBOLS SHOWN ON</li> <li>PLANS, SEE SHEET E0.1 FOR LIGHTING CONTROL</li> <li>DESCRIPTION AND TYPE/FUNCTIONALITY OF DEVICE(S) TO BE</li> <li>PROVIDED WITHIN ROOM. FOR ALL LOW VOLTAGE WALL</li> <li>SWITCH DIMMERS, PROVIDE SEPARATE BUTTONS FOR EACH</li> </ul>	ENGINEERING 12801 N CENTRAL EXPY #1400 DALLAS, TX 75243 972.239.5111 HGA DESIGN ARCHITECT 420 NORTH 5TH STREET, SUITE 100 MINNEAPOLIS, MN, 55401
<ul> <li>DIMMING ZONE TO ALLOW FULL RANGE DIMMING OF EACH ZONE.</li> <li>FIELD COORDINATE LIGHT FIXTURE LOCATIONS IN ELECTRICAL, MECHANICAL AND TELECOM ROOMS WITH EQUIPMENT, DUCTS, PIPING, TELECOM, SECURITY, AND ALL UTILITIES IN SPACE.</li> <li>EXIT SIGNS ARE REQUIRED TO BE READILY VISIBLE. ENSURE THE EXIT SIGNS ARE NOT OBSTRUCTED. ALL EXIT SIGNS SHALL BE CIRCUITED TO NEAREST LIGHT FIXTURE AND BE UNSWITCHED.</li> </ul>	hga.com 612.758.4000 KIRKEGAARD ACOUSTICAL DESIGNER 2101 CITYWEST BOULEVARD HOUSTON, TX, 77042 kirkegaard.com 832.975.8850
ALL FIXTURES SHOWN FOR LIFE SAFETY TO BE PROVIDED WITH FIXTURE BATTERY BAKUP CAPABLE OF 90 MINUTES PAST LOSS OF POWER.	ATLAST CONSULTING AV/IT 603 MUNGER STREET, SUITE 232 DALLAS, TX, 75202 atlas-consulting.com 512.468.8300
◯ SHEET KEYNOTES	ISSUED FOR       REV       DATE
<ul> <li>CONTRACTOR TO REUSE EXISTING LIGHT FIXTURES AND REINSTALL IN ACCORDANCE WITH NEW LAYOUT SHOWN. CONTRACTOR TO EXTEND EXISTING CIRCUITRY FOR RELOCATED LIGHT FIXTURES.</li> <li>NEW LIGHT FIXTURES AND LAYOUT IN THIS SPACE, CONTRACTOR TO UTILIZE CIRCUIT FROM PREVIOUS LIGHT FIXTURE LAYOUT AND EXTEND FEED TOWARDS NEW LIGHT FIXTURES SHOWN. CONTRACTOR TO REFER TO ARCHITECTURAL</li> </ul>	
SERIES FOR ADDITIONAL INFORMATION ON LAYOUT OF LIGHT FIXTURES IGHTING CONTROL TOUCH SCREEN TO BE INSTALLED IN MILLWORK, CONTRACTOR TO CONFIRM LOCATION WITH DESIGN TEAM PRIOR TO ROUGH-INTO MILLWORK. CONTRACTOR TO UTILIZE EXISTING ELECTRICAL INFRASTRUCTURE FOR INSTALLATION OF NEW DEVICES. CONTRACTOR TO PROVIDE FIXTURE WITH	ISSUE FOR CONSTRUCTION         140CT2022
ALUMINUM TRIM. NEW THEATRICAL LIGHT FIXTURES WILL BE OWNER PROVIDER, CONTRACTOR INSTALLED. CONTRACTOR TO COORDINATE WITH OWNER FINAL FIXTURE LAYOUT. CONTRACTOR TO UTILIZE CIRCUIT "PANEL G~35,37" FOR POWER TO REQUIRED RECEPTACLE AND OR HARD WIRE.	SEALS AND SIGNATURES
	10/14/2022
	TEXAS REGISTERED FIRM NO. F-10072
	SHEET TITLE FIRST LEVEL LIGHTING PLAN
	Project Number

	Branch Panel: PANE Location: SSL 266 Supply From: Mounting: Surface Enclosure: Type 1	LG				Volts: Phases: Wires:		20				A.I.C. Rating: Mains Type: MCB Mains Rating: 200 A		
СКТ	Circuit Description	Trip	Poles	Α (	VA)	B(	VA)	C	VA)	Poles	Trip	Circuit De	escription	ск
1	PROJ. RM 282 CAM & LGTS	20 A	1	0	0	- (				1		PLUGS 282		2
3	LIGHTS	20 A	1			0	0			1		PLUGS 282		4
5	LIGHTS	20 A	1					0	0	1	-	PLUGS 263-A		6
7	LIGHTS	20 A	1	0	0					1		PLUGS 263		8
9	LIGHTS	20 A	1		-	0	0			1	20 A	OUTSIDE PLUG		10
11	LIGHTS	20 A	1					0	0	1		PLUGS 282		12
13	LIGHTS	20 A	1	0	0					1		PLUGS 263		14
15	SCREEN	20 A	1	-	-	0	0			1	20 A	LIGHTS		16
17	PLUGS	20 A	1					0	1680	1	20 A	JAZZ LAB 282 LIGHTING	à	18
19	STORAGE 263A AV RACK	20 A	1	360	0					1		PLUGS RM 262-A		20
21	PLUG ENCOUNTER	20 A	1		-	0	0			1	-	PLUGS RM 262-A		22
23	EXISTING POWER	20 A	1					0	0	1	20 A	PLUGS RM 260/262		24
25	EXISTING POWER	20 A	1	0	0					1	20 A	PLUGS		26
27	WHEELCHAIR LIFT ROOM 270	20 A	1			1440	0			1		SPEAKER FRONT		28
29	JAZZ LAB 282 PROJECTOR	20 A	1			-		180	0	1	20 A	SPEAKER REAT		30
31	JAZZ LAB 282 PROJECTOR SCREEN	20 A	1	180	0									32
33	JAZZ LAB 282 EQUIPMENT RACK	20 A	1			180	0			3	40 A	40A DIMMER RACK		34
35	SPARE	20 A	1					0	0	1				36
37	SPARE	20 A	1	0	0					1	20 A	SPARE		38
39	SPARE	20 A	1			0	0			1	20 A	SPARE		40
41	SPARE	20 A	1					0	0	1		SPARE		42
	-		al Load:	540	VA	162	0 VA	186	0 VA			-		
			I Amps:		Α	15	5 A		' A	]				
Load C	classification	Con	nected L	oad	De	mand Fa	ctor	Estin	nated De	mand		Panel	Totals	
Recept	acle		900 VA			100.00%	D		900 VA					
Lighting			1680 VA			100.00%		1680 VA		1	Total Conn. Load:		4020 VA	
Mechanical Equipment			1440 VA			80.00%			1152 VA	A		Total Est. Demand:	3732 VA	
												Total Conn.:		
												Total Est. Demand:	10 A	

		LIGH	ITING FIX	TURE	SCHED	ULE			
TYPE	DESCRIPTION	MANUFACTURER	MODEL	LOAD	WATTS PER FOOT (FOR CONTINUOU S RUNS)	VOLTAGE	MOUNTING	COMMENTS	TYPE
C1	PENDANT MOUNTED LED CYLINDER FIXTURE	LITHONIA	LDN6CYL 35 30 L06 BR LSS MVOLT GZ1 ACC 90CRI	35 VA		120 V	PENDANT	COWINEINTS C1E FIXTURE TO BE PROVIDED WITH BATTERY BACKUP FOR LOSS OF POWER OPERATION. CONTRACTOR TO ALSO PROVIDE EMERGENCY RELAY PACK FOR TRANSISTION OF POWER FROM NORMAL TO BACKUP.	C1
C2	RECESSED 4 IN DOWNLIGHT	LITHONIA	LDN4 35K 30 L04 WR LSS MVOLT GZ10 EL 90CRI	32 VA		120 V	RECESSED	C2E FIXTURE TO BE PROVIDED WITH BATTERY BACKUP FOR LOSS OF POWER OPERATION. CONTRACTOR TO ALSO PROVIDE EMERGENCY RELAY PACK FOR TRANSISTION OF POWER FROM NORMAL TO BACKUP.	C2
C3	RECESSED 4 IN DOWNLIGHT	LITHONIA	LDN4 35K 30 L04 BR LSS MVOLT GZ10 EL 90CRI	32 VA		120 V	RECESSED	C3E FIXTURE TO BE PROVIDED WITH BATTERY BACKUP FOR LOSS OF POWER OPERATION. CONTRACTOR TO ALSO PROVIDE EMERGENCY RELAY PACK FOR TRANSISTION OF POWER FROM NORMAL TO BACKUP.	C3
C4	PENDANT MOUNTED LED CYLINDER FIXTURE	LINDSLEY LIGHTING	LSSPN 10 35 0990 BK BK 30 B	35 VA		120 V	PENDANT	C1E FIXTURE TO BE PROVIDED WITH BATTERY BACKUP FOR LOSS OF POWER OPERATION. CONTRACTOR TO ALSO PROVIDE EMERGENCY RELAY PACK FOR TRANSISTION OF POWER FROM NORMAL TO BACKUP.	C4
L1	RECESSED LINEAR LED FIXTURE	FINELITE	HP 4 R D B 935 F 96LG 120 SC FC10 FE SW LGD10W	32 VA	8 VA	120 V	RECESSED	L1E FIXTURE TO BE PROVIDED WITH BATTERY BACKUP FOR LOSS OF POWER OPERATION. CONTRACTOR TO ALSO PROVIDE EMERGENCY RELAY PACK FOR TRANSISTION OF POWER FROM NORMAL TO BACKUP.	L1
L2	CHAIN SUSPENDED LINEAR FIXTURE			32 VA		120 V	SUSPENDED	EXISTING LIGHT FIXTURE, CONTRACTOR TO FIXTURES. IF INSUFFICIENT NUMBER OF FIXTURES CONTRACTOR TO ORDER FIXTURE PART NUMBER	L2
X1	WALL MOUNTED EXIT SIGN	LITHONIA	EDG 1 R EL	9 VA		120 V	WALL		X1



# GENERAL SHEET NOTES A. COORDINATE ALL FINAL LOCATIONS, LOADS, AND CONNECTION REQUIREMENTS WITH MECHANICAL DRAWINGS AND FINAL EQUIPMENT SELECTION. B. CONTRACTOR TO VERIFY THAT LUGS ON ALL MECHANICAL AND ELECTRICAL EQUIPMENT CAN ACCEPT THE WIRE SIZES INDICATED ON SCHEDULE AND PLANS. C. CONTRACTOR TO VERIFY WIRE SIZES WITH FINAL EQUIPMENT LOCATIONS TO ACCOUNT FOR VOLTAGE DROP ON ALL MECHANICAL EQUIPMENT. FOR ALL MECHANICAL EQUIPMENT, PROVIDE ADDITIONAL 120V CONNECTIONS AS REQUIRED BY MANUFACTURER. COORDINATE ALL MECHANICAL DISCONNECT, VFD, STARTER AND CONTROLLER REQUIREMENTS WITH MANUFACTURER. ◯ SHEET KEYNOTES





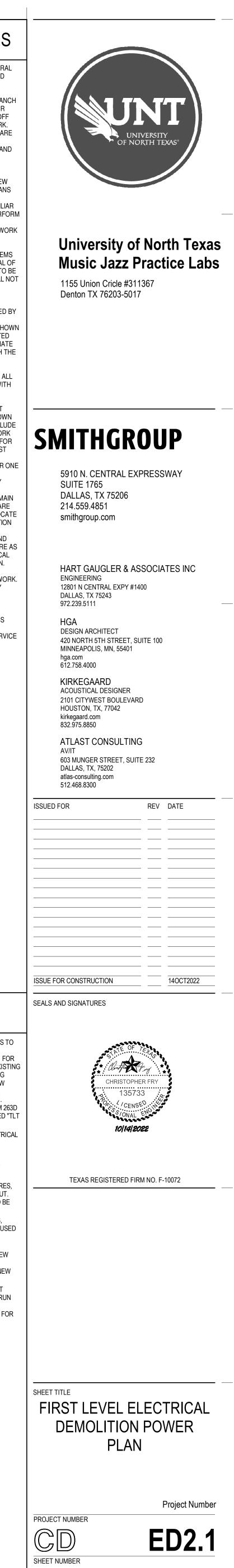
- A. SEE DRAWING E0.1 FOR ABBREVIATIONS, SYMBOLS, GENERAL NOTES AND DEVICE MOUNTING HEIGHT OF WALL MOUNTED DEVICES, UON.
  B. SEE DRAWING SERIES E7 FOR ALL SCHEDULES.
  C. REMOVE EXISTING ELECTRICAL DEVICES, EQUIPMENT, BRANCH
- CIRCUITS AND FEEDERS IN THEIR ENTIRETY BACK TO THEIR POINT OF ORIGIN UNLESS OTHERWISE INDICATED. TURN OFF AND LABEL CIRCUIT BREAKERS AS SPARES FOR NEW WORK. QUANTITY AND LOCATION OF DEVICES SHOWN ON PLANS ARE APPROXIMATE. FIELD VERIFY DEVICES AND LOCATIONS.
- E. PROTECT EXISTING-TO-REMAIN CEILING, FLOORS, WALLS AND PANELS AND DEVICES.
  F. SELECT DEMOLITION MAY BE REQUIRED FOR NEW CONSTRUCTION AND MAY NOT BE DELINEATED ON THIS DRAWING. CAREFULLY COORDINATE DEMOLITION WITH NEW
- CONSTRUCTION (PARTITION AND REFLECTED CEILING) PLANS TO VERIFY ACTUAL EXTENT OF DEMOLITION. G. EXAMINE THE DRAWINGS OF OTHER TRADES AND BE FAMILIAR WITH THE DEMOLITION REQUIRED BY OTHER TRADES. PERFORM INCIDENTAL ELECTRICAL DEMOLITION WORK AND/OR
- RELOCATION REQUIRED TO FACILITATE THE DEMOLITION WORK OF OTHER TRADES, WHETHER OR NOT SPECIFICALLY INDICATED I. THOROUGHLY SURVEY THE EXISTING BUILDING AND SYSTEMS PRIOR TO SUBMITTING THE BID PRICE. INCLUDE A REMOVAL OF ALL ASSOCIATED COMPONENTS OF SYSTEMS INDICATED TO BE
- REMOVED. DEMOLISHED ELECTRICAL COMPONENTS SHALL NOT BE ABANDONED IN PLACE.
  I. PROVIDE BLANK COVER PLATES WHERE DEVICES ARE REMOVED BUT EXISTING WALLS REMAIN INTACT.
  J. PROVIDE NEW TYPED DIRECTORIES FOR PANELS AFFECTED BY THIS ALTERATION.
- K. FOR ALL EXISTING TO REMAIN MECHANICAL EQUIPMENT SHOWN ON THE MECHANICAL DRAWINGS, MAINTAIN ALL ASSOCIATED ELECTRICAL DEVICES AND CIRCUIT CONTINUITY. COORDINATE ALL MECHANICAL CONNECTIONS TO BE DEMOLISHED WITH THE MECHANICAL DRAWINGS. FOR DEMOLISHED EQUIPMENT, REMOVE ALL WIRDING AND CONDUCT DESCRETE
- REMOVE ALL WIRING AND CONDUIT BACK TO PANEL.
  L. RECYCLE OR DISPOSE MATERIALS OFF SITE AND INCLUDE ALL COSTS IN BID. HANDLE ALL MATERIALS IN ACCORDANCE WITH LEED REQUIREMENTS, ALL FEDERAL, STATE, AND LOCAL REGULATIONS.
  M. WHERE EXISTING BUILDING SERVICES AND/OR EQUIPMENT THAT IS TO REMAIN IN LISE ARE REQUIRED TO TO TO TOTAL.
- THAT IS TO REMAIN IN USE ARE REQUIRED TO BE SHUT DOWN COORDINATE WITH THE OWNER'S REPRESENTATIVE., INCLUDE ALL ASSOCIATED OVERTIME COSTS TO PERFORM THIS WORK DURING WEEKENDS AND EVENINGS. INCLUDE ALL COSTS FOR PROVIDING TEMPORARY POWER WHERE SHUT DOWN MUST OCCUR FOR PERIODS LONGER THAN THESE HOURS. COORDINATE ELECTRICAL SHUT DOWNS WITH THE OWNER ONE
- WEEK PRIOR TO SHUT DOWN.
  N. REMOVE ELECTRICAL EQUIPMENT INDICATED WITH HEAVY WEIGHT DASHED LINES OR INDICATED WITH KEYNOTES.
  O. PROVIDE CODE-COMPLIANT SUPPORT TO EXISTING-TOREMAIN UNSUPPORTED CONDUITS AND BOXES WHERE CEILINGS ARE TO BE REMOVED. RE-ROUTE BRANCH CIRCUITS AND RELOCATE UNIOTION DOVED TO PROVIDE TO PR
- JUNCTION BOXES AS REQUIRED TO FACILITATE INSTALLATION OF NEW EQUIPMENT AND SYSTEMS IN CEILING SPACES.
   P. MAINTAIN ELECTRICAL SERVICE TO LIGHTING FIXTURES AND DEVICES THAT ARE TO REMAIN. EXTEND CONDUIT AND WIRE AS REQUIRED WHERE DEMOLITION WORK AFFECTS ELECTRICAL SERVICE TO DOWNSTREAM DEVICES THAT ARE TO REMAIN.
- Q. SEE ARCHITECTURAL AND NON-POWER/LIGHTING MEP DRAWINGS FOR ALL NON-POWER/LIGHTING DEMOLITION WORK.
   REMOVE ELECTRICAL EQUIPMENT INDICATED WITH HEAVY WEIGHT DASHED LINES OR INDICATED WITH KENNESSE
- WEIGHT DASHED LINES OR INDICATED WITH KEYNOTES. S. EXISTING TO REMAIN DEVICES SHOWN IN SOLID LINES. CIRCUITING SHOWN IS EXISTING TO REMAIN. MAINTAIN ELECTRICAL SERVICE TO LIGHTING FIXTURES AND DEVICES THAT ARE TO REMAIN. EXTEND CONDUIT AND WIRE AS REQUIRED WHERE DEMOLITION AFFECTS ELECTRICAL SERVICE TO DOWNSTREAM DEVICES THAT ARE TO REMAIN.

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- LIGHT FIXTURES AND ELECTRICAL DEVICES TO BE REMOVED FROM EXISTING SPACE. CONTRACTOR TO REFER TO E2.1 AND E3.1 FOR NEW LAYOUT. CONTRACTOR TO TRACE EXISTING LIGHTING AND RECEPTACLE CIRCUIT BEING USED, AND REUTILIZE FEED TOWARDS NEW LAYOUT. PANELBOARD SCHEDULES TO BE UPDATED WITH TYPE WRITTEN SCHEDULE. LIGHTING CIRCUIT TO BE LABELED "TLT RM 263D LIGHTING". OUTLET CIRCUIT TO BE LABELED "TLT RM 263D RCPTS" CONTRACTOR TO UTILIZE EXISTING ELECTRICAL INFRASTRUCTURE FOR NEW RECORDING STATION, AS SHOWN ON ARCHITECTURAL SERIES. CONTRACTOR TO REFER TO ELECTRICAL SERIES FOR NEW LAYOUT OF DEVICES. CONTRACTOR TO RELOCATE LIGHT FIXTURES, REFER TO LIGHTING PLAN FOR NEW LAYOUT.
- ANY FIXTURES NOT BEING RELOCATED TO BE PRESERVED AND RETURNED TO OWNER. REMOVE EXISTING OUTLETS AND J-BOXES, CONDUIT AND CONDUCTOR ARE TO BE REUSED FOR NEW RECEPTACLE LOCATIONS. CONTRACTOR TO CONNECT EXISTING ELECTRICAL POINT OF CONNECTION TO NEW LOCATION. CONTRACTOR TO REFER TO MECHANICAL SERIES FOR EXISTING AND NEW LAYOUT. CONTRACTOR TO REMOVE EXISTING LIGHT
- FIXTURES AND SALVAGE AS MUCH HOME RUN CONDUIT FEED FOR NEW FIXTURES AND LAYOUT. CONTRACTOR TO REFER TO E3.1 FOR ADDITIONAL INFORMATION. ALL FIXTURES REMOVED TO BE RETURNED TO OWNER.
- ED002 ED003 ED004 ED005

ED001

ED006



	GENERAL NOTES	GRO
	1. THE GENERAL CONDITIONS, SUPPLEMENTARY GENERAL CONDITIONS, SPECIFICATIONS AND REQUIREMENTS OF OTHER DIVISIONS REQUIRE COORDINATION AND SHALL APPLY TO THE DIVISION 27 CONTRACTOR. ANY CONTRADICTING INFORMATION SHALL BE SUBMITTED VIA A REQUEST FOR INFORMATION (RFI).	1. ALL EN CO AT BE
	2. COMMUNICATION CABLING INTEGRATOR HEREAFTER REFERRED TO, AS "CONTRACTOR" SHALL PROVIDE ALL MATERIALS, COMPONENTS, TOOLS, AND LABOR TO COMPLETE A TELECOMMUNICATIONS INFRASTRUCTURE AS SET FORTH IN THE STRUCTURED CABLING SYSTEM SET FORTH IN THE STRUCTURED CABLING SYSTEM 27, T DRAWINGS AND E DRAWINGS.	IN ⁻ OR 2. ALL GR NA
	3. THE CONTRACTOR SHALL CAREFULLY EXAMINE THE SITE TO DETERMINE THE EXTENT OF WORK AND CONDITION UNDER WHICH IT WILL BE DONE. REVIEW AND VERIFY CONTRACT DOCUMENTS IN RELATION TO FIELD CONDITIONS TO VERIFY ACCURACY, THE OWNER, OR THEIR DESIGNATED REPRESENTATIVE, SHOULD BE CONSULTED AS NEEDED FOR CLARIFICATION OR DIRECTION REGARDING ANY PROJECT RELATED QUESTIONS; THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING CLARIFICATION FROM THE OWNER, OR THEIR DESIGNATED REPRESENTATIVE, PRIOR TO PROCEEDING WITH THE WORK OR RELATED WORK IN QUESTION.	3. SUI AN TH/ AW AT
	4. DISCREPANCIES BETWEEN THESE PLANS AND ACTUAL FIELD CONDITIONS MUST BE BROUGHT TO THE IMMEDIATE ATTENTION OF THE OWNER, OR THEIR DESIGNATED REPRESENTATIVE, FOR CLARIFICATION.	ELEC
	5. REFER TO CONTRACT DOCUMENTS, DRAWINGS AND SPECIFICATIONS AS A UNIT AND IN WHOLE IN THE BIDDING AND INSTALLATION OF THIS PROJECT.	1. FO RE CO
	<ol> <li>ELECTRICAL CONTRACTOR SHALL READ IN THEIR ENTIRETY ALL SECTIONS OF THE COMMUNICATIONS CABLING SYSTEM DOCUMENTS AND APPLY THEM AS APPROPRIATE FOR WORK IN THIS SECTION. REF DIVISION 27 AND T DRAWINGS.</li> </ol>	DIS
	7. ELECTRICAL CONTRACTOR SHALL PROVIDE MATERIALS, COMPONENTS, TOOLS, AND LABOR TO COMPLETE COMMUNICATIONS CABLING PATHWAY, ELECTRICAL POWER DISTRIBUTION AND GROUNDING SYSTEM AS SET FORTH IN THE COMMUNICATIONS CABLING SYSTEM DOCUMENTS AND THE ELECTRICAL DOCUMENTS, SPECIFICATIONS AND DRAWINGS.	<u>COM</u>
	<ol> <li>CONTRACTOR SHALL NOTE AND REPORT TO GC PERFORMED BY ELECTRICAL CONTRACTOR WHICH DOES NOT COMPLY WITH COMMUNICATIONS SPECIFICATIONS AND DRAWINGS AND ARE INTENDED FOR THE COMMUNICATION SYSTEMS COMPONENTS.</li> <li>CONTRACTOR SHALL TAKE NECESSARY MEANS TO PROTECT COMMUNICATION SYSTEM COMPONENTS FROM MECHANICAL DAMAGE BEFORE, DURING AND AFTER CONSTRUCTION.</li> </ol>	1. CO CAI 2. HO UTI 3. WIF
	10. CONTRACTOR IS REQUIRED TO REFERENCE DIVISION 27 SPECIFICATIONS FOR ITEMIZED PRICING REQUIREMENTS.	4. SE
	11. ALL EXPOSED ELEMENTS, CABLING, AND ACCESSORIES SHALL BE BLACK IN COLOR.	4Pf 5. NO
	<b>COMMUNICATION PATHWAY</b>	TO EX0 AR0
	1. OUTLET FACEPLATES MUST BE LABELED WITH THE JACK NUMBERS OR PATCH PANEL PORTS PER SPECIFICATIONS. ALL JACKS MUST BE FLUSH WITH THE FACEPLATE.	6. ALL 1. N OF
	2. BACK BOXES INSTALLED FOR COMMUNICATIONS DATA AND VOICE WIRING TERMINATION SHALL BE 4 11/16"X4 11/16"X3" DEEP BOXES TO ALLOW FOR THE REQUIRED WORKING CLEARANCE OF THE CAT6 UTP CABLE. THESE BOXES SHALL BE SEPARATE FROM ELECTRICAL JUNCTION BOXES AND BE EXCLUSIVELY FOR DATA AND VOICE COMMUNICATIONS.	7. CO 8. LAE WI ⁻
	<ol> <li>MUD RINGS SHALL BE INSTALLED ON ALL COMMUNICATIONS WALL BOXES.</li> <li>CONDUITS TO COMMUNICATIONS WALL BOXES SHALL BE MINIMUM OF ONE IN. (1") IN DIAMETER AND SHALL BE COMPLETE WITH NYLON PULL STRING. OUTLETS HAVING MORE THAN TWO CABLES REQUIRE AN ADDITIONAL (1")</li> </ol>	9. ALL CO LIQ CO SHI
	5. SUPPLY SOLUTIONS AND SHOP DRAWINGS SUBMITTALS FOR CONDUIT SEALING MATERIALS AND SYSTEMS FOR WRITTEN APPROVAL OF MATERIAL/SYSTEMS PRIOR TO PURCHASE AND INSTALLATION. MATERIALS AND SYSTEMS SHALL BE COMPLETE UPON INSTALLATION.	
	<ol> <li>MATERIALS AND SYSTEMS SHALL BE COMPLETE UPON INSTALLATION. SWEEPING 90 DEG. BENDS AND NOT EXCEED 100 FEET. IF THESE CONDITIONS CAN NOT BE MET. A J-BOX MUST BE PLACED IN THE RUN, WITH THE ABILITY TO ACCESS BOX THROUGH THE CEILING.</li> </ol>	
_	7. CONDUITS SHALL HAVE CONNECTORS, PROTECTIVE BUSHINGS, PULL STRINGS AND SHALL BE GROUNDED.	
	8. ELECTRICAL CONTRACTOR SHALL COORDINATE WITH ARCHITECT AND TELECOMMUNICATIONS CONSULTANT ON ENTRY, PATHWAYS AND OUTLET BOX PLACEMENT IN MODULAR FURNITURE AND CUSTOM MILLWORK.	
		TELE
		T0.0.0 T2.1.1 T3.1.1 TD3.1.1
≥		
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# OUNDING AND BONDING

ALL METAL RACKS, FRAMES, CABINETS AND MISCELLANEOUS EQUIPMENT ENCLOSURES SHALL BE BONDED TOGETHER USING GREEN INSULATED COPPER WIRE SO THAT ALL EQUIPMENT, STRUCTURED CABLING RACKS ARE AT THE SAME GROUND POTENTIAL. A VOLT-OHM-METER (VOM) MEASUREMENT BETWEEN ANY TWO POINTS ON METAL RACKS AND EQUIPMENT ENCLOSURES IN THE TELECOMMUNICATIONS ROOMS SHALL BE LESS THAN 1.25 VOLTS DC OR AC POTENTIAL.

ALL GROUNDS USED SHALL BE BONDED TOGETHER TO FORM A SINGLE GROUNDING ELECTRODE SYSTEM AS REQUIRED IN ARTICLE 250 OF NFPA 70 -NATIONAL ELECTRICAL CODE.

SURFACES SHALL BE PREPARED TO PROVIDE A PROPER PATH TO GROUND. ANY SURFACE TO BE GROUNDED MUST BE FREE OF PAINT OR OTHER COATING THAT MIGHT PREVENT AN EFFECTIVE GROUND. PAINT SHOULD BE SCRAPED AWAY UNTIL METALLIC SURFACE HAS BEEN EXPOSED BEFORE THE ATTACHMENT OF GROUNDING OR BONDING WIRE.

# ECTRICAL

FOR SPECIFIC POWER AND RECEPTACLE REQUIREMENTS IN THE PROJECT REFERENCE ELECTRICAL SPECIFICATIONS AND DRAWINGS AND VERIFY WITH COMMUNICATION SPECIFICATIONS AND DRAWINGS. REPORT TO GC DISCREPANCIES PRIOR TO PURCHASE OR INSTALLATION.

# MMUNICATIONS CABLE

CONTRACTOR SHALL PROVIDE AND INSTALL HORIZONTAL COPPER DATA CABLES.

HORIZONTAL DATA CABLING SHALL CONSIST OF 23 AWG PLENUM CAT6A 4PR UTP CABLES TO EACH DATA OUTLET.

WIRELESS DATA CABLING SHALL CONSIST OF 23 AWG PLENUM CAT6A 4PR UTP CABLES TO EACH ACCESS POINT.

SECURITY IP CAMERA DATA CABLING SHALL CONSIST OF 23 AWG PLENUM CAT6A 4PR UTP CABLES TO EACH SECURITY CAMERA.

NO HORIZONTAL CABLE SHALL BE LONGER THAN 295 FEET FROM TERMINATION TO TERMINATION. IF THE CONTRACTOR BELIEVES ANY STATION CABLE WILL EXCEED THE 295 FEET LIMIT WRITTEN APPROVAL FROM THE OWNER'S ARCHITECT/ENGINEER WILL BE REQUIRED PRIOR TO INSTALLATION.

ALL HORIZONTAL CABLING SHALL ROUTE BACK TO THE NEAREST IDF ON LEVEL 1. NO PLANS ARE AVAILABLE FOR THE LOCATION, ASSUME A PERMANENT LINK OF 300' FOR EACH CABLE PULLED. LOCATION TO BE DETERMINED IN THE FIELD.

COMMUNICATIONS CABLE SHALL NOT BE PAINTED.

ABEL CABLES PER OWNER STANDARD. COORDINATE FINAL NOMENCLATURE WITH OWNER PRIOR TO INSTALLATION.

ALL CABLING INSTALLED UNDERGROUND IN CONCRETE SLABS, IN DIRECT CONTACT WITH THE EARTH, LOCATIONS SUBJECT TO SATURATION WITH LIQUIDS AND UNPROTECTED LOCATIONS EXPOSED TO WEATHER SHALL BE CONSTRUCTED WITH APPROPRIATE WEATHER PROOFING COMPOUNDS AND SHEATHING.

# LECOM SHEET INDEX

.0	TELECOM INDEX
.1	TELECOM GROUND LEVEL FLOOR PLAN
.1	TELECOM GROUND LEVEL REFLECTED CEILING PLAN
.1.1	TELECOM GROUND LEVEL DEMOLITION REFLECTED CEILING PLAN

TELECOM S	YMBOL LEGI
WAP	WIRELESS ACCESS POINT (V
xD \above{starting}	DATA OUTLET (D), CABLE TY
xD	DATA OUTLET (D) (x) = NUMBER OF CABLE RU
CAM	CEILING MOUNTED AUDIOVI
	WALL MOUNTED AUDIOVISU
CAM	FLOOR BOX MOUNTED AUD

# **ABBREVIATIONS**

\FF	ABOVE FINISHED FLOOR
WG	AMERICAN WIRE GAUGE
CON.	CONDUCTOR
0	INFORMATION OUTLET
<b>IDF</b>	MAIN DISTRIBUTION FRAME
DF	INTERMEDIATE DISTRIBUTION FRAM
AN	LOCAL AREA NETWORK
I/A	NOT APPLICABLE
liC	NOT INCLUDED IN CONTRACT
FOI	OWNER FURNISH OWNER INSTALLE
BB	TELECOMMUNICATIONS BONDING B
MBC	TELECOMMUNICATIONS MAIN BONE
ВС	TELECOMMUNICATIONS BONDING C
MGB	TELECOMMUNICATIONS MAIN GROU
GB	TELECOMMUNICATIONS GROUND B
R	TELECOM ROOM
S	TRADE SIZE
JTP	UNSHIELDED TWISTED PAIR
VP	WATERPROOF
	AWG CON. CO ADF DF AN I/A IIC DFOI BB MBC BC MBC BC MGB GB GB GB C R S JTP

# <u>SEND</u>

WAP), (DATA CEILING OUTLET), CABLE TYPE AS SPECIFIED. (2) DATA CABLE RUNS PER WIRELESS ACCESS POINT LOCATION

YPE AS SPECIFIED, MOUNTED +18" A.F.F. UNLESS NOTED OTHERWISE. (x) = NUMBER OF CABLE RUNS PER LOCATION AS INDICATED

JNS PER LOCATION AS INDICATED. STUB CONDUIT, MIN. 6" IN TO MILLWORK

ISUAL STREAMING CAMERA LOCATION. PROVIDE SDI AND FIBER CONNECTION BACK TO EQ1 IN ROOM 263A

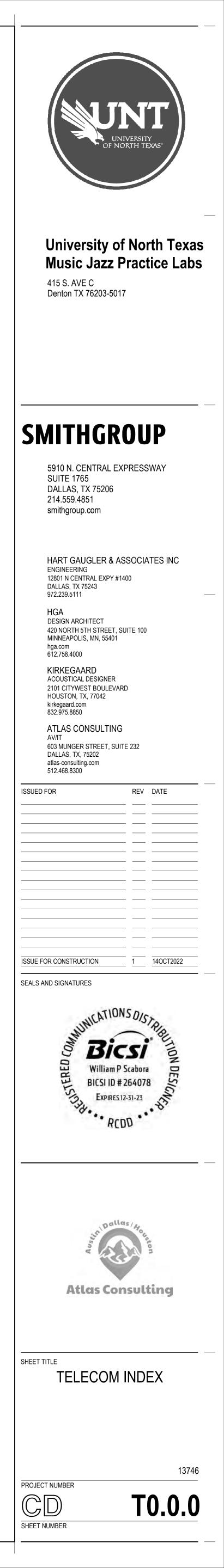
UAL STREAMING CAMERA LOCATION. PROVIDE SDI AND FIBER CONNECTION BACK TO EQ1 IN ROOM 263A

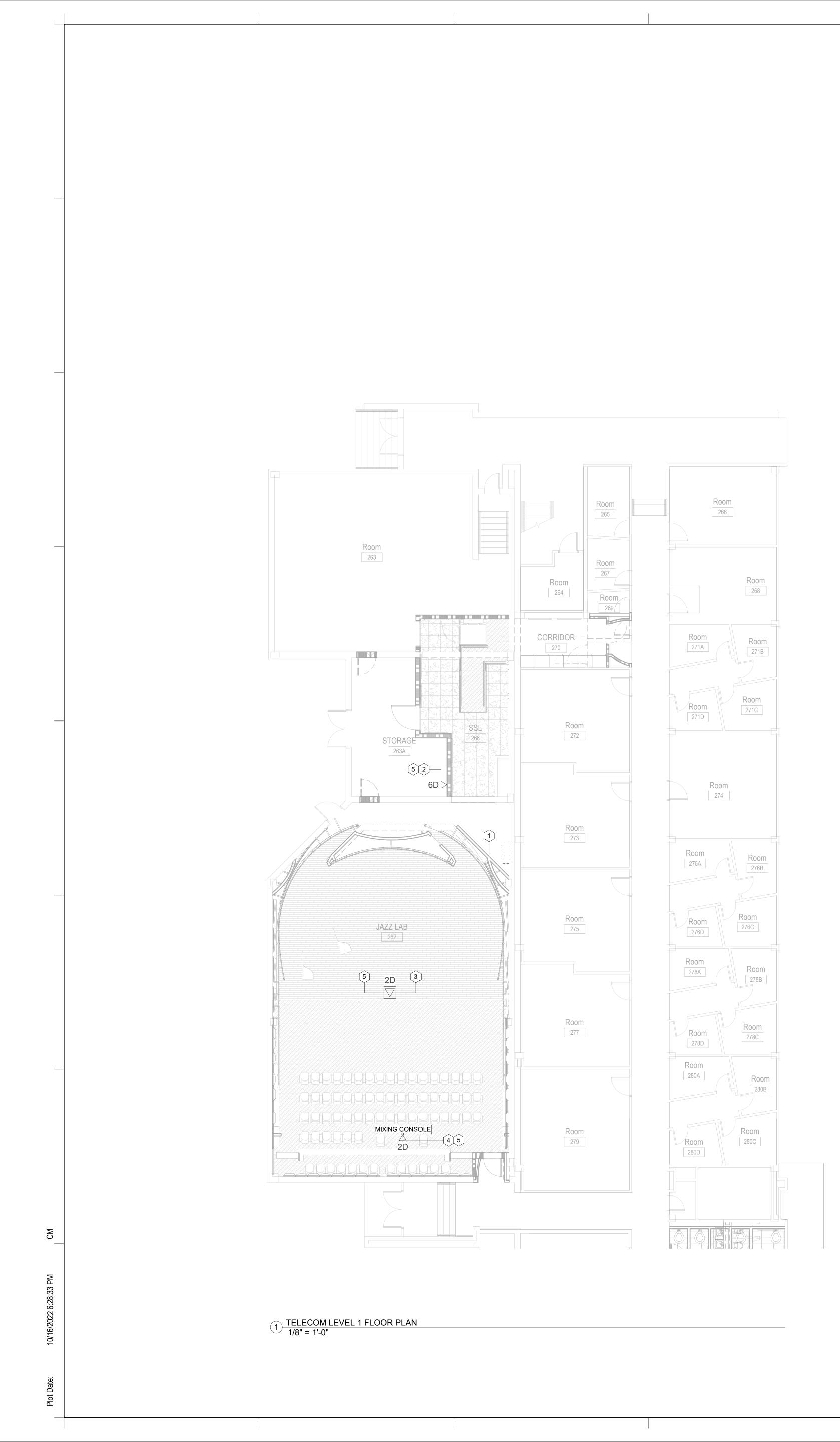
DIOVISUAL STREAMING CAMERA LOCATION. PROVIDE SDI AND FIBER CONNECTION BACK TO EQ1 IN ROOM 263A

ME

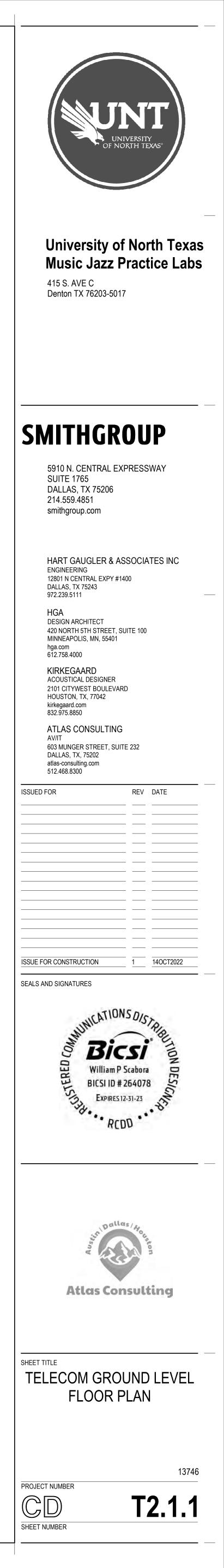
LED BACKBONE NDING CONDUCTOR CONDUCTOR DUNDING BUS BAR

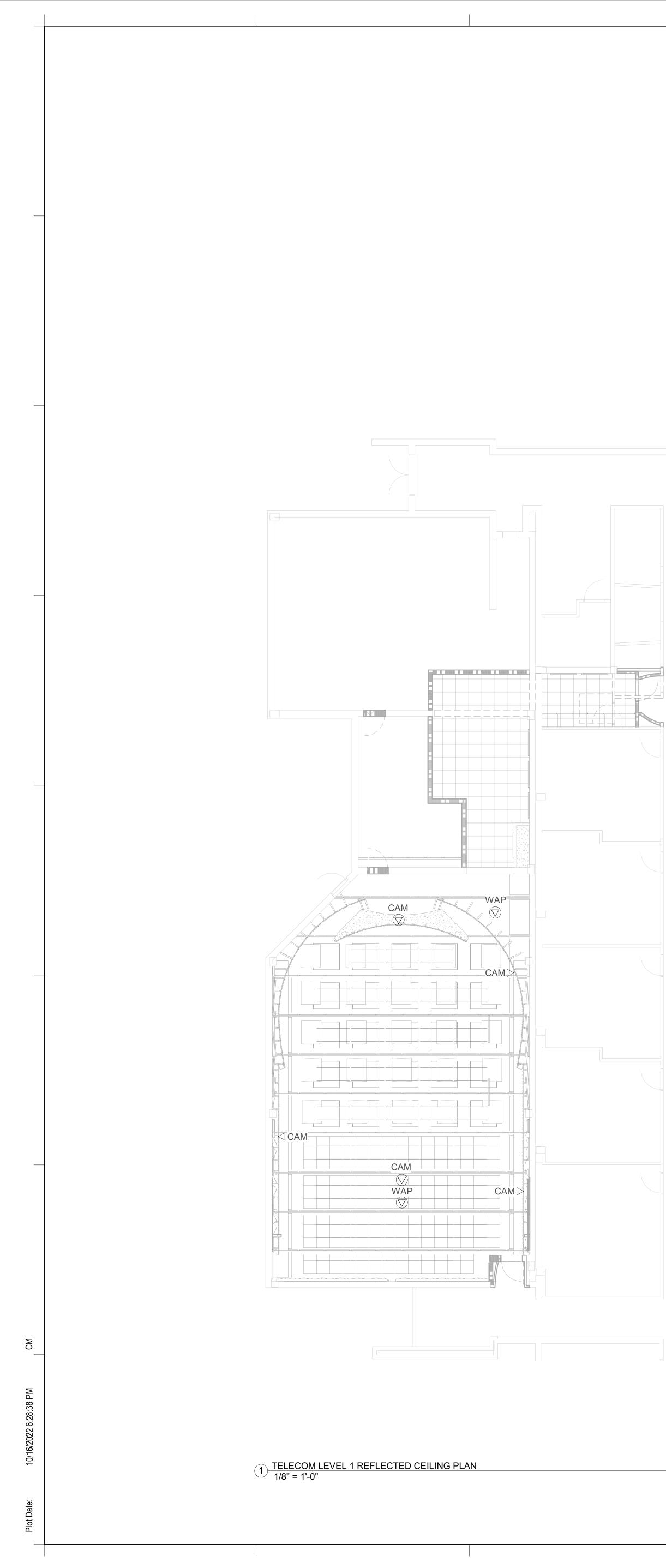
IT RESPONSIBILITY MATRIX						
TELECOM RESPONSIBILITY MATRIX	GC	IT CONTRACTOR	OWNER			
NETWORK CABLING TO IDF		X				
CONDUITS	Х					
J-BOXES	Х					
POWER>24VDC	Х					
FLOOR BOXES/FLOOR POKES	Х					
DISPLAY BACK BOXES/BACKING	Х					
ACCESS PANELS	Х					
FIBER OPTIC CABLING		X				
DATA SWITCHES			X - (OFOI)			
WIRELESS ACCESS POINT			X - (OFCI)			
RACK MOUNTED UPSs			X- (OFOI)			
J-HOOK PATHWAY FOR DATA CABLING		X				
PHONES			Х			
COMPUTERS			Х			

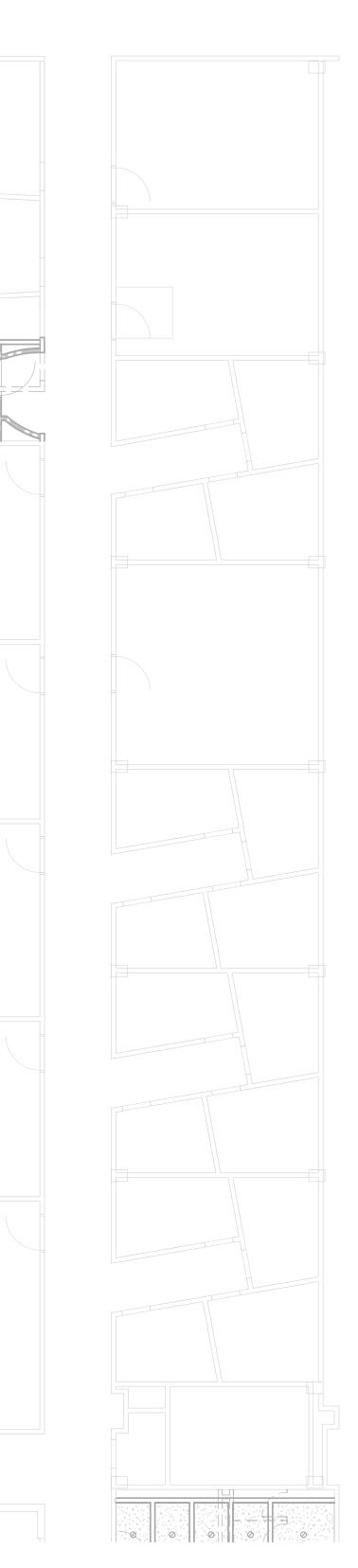


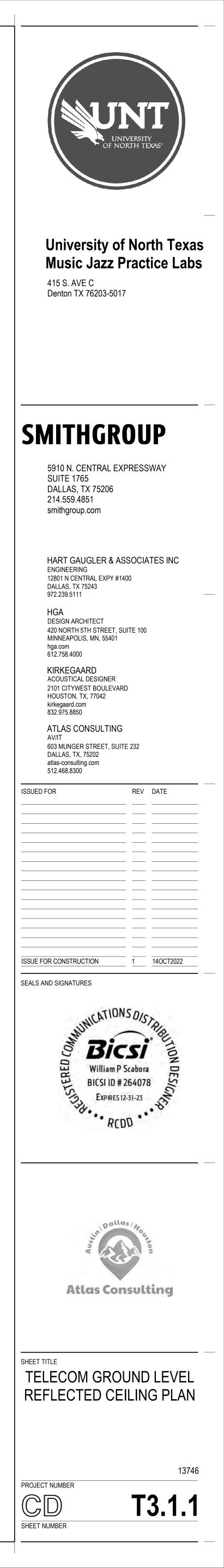


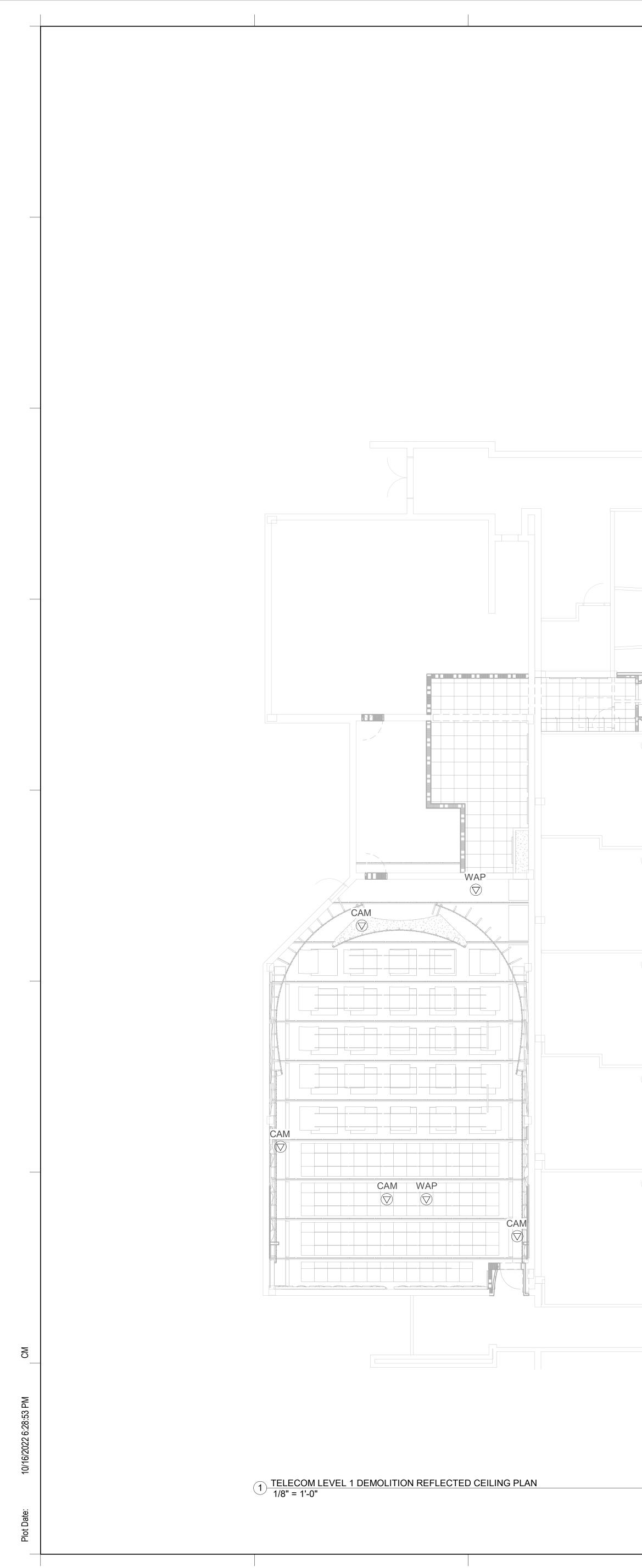
	KEYNOTE LEGEND
1	LOCATION OF 12-STRAND OS2 FIBER FROM STREAMING MEDIA LAB ON 1ST FLOOR. FIBER IS CONTAINED WITHIN WALL MOUNTED LIU, TO REMAIN DURING CONSTRUCTION
2	LOCATION OF NEW AUDIOVISUAL EQUIPMENT RACK. RE-ROUTE FIBER FROM EXISTING WALL MOUNTED LIU. FUSION SPLICE EXISTING OS2 LOCATION. PROVIDE SPLICE BOX IN CEILING AT LOCATION.
3	FLOOR BOX TO SERVE AUDIOVISUAL EQUIPMENT RACK ON CASTERS, PROVIDE WITHIN EXISTING FLOOR BOX.
4	DATA TO SERVE MIXING CONSOLE, ROUTE CABLING THROUGH EXISTING PATHWAYS WITHIN THE RISER.
5	ONE DATA CABLE RUN SHALL BE DEDICATED FOR CONNECTION TO COLLEGE OF MUSIC DANTE NETWORK. THE CABLE SHALL BE RAN BACK TO THE STREAMING HEAD-END LOCATION, IN A SEPARATE LOCATION THAN THE NEAREST IDF.

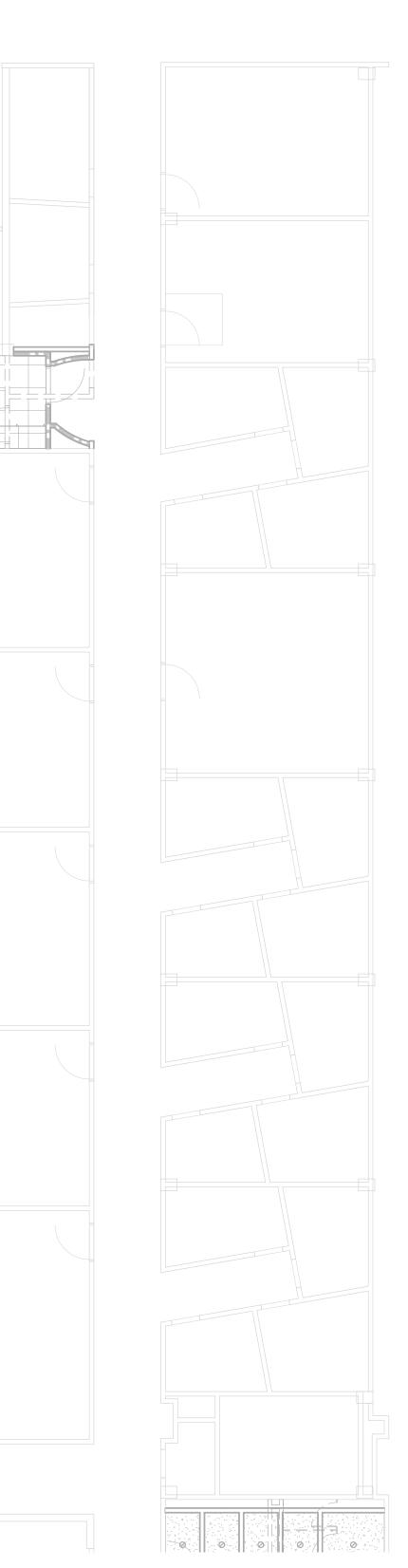






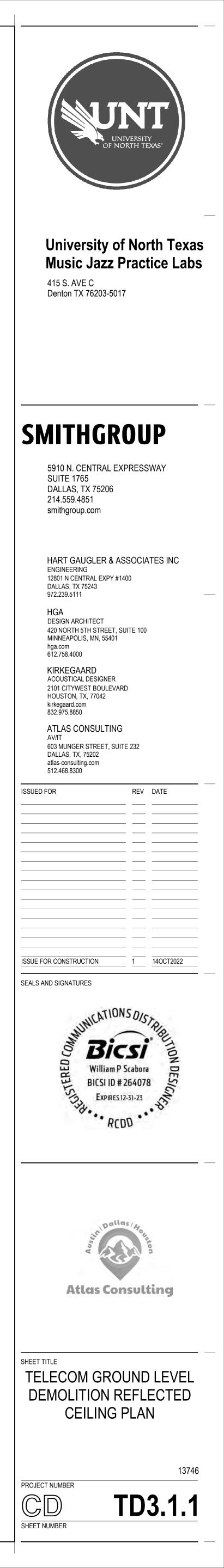


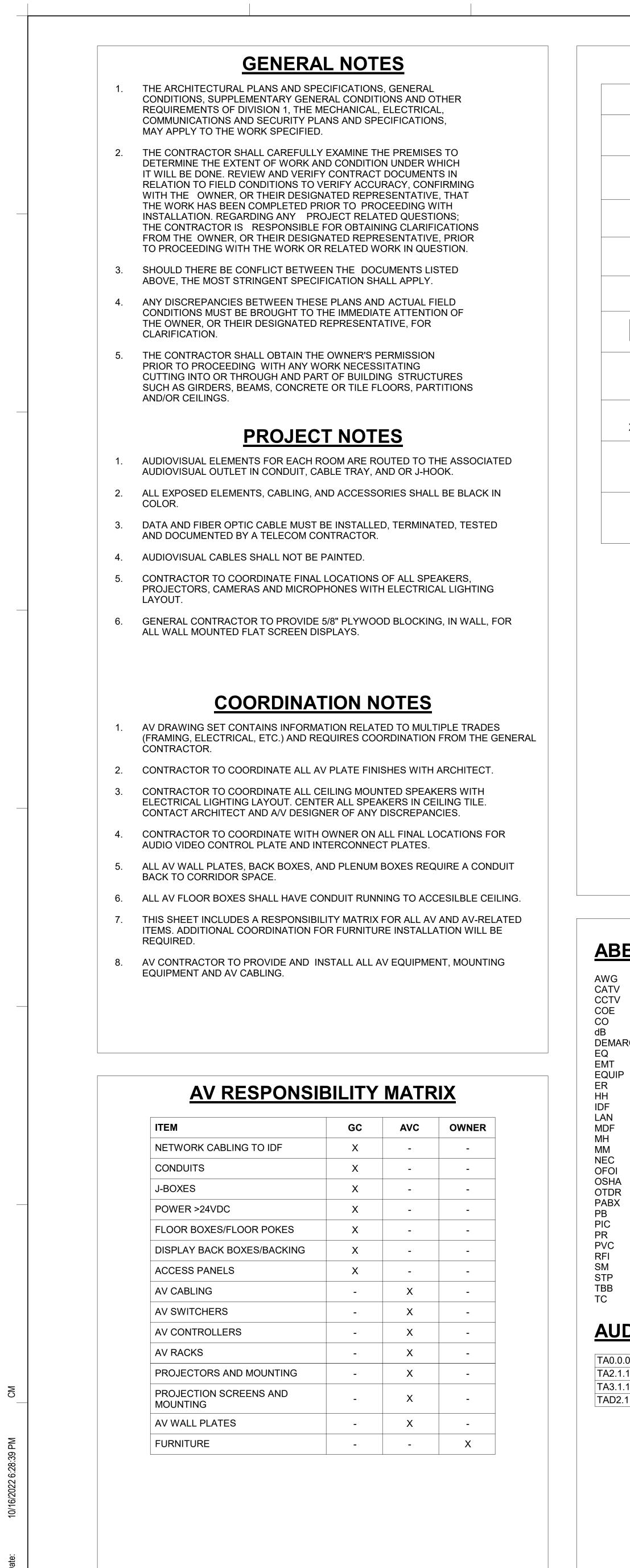




# GENERAL NOTES:

- 1. ALL WIRELESS ACCESS POINTS SHOWN ON THIS PLAN SHALL BE REMOVED AND RETURNED TO THE OWNER.
- 2. PROVIDE WARNING TAPE ON ALL REMAINING FIBER CABLE, THAT IS TO BE LEFT ABOVE CEILING DURING CONSTRUCTION.





# AUDIOVISUAL SYMBOL LEGEND

SYMBOL	DESCRIPTION	POWER REQUIREMENTS	DATA REQUIREMENTS	CONDUIT REQUIREMENTS	NOTES
S1	YOKE MOUNTED SPEAKERS	N/A	N/A	1-1/4" CONDUIT FROM 2-GANG "AV" J-BOX TO ACCESSIBLE CEILING	REFER TO PLANS AND ELEVATIONS FOR LOCATION AND MOUNTING HEIGHTS
S2	YOKE MOUNTED LOBE SPEAKERS	N/A	N/A	1-1/4" CONDUIT FROM 2-GANG "AV" J-BOX TO ACCESSIBLE CEILING	(2) SPEAKER COLUMNS TO BE MOUNTED WITHIN YOKE
<b>S</b> 3	YOKE MOUNTED CEILING SUBWOOFER	N/A	N/A	1-1/4" CONDUIT FROM 2-GANG "AV" J-BOX TO ACCESSIBLE CEILING	N/A
EQ1	FULL HEIGHT AUIDO VISUAL RACK	DEDICATED 120VAC/20A QUAD OUTLET BEHIND RACK.	4-DATA OUTLET BEHIND RACK.	(4) 2" CONDUITS FROM TOP OF AV RACK RAN UP TO 96" ABOVE THE TOP OF RACK.	N/A
EQ2	ROLLING AUDIOVISUAL EQUIPMENT RACK	EXISTING FLOOR BOX POWER TO PLUG INTO THE RACK MOUNTED POWER CONDITIONER.	2-DATA OUTLET INTO FLOOR BOX BELOW RACK.	N/A	DASHED LINE ON PLAN REPRESENTS REQUIRED SPEAKER CABLING PATHWAY
PROJECTOR	CEILING MOUNTED VISUAL PROJECTOR	120VAC/20A DUPLEX OUTLET INSTALLED INTO CEILING.CONFIRM LOCATION WITH AV VENDOR	N/A	N/A	TO BE CONTROLLED BY RACK MOUNTED TOUCH SCREEN CONTROLLER.
CAM	WALL MOUNTED AUDIOVISUAL STREAMING CAMERA	N/A	(1) 6-STRAND OS2 FIBER AND SDI CONNECTION BACK TO AUDIOVISUAL EQUIPMENT RACK.	N/A	EXISTING AV PTZ CAMERA TO BE REMOVED AND REINSTALLED. STORE AND PROTECT DURING CONSTRUCTION.
XX" H x XX" W	INFRASTRUCTURE FOR SURFACE MOUNTED, MOTORIZED PROJECTION SCREEN	120VAC/20A HARDWIRED CIRCUIT.	N/A	N/A	ROUTE RS-232 CONNECTION TO AV CONTROLLER WITHIN AV RACK. TO BE CONTROLLED BY RACK MOUNTED TOUCH SCREEN CONTROLLER.
	SURFACED MOUNTED CEILING CAMERA	N/A	(1) 6-STRAND OS2 FIBER AND SDI CONNECTION BACK TO AUDIOVISUAL EQUIPMENT RACK.	N/A	EXISTING AV PTZ CAMERA TO BE REMOVED AND REINSTALLED. STORE AND PROTECT DURING CONSTRUCTION.
M	CEILING MOUNTED OVERHEAD MICROPHONE	PHANTOM POWERED FROM MICROPHONE MIXER	N/A	N/A	TOP OF MICROPHONE TO BE ALIGNED WITH TOP OF CEILING. PROVIDE JUNCTION BOX BEING SUPPORTED FROM STRUCTURE. PROVIDE XLR PLATE FOR TERMINATION OF MICROPHONE CONNECTION CABLE.

		_		
i	AMERICAN WIRE GAGE	Α.	The	work detailed by these specifications and drawing
/	COMMUNITY ANTENNA TELEVISION			ional conduit and power requirements, etc. has be
/	CLOSED CIRCUIT TELEVISION			ents for a complete turnkey installation including a
	CENTRAL OFFICE EQUIPMENT	В.	Gene	eral elements of the work shall consist of but, not l
	CENTRAL OFFICE		1.	Procure all permits and license required to comp
	DECIBEL		2.	Prepare schedule of work.
ARC	DEMARCATION POINT		3.	Submittal preparation and processing prior to or
	EQUAL		4.	Provide materials necessary to complete the Au
	ELECTRIC METALLIC TUBING		Х.	Substitutions to specified equipement must be s
Р	EQUIPMENT		5.	Provide all required software and licenses to the
	EQUIPMENT ROOM		6.	Contractor shall provide continuous on-site supe
	HANDHOLE			changes and installations details, preparing wee
	INTERMEDIATE DISTRIBUTION FRAME		7.	The Contractor shall provide all miscellaneous h
	LOCAL AREA NETWORK		8.	The contractor shall provide all materials, equip
	MAIN DISTRIBUTION FRAME			as described herein and supplementary drawing
	MANHOLE		9.	Coordination with all trades and Owner represer
	MULTIMODE			Electrical Divisions.
	NATIONAL ELECTRIC CODE		10.	Coordinate receipt of Owner furnished equipment
	OWNER FURNISH OWNER INSTALLED		11.	Perform installation according to contract docun
4	OCCUPATIONAL SAFETY AND HEALTH ADMIN.		12.	Protect new facilities finishes and equipment.
ર	OPTICAL TIME DOMAIN REFLECTOMETER		13.	Maintain construction materials and refuse withi
<	PRIVATE AUTOMATIC BRANCH EXCHANGE		14.	Clean the work area at the end of each day.
	PULLBOX		15.	Provide system software and programming and
	PLASTIC INSULATED CONDUCTOR			Owner.
	PAIR POLYVINYL CHLORIDE		16.	Program Audiovisual Systems and load with use
	RADIO FREQUENCY		17.	Provide e-Control / WebGUI for all programmed
	INTERFERENCE		18.	All touch panel and internet controls must have
	SINGLE MODE		10.	and Consultant for approval.
	SHIELDED TWISTED PAIR		19.	Providing (2) final programming changes for all
	TELECOMMUNICATIONS BONDING BACKBONE		20.	Perform initial testing, programming and adjustn
	TELECOMMUNICATIONS CLOSET		20. 21.	Make final adjustments, calibrations and program
			21.	Demonstrate all systems for final acceptance.
			22. 23.	Preparation of O&M manuals and as-built docur
INI	OVISUAL DRAWINGS INDEX		23. 24.	Providing warranty service for a period of one ye
וטי			24. 25.	Bid pricing shall include line item pricing for equ
			23. 26.	Contractor shall have a minimum of 5 years exp
0.0	AUDIO VISUAL INDEX		20. 27.	
1.1	AUDIOVISUAL GROUND LEVEL FLOOR PLAN		27. 28.	Contractor shall have in house engineering, prog
			20.	Training shall be provided to the Owner and the
1.1	AUDIOVISUAL GROUND LEVEL REFLECTED CEILING PLAN			copies & a digital copy of quick refernce guides
2.1	AUDIOVISUAL GROUND LEVEL DEMOLITION PLAN			

nd drawings has been specified to meet certain requirements for performance. Some information, such as exact equipment models, layout, wire routing, etc. has been omitted. It shall be the responsibility of the Contractor to translate these drawings into a complete design package containing all necessary in including all material, labor, warranties, shipping and permits. of but, not be limited to:

red to complete this installation.

**PROJECT OVERVIEW** 

prior to ordering equipment which shall include product data with index sheet and a complete drawing package.

lete the Audiovisual Systems. t must be submitted for approval prior to purchase and installation.

n-site supervision of the installation technicians. On-site supervision shall include: daily supervision of the work, updating work site progress drawings to reflect paring weekly progress reports and attendance at site coordination meetings as directed by the Owner and Consultant. ellaneous hardware including cable management devices, termination cabinets, wire and cable labeling materials, fasteners, hangers and brackets as required. ials, equipment, labor and all other incidental material, tools, appliances and transportation as required for a complete and functional audio video system (AVS) ary drawings.

er representatives as required facilitating the installation of the control system equipment including: Door Hardware, Fire Alarm, Blinds, Shades, HVAC and d equipment.

ract documents and manufacturers recommendations.

efuse within the area of work.

nming and other materials necessary for the Audiovisual Systems to function by standard industry practices. Final editable code shall be turned over to the

ad with user defined text and specified operations per design drawings. ogrammed interfaces and room systems.

must have "User interface" (Basic functionality) and Lockable / password "Admin user interface" (Advance functionality). Coordinate all programming with Owner

ges for all systems within warranty period after acceptance date. and adjustments with written reports.

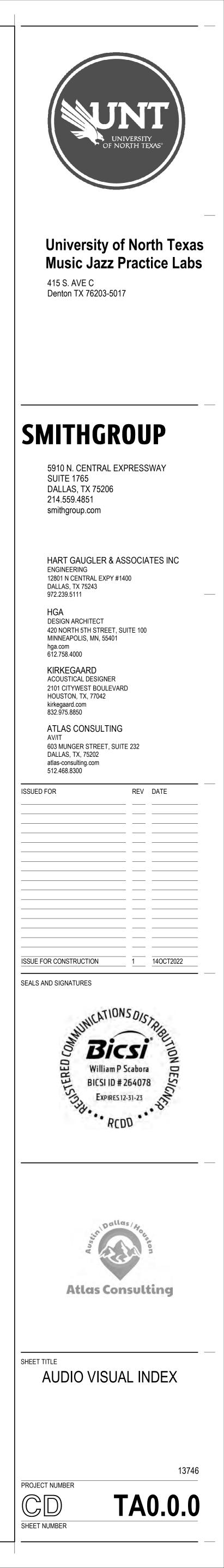
and programming modifications as directed by the Owner and Consultant.

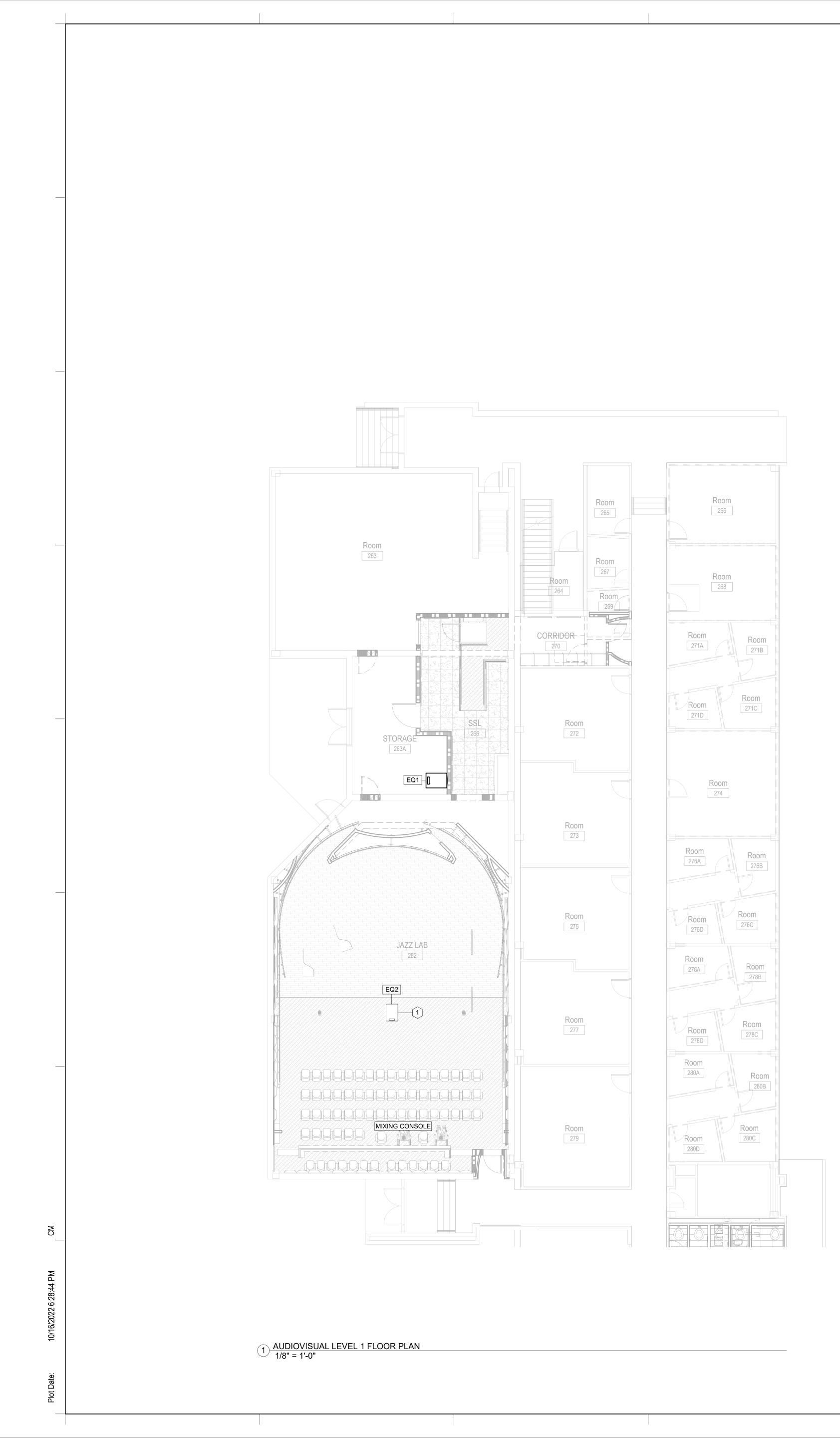
# built documents for Owner's use.

d of one year from final completion date and include (2) maintenance visits at 6-month intervals to be completed prior to the end of the warranty period.

ing for equipment and materials and be group by room type. 5 years experiance in projects similar in size and design.

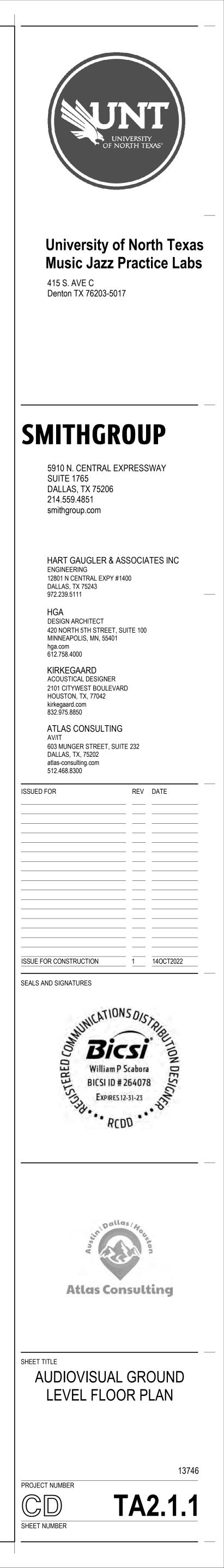
eering, programming and project management consistant with the requirements of the project. her and their representitives and shall include (2) 1-hour User training sessions, (2) 1-hour Technical Operation/Support staff training sessions and laminated hard nce guides (QRG) for each room type.

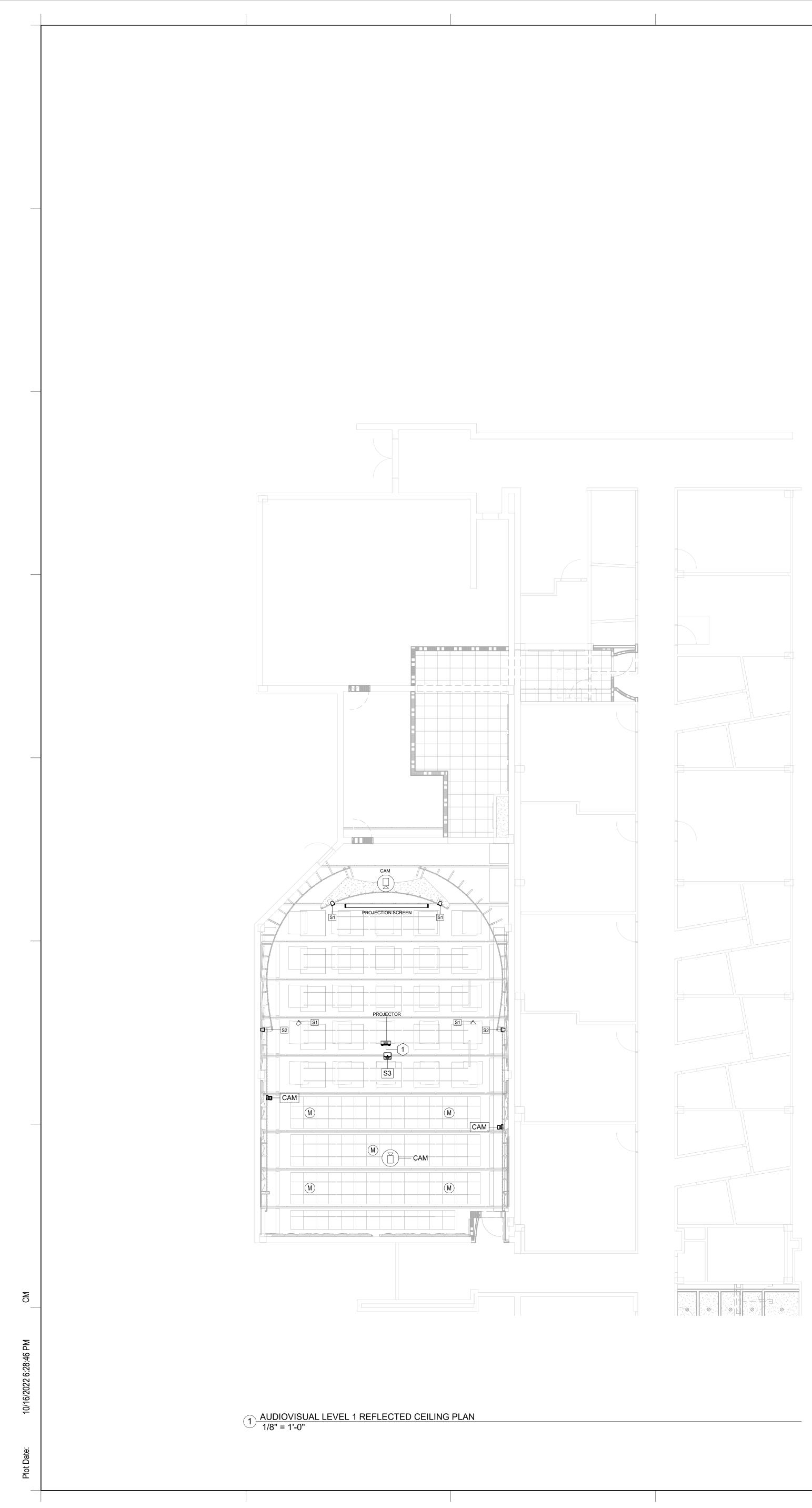




# **KEYNOTE LEGEND**

LOCATION OF HDBASET TRANSMITTER WITHIN ROLLING EQUIPMENT RACK. PROVIDE CAT6A CONNECTION BACK TO RACK EQ1 FOR CONNECTION TO THE HDBASET MATRIX SWITCHER. CABLE SHALL TERMINATE WITHIN EXISTING FLOORBOX.

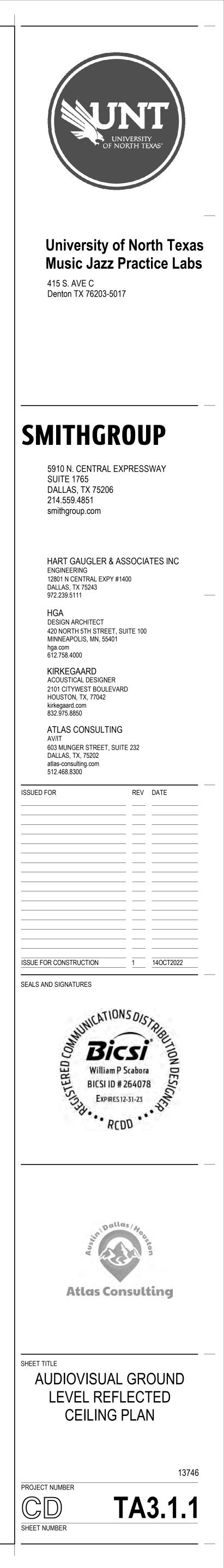


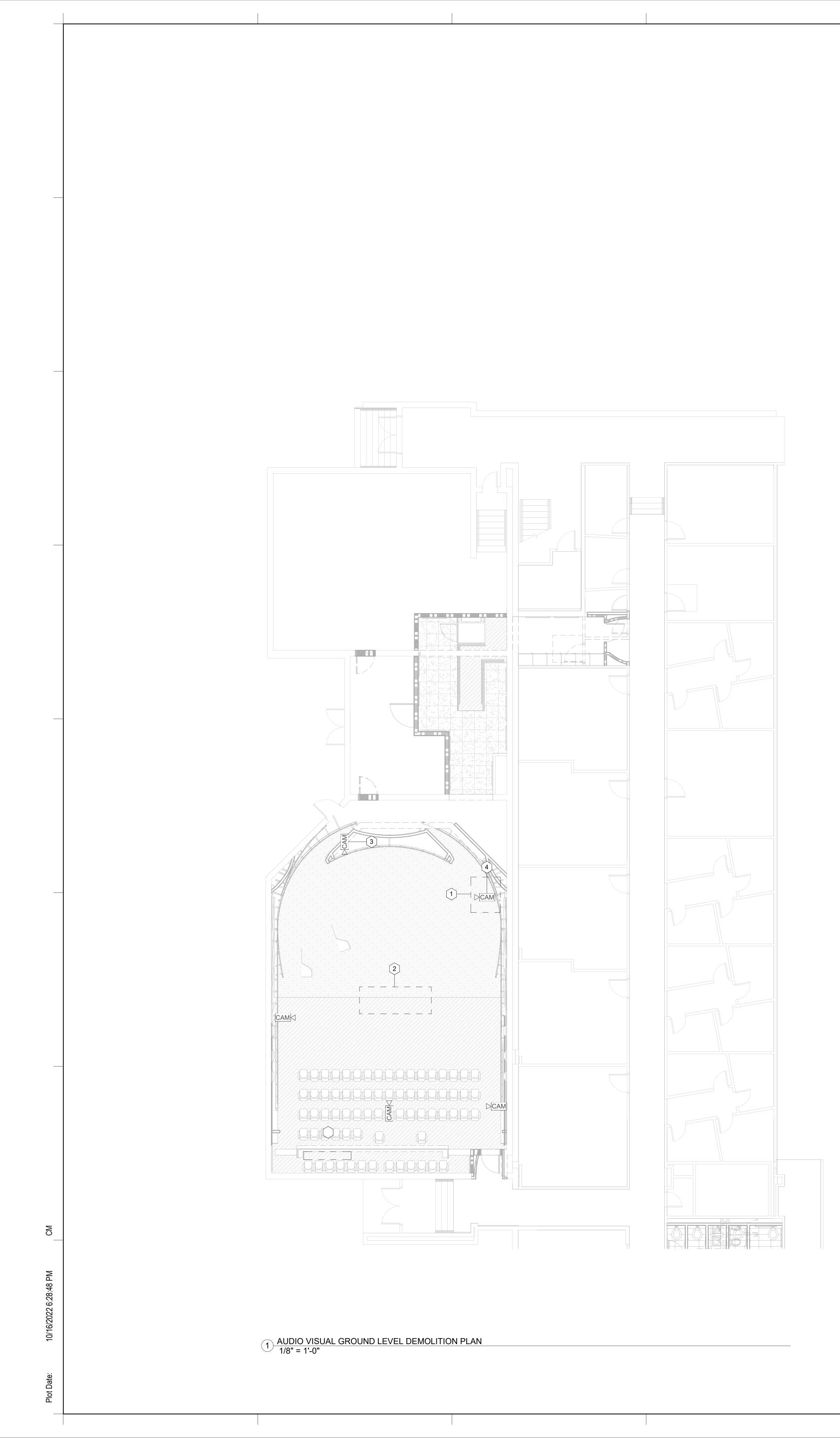




# **KEYNOTE LEGEND**

1 LOCATION OF HDBASET RECEIVER FOR CEILING MOUTED PROJECTOR. PROVIDE CAT6A CONNECTION BACK TO RACK EQ1 FOR CONNECTION TO THE HDBASET MATRIX SWITCHER. RECEIVER SHALL MOUNT WITHIN PROJECTOR MOUNT.





KEYNOTE LEGEND
LOCATION OF EXISTING STREAMING/RECORDING EQUIPMENT. REMOVE EQUIPMENT AND STORE DURING CONSTRUCTION.
LOCATION OF EXISTING AUDIO HEAD-END EQUIPMENT
LOCATION OF EXISTING STREAMING CAMERA MOUNTED TO CURTAIN. REMOVE EQUIPMENT AND STORE DURING CONSTRUCTION.
LOCATION OF EXISTING STREAMING CAMERA ONTOP OF RECORDING CABINET. REMOVE EQUIPMENT AND STORE DURING CONSTRUCTION.

**GENERAL NOTES:** 

1. ALL AUDIOVISUAL EQUIPMENT SHOWN ON THIS PLAN SHALL BE REMOVED AND RETURNED TO THE OWNER.



TECHNICAL SPECIFICATIONS AND DRAWINGS

FOR

# UNIVERSITY OF NORTH TEXAS MUSIC JAZZ LAB STRUCTURAL MODIFICATION

DENTON, TEXAS

WALTER P MOORE PROJECT NUMBER D04.22037.00 November 10, 2022

# TECHNICAL SPECIFICATIONS AND DRAWINGS

## FOR

# UNIVERSITY OF NORTH TEXAS MUSIC JAZZ LAB STRUCTURAL MODIFICATION DENTON, TEXAS

# WALTER P. MOORE AND ASSOCIATES, INC.

500 N. Akard St, Suite 2300 Dallas, TX 75201 214.740.6200

D04.22037.00

# SECTION 000105 - TITLE/CERTIFICATION PAGE

PROJECT:	UNIVERSITY OF NORTH TEXAS MUSIC JAZZ LAB STRUCTURAL MODIFICATION DENTON, TEXAS
PROJECT NUMBER:	Walter P Moore Project No. D04.22037.00
ENGINEER:	Walter P. Moore and Associates, Inc. 500 N. Akard St, Suite 2300 Dallas, TX 75201 Phone: 214.740.6200
	Project Principal Jeffrey Kobes, P.E., S.E. Walter P. Moore and Associates, Inc. Phone: 214.740.6272
	Project Manager and Project Engineer Abhishek Aggarwal, P.E. Walter P. Moore and Associates, Inc. Phone: 214.740.6257
	Graduate Engineer Sunny Sharma, E.I.T. Walter P. Moore and Associates, Inc. Phone: 214.740.6240

END OF SECTION 000105

SECTION 00 01 07 – Seals page

I HEREBY CERTIFY THAT THESE PLANS AND TECHNICAL SPECIFICATIONS WERE PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF TEXAS.



# Abhishek Aggarwal, P.E. 120411 TEXAS FIRM REGISTRATION NUMBER 1856

END OF SECTION 00 01 07

# SECTION 00 01 10 - TABLE OF CONTENTS

## **SPECIFICATIONS**

# DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS

Section 00 01 05 - Title/Certification Page

Section 00 01 07 - Seals Page

Section 00 01 10 – Table of Contents

## DIVISION 03 – CONCRETE

Section 03 10 00 – Concrete Forming and Accessories

Section 03 20 00 – Concrete Reinforcing

Section 03 30 00 – Cast-in-Place Concrete

## **DIVISION 05 – STEEL**

Section 05 12 00– Structural Steel Framing

# END OF SECTION 00 01 10

# SECTION 031000 – CONCRETE FORMING AND ACCESSORIES

#### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification sections provided in Architect's project manual for UNT Music Jazz Practice Lab project, apply to work of this section.

#### 1.2 SUMMARY

- A. Section includes formwork, falsework, bracing, and other temporary supports required to form and support all cast-in-place concrete shown on the drawings.
- B. Related Requirements:
  - 1. Specification 032000 "Concrete Reinforcing" for reinforcement associated with cast-inplace concrete.
  - 2. Specification 033000 "Cast-in-Place Concrete" for cast-in-place concrete and related products.

#### 1.3 REFERENCES

- A. Definitions:
  - 1. Formwork: The total system of support for freshly placed concrete, including the mold or sheathing that contacts the concrete and all supporting members, hardware, and necessary bracing.
  - 2. Professional Engineer: A professional engineer who is licensed to practice engineering in the state where the project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for projects with concrete formwork that are similar to that indicated for this Project in material.
- B. Reference Standards:
  - 1. Comply with the provision of the following codes, specifications, and standards except where more stringent requirements are shown or specified:
    - a. ACI 117 Standard Specifications for Tolerances for Concrete Construction and Materials.
    - b. ACI 301 Specifications for Structural Concrete.
    - c. ACI 318 Building Code Requirements for Structural Concrete and Commentary.
    - d. ACI 347R Guide to Formwork for Concrete; 2014.

- e. ASTM B221 Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- f. ASTM B221M Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.
- g. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- h. PS 1 Structural Plywood; 2009.
- i. CRSI, "Manual of Standard Practice."

#### 1.4 RESPONSIBILITY

A. The design, construction, and safety of all formwork shall be the responsibility of the Contractor. All forms, falsework, bracing, and other temporary supports shall be engineered to support all loads imposed including the wet weight of concrete, construction equipment, live loads, lateral loads due to wind and wet concrete imbalance. The Contractor shall also be responsible for determining when temporary supports, and other bracing may be safely removed.

#### 1.5 SUBMITTALS

- A. Shop Drawings:
  - 1. Formwork Product Data: Form Deck for Stair Landing.

# PART 2 - PRODUCTS

# 2.1 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Unless otherwise specified, formwork for exposed concrete surfaces as defined by the Surface Finish Class noted on the drawings, shall consist of plywood, metal, metal framed plywood, or other acceptable surface. Formwork shall provide a continuous straight and smooth surface conforming to the joint system as specified on the Architect's drawings. Form material shall have sufficient thickness to withstand pressure of concrete without bow or deflection. Plywood shall be exterior grade plywood panels, suitable for concrete forms, complying with U.S. Product Standard PS-1, each piece bearing a legible inspection trademark.
- B. Non-specific formed concrete: Unless otherwise specified, the default finish for formed surfaces shall be rough-form finish constructed with plywood, lumber, metal, or other acceptable material. Lumber shall be dressed on at least two edges and one side for tight fit. The minimum grade shall be B-C, exterior grade.
- C. Textured-form finished concrete: For exposed surfaces as noted on the drawings provide units of form face design, size, arrangement and configuration that matches Architect's control sample. Provide solid backing and form supports to ensure stability of textured form liners. See Architect's drawings, specifications and control sample for special form textured finish concrete.

# 2.2 FORMWORK COATINGS

- A. Formwork coatings shall be of a commercial formulation that will not bond with, stain, nor adversely affect concrete surfaces or impair subsequent treatment of concrete surfaces requiring bond or adhesion, nor impede curing with water or curing compounds. Provide a product that has a maximum VOC (Volatile Organic Compounds) of 50 g/l but not greater than that permitted by the local government agency having jurisdiction in the area where the project is located.
- B. Products: Subject to compliance with requirements, provide one of the following:
  - 1. Dayton Superior; Clean Strip J1EF.
  - 2. Dayton Superior; Farm Fresh XL.
  - 3. W.R. Meadows; Duogard II.

#### 2.3 NAILS AND FASTENERS

A. Use only galvanized nails and fasteners for securing formwork in structures exposed to weather or unconditioned spaces such as garages, canopies, and porte-cocheres.

## 2.4 FORM TIES

- A. Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to minimize spalling of concrete on removal.
  - 1. Exposed Surfaces: For surfaces designated with Surface Finish Class SF-2.x or SF-3.x, furnish units that will leave no portion of the tie closer than 3/4 inch to the plane of the concrete surface and that will leave holes not larger than one inch in diameter in concrete surface when the ends or end-fasteners have been removed.
  - 2. Exposed to Weather or Unconditioned Space: Provide removable, glass-fiber-reinforced plastic, stainless steel, or galvanized form ties that will leave no corrodible metal closer than 1 1/2 inches in surfaces that will be exposed to weather or in an unconditioned space in the final structure. The ties shall leave holes no larger than one inch in diameter in concrete surfaces when the ends or end-fasteners are removed.

#### 2.5 CHAMFER STRIPS

A. Provide wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.

# PART 3 - EXECUTION

# 3.1 FABRICATION AND CONSTRUCTION

A. Design, erect, support, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic construction loads that might be applied until the concrete structure can support such loads.

- 1. The formwork design engineer shall design the concrete formwork, and formwork removal.
- B. Construct forms to sizes, shapes, lines, and dimensions shown, and to obtain accurate alignment, location, grades, level and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages, inserts, and other features required in work. Use selected materials to obtain required finishes. Solidly butt joints and provide back-up at joints to prevent leakage of concrete mortar.
- C. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical. Kerf wood inserts for forming keyways, reglets, recesses, and the like, to prevent swelling and for easy removal.
- D. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- E. Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Securely brace temporary openings and patch forms to prevent loss of concrete mortar. Locate temporary openings on forms at inconspicuous locations.
- F. Chamfer exposed corners and edges as indicated, using specified chamfer strips fabricated to produce uniform smooth lines and tight edge joints.
- G. Provisions for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses and chases from trades providing such items. Accurately place and securely support items built into forms.

# 3.2 CLEANING AND TIGHTENING

A. Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and all other debris just prior to concrete placement. Retighten forms and bracing prior to concrete placement as required to prevent concrete mortar leaks and maintain proper alignment.

#### 3.3 CLEANING AND RE-USE OF FORMS

A. Forms reused in the work shall be repaired and cleaned. Split, frayed, delaminated, or otherwise damaged facing material will not be acceptable for exposed surfaces. Forms intended for successive concrete placement shall have surfaces cleaned, fins and laitance removed, and joints tightened to avoid surface offsets. New form coating compound shall be applied to reused forms. Thin form-coating compounds only with thinning agent of type, and in amount, and under conditions of form-coating compound manufacturer's directions. Do not allow excess form-coating material to accumulate in forms or to come into contact with in-place concrete surfaces against which fresh concrete will be placed. Apply in compliance with manufacturer's instructions. Coat steel forms with a non-staining, rust-preventative form oil or otherwise protect against rusting. Rust-stained steel formwork is not acceptable.

#### 3.4 TOLERANCES

- A. Unless specified otherwise, all tolerances for concrete formwork shall conform to ACI Standard 117, "Standard Tolerances for Concrete Construction and Materials". Before concrete placement the Contractor shall check lines and levels of erected formwork and make any corrections and adjustments as required to ensure proper size and location of concrete members and stability of forming systems. During concrete placement the Contractor shall check formwork and supports to ensure that forms have not displaced and that completed work will be within specified tolerances.
- B. Construct forms so as to limit the offset between adjacent pieces of formwork facing material in accordance with the surface tolerance class as defined in ACI 117 corresponding to the Surface Finish Class noted on the drawings. The offset limits shall apply to both abrupt and gradual variations in the surface.
- C. Prior to each concrete pour, the Contractor shall engage a qualified surveyor to verify that work is within specified tolerances. The surveyor shall report in writing to the Architect, Engineer and Contractor certifying that the work is acceptable or indicating any deviations from allowable tolerances.
- D. The Owner shall hire an independent qualified surveyor to verify the proper form, line, position, and elevation of the finished concrete work. The results of each survey shall be sent to the Owner, Architect/Engineer, and Contractor and shall identify any deviation from specified tolerances. All work not in conformance with specified tolerances shall be removed at the Contractor's sole expense if so specified by the Owner.

# 3.5 REMOVAL OF FORMS AND SUPPORTS

- A. Determination by Contractor's Registered Engineer: The Contractor's registered professional engineer shall determine and submit for Owner's record the time and sequence of formwork removal subject to the criteria as specified below.
- B. Records of Weather Conditions: The Contractor shall be responsible for keeping records of weather conditions to be used in the decision on when to remove forms.

# 3.6 FIELD QUALITY CONTROL

- A. Field Inspection:
  - 1. Slabs-on-Grade:
    - a. Verify formwork at turndowns and slab edges is plumb and straight, braced against movement and lubricated for removal.

# END OF SECTION 031000

#### SECTION 032000 – CONCRETE REINFORCING

#### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification sections provided in Architect's project manual for UNT Music Jazz Practice Lab project, apply to work of this section.

#### 1.2 SUMMARY

- A. Section includes labor, materials, hardware, equipment, transportation and services required to fabricate and place all reinforcement for cast-in-place concrete including bars, welded wire reinforcement, ties and supports shown on the drawings and as specified. Prestressing reinforcement is specified in Post-Tensioned Concrete and/or Precast Concrete sections of the specifications.
- B. Related Requirements:
  - 1. Specification 031000 "Concrete Forming and Accessories" for forming associated with cast-in-place concrete.
  - 2. Specification 033000 "Cast-in-Place Concrete" for cast-in-place concrete and related products.

#### 1.3 REFERENCES

- A. Reference Standards:
  - 1. Comply with all provisions of the following codes, specifications, and standards except where more stringent requirements are shown or specified:
    - a. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
    - b. ACI 301, "Specifications for Structural Concrete for Buildings."
    - c. CRSI, "Manual of Standard Practice."

# 1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
  - 1. Quality Control: The Contractor is responsible for quality control, including workmanship and materials furnished by subcontractors and suppliers.
  - 2. Document Conflict and Precedence: In case of conflict among documents, including architectural and structural drawings and specifications, notify the Architect/Engineer prior to submitting proposal. In case of conflict between and/or among the structural drawings and specifications, the strictest interpretation shall govern, unless specified otherwise in writing by the Architect/Engineer.

B. Preinstallation Meetings: The Reinforcing-Placing subcontractor shall attend the Pre-Concrete Conference conducted by the Concrete Contractor as described in Specification 033000 "Cast-in-Place Concrete."

#### 1.5 SUBMITTALS

- A. Product Data: Submit manufacturer's product data with application and installation instructions for proprietary materials and items including mechanical splices, hooked anchorage systems, large-headed stud punching shear reinforcement, dowel bar replacement systems, and dowel bar sleeves. For fiber reinforcement, submit manufacturer's product data, including application rate and mixing instructions.
- B. Shop Drawings:
  - 1. Submit shop drawings for all reinforcing steel and related accessories for the Engineer's approval. Shop drawings shall show arrangement and layout, bending and assembly diagrams, bar schedules, stirrup spacing, splicing and laps of bars and shall be prepared in accordance with CRSI Standards.
- C. Certificates:
  - 1. Submit, for record, mill certificates and/or test results signed by Producer, for all reinforcement.
- D. Qualification Statements: Submit welding certificates.

# PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Steel Reinforcement:
  - 1. Reinforcing materials shall be delivered from the mill in bundles that are identified as to heat number and manufacturer and accompanied with mill and analysis test reports and an affidavit from the supplier stating that the material conforms to the requirements of the governing ASTM specification listed herein.
  - 2. Reinforcing Bars: Reinforcing bars shall conform to ASTM A 615, Grade 60 or Grade 80 as noted on the drawings.

#### 2.2 REINFORCEMENT ACCESSORIES

- A. Tie Wire: Tie wire shall be annealed steel tie wire, minimum 16 gauge.
  - a. Tie wire in architecturally exposed concrete shall be plastic coated or stainless steel.
  - b. Tie wire for epoxy-coated reinforcement shall be epoxy-coated.
  - c. Tie wire for galvanized reinforcement shall be galvanized.

- B. Holding Wire: Holding wire shall conform to ASTM A 82 or ASTM A 1064.
- C. Supports for Reinforcement: Provide supports for reinforcement including bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Use wire bar type supports complying with CRSI recommendations.
  - 1. Slabs-on-Grade: Use precast concrete bar supports (dobies) or supports with sand plates or horizontal runners designed for use on ground.

#### 2.3 ALTERNATES:

- 1. Products Requiring International Code Council (ICC) Evaluation Service Reports:
  - a. For those products listed in Part 2 as requiring Evaluation Service Reports (ESRs), alternate products that do not have ESRs will be considered by the Engineer only if valid research reports or test data from an independent and approved agency is provided and use of the product receives prior approval from the Building Official.

#### PART 3 - EXECUTION

#### 3.1 FABRICATION AND DELIVERY

- A. Bending and Forming: Fabricate bars of indicated sizes and accurately form to shapes and lengths indicated and required, by methods not injurious to materials. Do <u>not</u> heat reinforcement for bending. Bars shall be free from injurious defects, have a workman-like finish with no excessive rust and/or pitting, and have no unusual kinks or bends.
- B. Marking and Shipping: Bundle reinforcement and tag in accordance with Section 7.4.5 of the CRSI "Manual of Standard Practice." Transport and store at site so as not to damage material. Keep sufficient supply of tested, approved, and proper reinforcement at the site to avoid delays. Maintain reinforcing bars free of mud, dirt, grease, or other coating.

# 3.2 PLACING REINFORCEMENT

- A. Comply with CRSI recommended practice for "Placing Reinforcing Bars", for details and methods of reinforcement placement and supports and as herein specified.
- B. Before placing reinforcement and again before concrete is placed, clean reinforcement of loose rust and mill scale, earth, ice, and other materials which reduce or destroy bond with concrete.
- C. Accurately position, support, and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by chairs, runners, bolsters, spacers, and hangers as required. Exercise particular care to maintain proper distance and clearance between parallel bars and between bars and forms. Provide spreaders and spacers to hold steel in position. Support steel at proper height upon approved chairs.

- D. Place reinforcement to obtain at least minimum coverages for concrete protection. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set tie wires so ends are directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire reinforcement in as long lengths as practicable. Provide lap splice for wires of adjoining pieces per ACI 318 Chapter 25.5.3 or 25.5.4 and lace splices with wire. Offset end laps in adjacent widths to prevent continuous laps in either direction.
- F. Coordinate with other trades and expedite materials and labor to avoid omissions and delay.
- G. Extend reinforcement continuous through construction joints unless otherwise shown on the drawings.
- H. Do not bend reinforcement that is embedded partially in concrete except in locations noted on the drawings or approved by the Engineer.

#### 3.3 SPLICING REINFORCING STEEL

- A. Provide splices as indicated on the drawings. Splice reinforcing bars only at locations shown on the structural drawings and approved shop drawings. Unauthorized or unscheduled splices not approved by the Engineer in writing will not be accepted.
- B. All lap splices in reinforcing steel shall be contact lap splices unless detailed otherwise on the drawings.
- C. Maintain proper cover and spacing between reinforcing bars at splices.
- D. Lap unscheduled reinforcing bars not otherwise specified with a Class B lap splice. Lap welded wire reinforcement per ACI 318 Chapter 25.5.3 or 25.5.4.

# 3.4 SHRINKAGE AND TEMPERATURE REINFORCEMENT

A. Provide shrinkage and temperature reinforcement as indicated on the drawings at right angles to main top and bottom bars for all structural slabs unless detailed otherwise on the drawings.

#### 3.5 FIELD QUALITY CONTROL

- A. Field Inspection: The scope of the work to be performed by the inspector on the jobsite shall be as follows:
  - 1. Reinforcing Steel: The Testing Laboratory or designated Special Inspector shall inspect 100% of reinforcement before each concrete pour to verify the information noted below. Inspection reports shall be prepared and distributed in accordance with the local building code and as specified in this specification.
    - a. Primary and secondary longitudinal reinforcement has correct size and number in proper layers.
    - b. Longitudinal reinforcement has correct length and lap.

- c. Ties and stirrups are of correct size, spacing, and number and have the proper termination hook geometry.
- d. Unscheduled face reinforcement in beams are provided and are of correct size, number and spacing and have the proper end terminations.
- e. Proper hooks are provided at bar ends as detailed.
- f. Reinforcement is properly supported and braced to formwork to prevent movement during concrete placement.
- g. Reinforcement has proper cover.
- h. Sufficient spacing between reinforcement for concrete placement.
- i. Dowel reinforcement is of proper size, at proper spacing, and has proper lap length and embedment length.
- j. Welded wire reinforcement is composed of flat sheets, has proper wire gage and spacing, is properly supported, and is properly lapped.
- k. Proper construction/control/expansion joint spacing and reinforcement.
- 1. Reinforcement around embedded items is placed according to details.
- m. Welded reinforcement has been done according to AWS requirements.
- n. Proper installation of flat slab shear head reinforcement.

END OF SECTION 032000

# SECTION 033000 – CAST-IN-PLACE CONCRETE

## PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification sections provided in Architect's project manual for UNT Music Jazz Practice Lab project, apply to work of this section.

#### 1.2 SUMMARY

- A. Section includes all labor, materials, services, equipment, and hardware required in conjunction with or related to the forming, delivery, and pouring of all cast-in-place concrete work. Concrete paving and walks are specified in Division 32.
- B. Related Requirements:
  - 1. Specification 031000 "Concrete Forming and Accessories" for forming associated with cast-in-place concrete.
  - 2. Specification 032000 "Concrete Reinforcing" for reinforcement for cast-in-place concrete.

#### 1.3 REFERENCES

- A. Reference Standards:
  - 1. Codes and Standards: Comply with provisions of following codes, specifications and standards, except where more stringent requirements are shown or specified:
    - a. AISC 360, "Specification for Structural Steel Buildings."
    - b. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
    - c. ACI 301, "Specifications for Structural Concrete."
    - d. ACI 305.1, "Specification for Hot Weather Concreting."
    - e. ACI 318, "Building Code Requirements for Structural Concrete."
    - f. ACI 355.4, "Qualification of Post-Installed Adhesive Anchors in Concrete."
    - g. CRSI, "Manual of Standard Practice."

#### 1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
  - 1. Quality Control: The Contractor is responsible for quality control, including workmanship and materials furnished by subcontractors and suppliers.
  - 2. Document Conflict and Precedence: In case of conflict among documents, including architectural and structural drawings and specifications, notify the Architect/Engineer prior to submitting proposal. In case of conflict between and/or among the structural drawings

and specifications, the strictest interpretation shall govern, unless specified otherwise in writing by the Architect/Engineer.

- 3. Materials and installed work may require testing and retesting, as directed by the governing building code or the Architect/Engineer, at any time during progress of work.
  - a. The Contractor shall provide adequate notification to the Owner's Testing Agency of construction operations including the project schedule to allow the Testing Agency to schedule inspections. Failure to notify sufficiently may result in additional costs incurred by the Testing Laboratory that may be back-charged to the Contractor by the Owner.
  - b. The Contractor shall cooperate with laboratory personnel, provide access to the work, and provide access to manufacturer's operations.
  - c. The Contractor shall make adequate arrangement with the Owner's Testing Agency for inspection of material stockpiles and facilities.
  - d. The Contractor shall provide to the laboratory certificates and representative samples of materials proposed for use in the work in quantities sufficient for accurate testing as specified.
  - e. The Contractor shall furnish casual labor, equipment, and facilities as required for sampling and testing by the laboratory and otherwise facilitate the required inspections and tests.
  - f. Inspection or testing by the Owner does not relieve the Contractor of his responsibility to perform the Work in accordance with the Contract Documents. Tests not specifically indicated to be done at the Owner's expense, including retesting of rejected materials and installed work, shall be done at the Contractor's expense.
- 4. Responsibility for Selection and Use of Concrete Admixtures and Chemical Treatments: The Contractor shall be responsible for selecting admixtures and surface treatments that are compatible with the intended use of the concrete including all final surface treatments called for within this or other specifications or on the structural or architectural drawings. The Contractor is responsible for following the manufacturer's instructions for the use of their product including abiding by any limitations placed by the manufacturer on the use of any of its products.

# B. Sequencing:

1. Provide for installation of inserts, hangers, metal ties, anchors, bolts, angle guards, dowels, thimbles, slots, nailing strips, blocking, grounds, and other fastening devices required for attachment of work. Properly locate in cooperation with other trades and secure in position before concrete is poured. Do not install sleeves in any concrete slabs, beams, or columns except where shown on the drawings or upon written approval of the Architect/Engineer.

# 1.5 SUBMITTALS

- A. Product Data: Submit manufacturer's product data with application and installation instructions for proprietary materials and items, including patching compounds, epoxies, grouts, waterstops, joint systems, curing compounds, dry-shake finish materials, hardeners, sealers, joint fillers, and others as requested by Architect/Engineer.
- B. Shop Drawings:

- 1. Openings, Sleeves, and Cores: Submit drawings of all openings to be formed, sleeved, cored, or sawcut in cast-in-place elements. Drawings shall indicate size and location of openings, sleeves, or cores.
- 2. Embedded Items: Submit drawings showing all items to be embedded in concrete elements, including plates, angles, bolts, and any non-structural items, such as conduit. Drawings shall indicate location, size, orientation, and type of embedded item.
- C. Samples: Submit samples of materials specified if requested by Architect/Engineer, including names, sources, and descriptions.
- D. Certificates:
  - 1. Material and Mill Certificates:
    - a. Provide material and mill certificates as specified herein and in the Testing Laboratory section of the Specifications. The Manufacturer and Contractor shall sign the material and mill certificates certifying that each material item complies with specified requirements.
- E. Concrete Materials:
  - 1. Cementitious Materials:
    - a. Provide cementitious material types and certificates showing compliance with the respective ASTMs.
  - 2. Aggregates:
    - a. Provide types, sizes, pit or quarry locations, producers' names, aggregate supplier statement of compliance with ASTM C33/C33M.
    - b. Provide expansion data from ASTM C1260 or ASTM C1293 for all concrete designated C1, C2 or W1.
  - 3. Admixtures:
    - a. Provide types, brand names, producers' names, manufacturer's technical data sheets, compatibility with other admixtures, and certificates showing compliance with the respective ASTMs.
    - b. Provide certification from admixture manufacturers that chloride ion content complies with specified requirements.
  - 4. Design Mixtures:
    - a. Submit for each concrete mixture as specified in Section 2.3.
    - b. Submit shrinkage test results for all concrete identified on the drawings requiring shrinkage limits.
- F. Field Quality Control Submittals:

- 1. Surveys: Submit report certifying that all anchor rods and reinforcing dowels into columns above are in their proper location prior to placing of concrete.
- G. Environmental Product Declarations:
  - 1. To encourage the use of building products that are working to minimize their environmental and health impacts, consideration will be given to products with publicly available Environmental Product Declarations. For all concrete mixtures submit one of the following that applies to the product:
    - a. Product-specific Type III EPD with internal or external review that conform to ISO 14025, and EN 15804 or ISO 21930 and has at least a cradle to gate scope.
    - b. Industry Wide Type III EPD. A letter from the product manufacturer, on manufacturer's letterhead, stating that the manufacturer, and proposed batch plants, participated in the NRMCA Industry-Wide Environmental Product Declaration.
    - c. A letter from the product manufacturer, on manufacturer's letterhead, stating that the product does not have a product specific EPD nor was a participant in an industry wide EPD.
  - 2. Submit required EPDs at time of bid.
  - 3. Concrete mixes will be evaluated with consideration to their EPDs. Reference maximum cement content, where listed, per the "Classes of Concrete Matrix" in the structural drawings.
- H. Minutes of Preinstallation Meetings: Submit for review.

#### 1.6 QUALITY ASSURANCE

- A. Testing Laboratory Requirements: The Owner's Testing Laboratory shall:
  - 1. Concrete Design Mixtures: Review the submitted design mixtures for conformance to the specifications and for suitability for use in the project.
  - 2. Preinstallation Meetings: Attend the preinstallation meetings referenced above.
  - 3. Review adhesive anchor installer qualifications by certification. Obtain qualification certificates.
- B. Qualifications:
  - 1. Concrete Supplier: The concrete supplier shall have a minimum of five years of experience in manufacturing ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment. The supplier must be certified according to the National Ready Mixed Concrete Association's Certification of Ready Mixed Concrete Production Facilities.
  - 2. Concrete Contractor: The concrete contractor shall have a minimum of five years of experience with installation of concrete similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful service performance.
  - 3. Adhesive Anchor Installers: The individuals performing the installation of adhesive anchors that are horizontally or upwardly inclined shall be certified in accordance with the ACI/CRSI Adhesive Anchor Installer Certification program.

- C. Manufacturer Representative Presence:
  - 1. Post-installed anchors: The manufacturer's representative for each post-installed anchor product (adhesive, expansion, undercut, screw, or insert anchor) shall be present during the first day's installation of the product to provide instruction for the correct installation of each type of any to be installed in accordance with the manufacturer's recommendation and the current ICC-ES Evaluation Report.
- D. Mockups: Provide mock-ups as required.

# PART 2 - PRODUCTS

# 2.1 CONCRETE MATERIALS

- A. Refer to the drawings for classes and strengths of concrete required.
- B. Hydraulic Cement:
  - 1. Use ASTM C 150, ASTM C 1157, or ASTM C 595 (excluding Type IS) unless otherwise specified. Do not use Type III cement in slabs-on-grade unless approved in advance by the Engineer.
  - 2. Use one brand of cement, for each class of concrete, throughout the project, unless approved otherwise by the Architect/Engineer and the Owner's Testing Laboratory. Submit mill certificates certifying conformance to this specification for each brand and type of cement.
  - 3. Testing of cement in lieu of mill certificate submittal will be required if:
    - a. The cement has been in storage at the mixing site for over 30 days.
    - b. It is suspected by the Owner, Architect, Engineer, or Owner's Testing Laboratory that the cement has been damaged in storage or in transit or is in any way defective.
- C. Fly Ash: ASTM C 618, Class C or F.
- D. Silica Fume: ASTM C 1240, Amorphous Silica.
- E. Slag Cement: ASTM C 989, Grade 100 or 120 or ASTM C 595, Type IS or Type S.
- F. Normalweight Aggregates: ASTM C 33, and as herein specified. Submit material certificates from aggregate supplier or test results from an independent testing agency certifying conformance to this specification for each source of aggregate.
  - 1. Concrete identified on the drawings as Exposure Class C1, C2 or W1 must meet the Durability Requirements outlined in Section 2.3E.
- G. Water: Comply with the requirements of ASTM C 1602.
- H. Cementitious materials, aggregate, and water must be extracted or recovered as well as manufactured within 500 miles of the project site.

#### 2.2 ADMIXTURES

- A. Air-Entraining Admixture: ASTM C 260.
  - 1. Subject to compliance with requirements, provide one of the following products and manufacturers:
    - a. GCP Applied Technologies; Darex or Daravair series.
    - b. Master Builder Solutions; MasterAir VR 10, MasterAir AE 90, MasterAir AE 200.
    - c. Sika Corporation; Sika AER.
    - d. The Euclid Chemical Company; Air Mix, AEA-92, Eucon Air 30 or Eucon Air 40.
- B. Water-Reducing Admixture: ASTM C 494, Type A. See maximum permissible chloride ion content in concrete specified below.
  - 1. Subject to compliance with requirements, provide one of the following products and manufacturers:
    - a. Master Builder Solutions; MasterPozzolith Series or MasterGlenium Series.
    - b. Sika Corporation; Plastocrete 161.
    - c. The Euclid Chemical Company; Eucon WR-75, Eucon WR-91, Eucon NW or Eucon LW.
    - d. GCP Applied Technologies; WRDA series, Zyla Series.
- C. Calcium Chloride: Calcium chloride is not permitted.
- D. Certification: Written conformance to all the above-mentioned requirements and the chloride ion content of the admixture as tested by an accredited laboratory will be required from the admixture manufacturer at the time of design mixture review by the Engineer.

# 2.3 PROPORTIONING AND DESIGN OF CONCRETE MIXTURES

- A. The Contractor shall submit design concrete mixtures for each class of concrete indicated on the structural drawings and in the Specifications for approval by the Engineer and Owner's Testing Laboratory at least 15 working days prior to the start of construction. If required, the Contractor shall engage the services of an independent Testing Laboratory to assist in preparing the design mixtures. The Contractor shall not begin work with a particular mixture until that design mixture has been approved.
- B. The Contractor, acting in conjunction with his Concrete Supplier and his Testing Laboratory, shall submit in writing, with his design mixtures, the method used to select mixture proportions. Either of the following methods, as outlined in ACI 301, may be used:
  - 1. Field Experience Method.
  - 2. Laboratory Trial Mixture Method.
- C. Required types of concrete and compressive strengths shall be as indicated on the Structural Drawings.

- D. All design mixtures shall state the following information:
  - 1. Design mixture number or code designation by which the Contractor shall order the concrete from the Supplier.
  - 2. Identify design mixture usage (i.e., columns, shear walls, footings, slab-on-grade, etc.).
  - 3. Wet and dry unit weights.
  - 4. Compressive strength and associated age (28-day, 56-day, etc.).
  - 5. Aggregate type, source, size, gradation, fineness modulus.
  - 6. Cement type and brand.
  - 7. Fly ash or other pozzolan type and brand (if any).
  - 8. Admixtures including air entrainment, water reducers, high-range water reducers, accelerators, and retarders.
  - 9. Design slump or slump/flow.
  - 10. Proportions of each material used.
  - 11. Water/cementitious ratio and maximum allowable water content.
  - 12. Method by which the concrete is intended to be placed (bucket, chute, or pump).
  - 13. Required average strength qualification calculations per ACI 301 4.2.3.3a and 4.2.3.3b. Submit separate qualification calculations for each production facility that will supply concrete to the project.
  - 14. Documentation of Average Strength (Trial Mixture Data or Field Test Data) per ACI 301: When field test data is used to qualify average strength, submit separate documentation for each production facility that will supply concrete to the project.
  - 15. Field test data submitted for qualification of average strength under ACI 301 shall include copies of the Concrete Testing Agency's reports from which the data was compiled.
- E. Durability Requirements:
  - 1. For concrete identified on the drawings as Exposure Classes C1, C2, or **[P1/W1]**, use one of the following options to qualify the concrete mixtures to reduce the potential of alkalisilica reaction.
    - a. Use aggregate with an expansion of not more than 0.04% at one-year when tested in accordance with ASTM C1293.
    - b. Limit the total alkali content in concrete to 4.0 pounds per cubic yard of concrete for aggregate with an expansion value greater than or equal to 0.04% and less than 0.12% when test in accordance with ASTM C1293.
    - c. Limit the total alkali content in concrete to 3.0 pounds per cubic yard of concrete for aggregate with an expansion value greater than or equal to 0.12% and less than 0.24% per ASTM C1293
    - d. Limit the expansion for each aggregate to 0.10% at 16 days when tested in accordance with ASTM C1567.
- F. Supplementary Cementitious Materials: Fly ash and/or ground granulated blast-furnace slag replacement of Portland cement shall be within percentage replacement levels listed on the drawings unless noted otherwise. Every effort should be made to reduce the amount of cement to the minimum practical amount, and still achieve performance requirements contained in the Contract Documents.
  - 1. Cement replacement shall not exceed a percentage level that has been shown by experience on other projects to exhibit satisfactory performance using materials from identical sources as proposed for this project. As an alternate, trial concrete batches can be performed to

identify design mixtures that maximize cement replacement while meeting strength requirements per ACI 301 and finishability criteria.

- 2. The use of fly ash or slag in architecturally exposed structural concrete shall be coordinated with the Architect, Engineer, and Contractor.
- 3. Overall replacement percentages with combined fly ash and slag shall not exceed the maximum identified with slag or be less than the minimum identified with fly ash for each type of element. In addition, the replacement percentage of fly ash within the combined mixture shall not exceed the maximum identified with fly ash alone.
- 4. Replacement percentages exceeding the maximum may be permitted at the discretion of the Architect, Engineer of Record, and Contractor.
- 5. For concrete identified on the drawings as being subject to Exposure Class F3, the maximum amount of supplementary cementitious materials shall not exceed the limits noted in Table 4.2.2.7.b.2 "Maximum cementitious materials requirements for concrete exposed to deicing chemicals" of ACI 301.
- 6. Except for Mass Concrete, the Contractor may submit for approval a revised design mixture with lower supplementary cementitious material percentages than herein specified should finishability or other issues arise due to changing weather conditions.
- G. Aggregate: Comply with the following special requirements:
  - 1. For exposed concrete, provide aggregates from a single source.
  - 2. For exposed surfaces subject to Exposure Class C1 or C2, do not use aggregates containing spalling-causing deleterious substances unless the conditions outlined in the Durability Requirements are met.
  - 3. For slabs and other designated concrete, combined aggregate gradation shall be 8% 18% for large top size aggregates (1 1/2 inches) or 8% 22% for smaller top size aggregates (1 inch or 3/4 inch) retained on each sieve below the top size and above the No. 100. Deviations from this gradation may be allowed upon the approval of the Engineer subject to the following limitations:
    - a. The percent retained on two adjacent sieves shall be not less than 5%.
    - b. The percent retained on three adjacent sieves shall be not less than 8%.
    - c. If the percent retained on two adjacent sieves is less than 8%, the total percent retained on either of those sieves and the adjacent outside sieve shall be not less than 13%.
- H. Admixtures:
  - 1. Admixtures to be used in concrete shall be subject to the approval of the Engineer and Owner's Testing Laboratory and shall be used for the purpose intended by the manufacturer to produce concrete to meet the specified requirements.
  - 2. Quantities of admixtures to be used shall be in strict accordance with the manufacturer's instructions.
  - 3. Air Content Requirements: For concrete subject to Exposure Class F1, F2 or F3 as noted on the drawings, use air-entrainment admixtures to provide concrete such that the air content at the point of placement shall conform to the requirements of ACI 301 Table 4.2.2.7.b "For Exposure Category F: Freezing and thawing exposures" within plus or minus 1.5%. Required air content levels may be reduced by 1.0 percent for concrete strengths above 5,000 PSI.
    - a. Interior steel troweled surfaces shall not have more than 3% total air content.

- b. Surfaces scheduled to receive hardeners shall not have more than 3% total air content.
- c. Air-entraining admixtures are not permitted in industrial slabs.
- I. Adjustments of Concrete Mixtures: Design mixture adjustments may be requested by the Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant. Such adjustments shall be provided at no additional cost to the Owner. Any adjustments in approved design mixtures including changes in admixtures shall be submitted in writing to the Engineer and Owner's Testing Laboratory for approval prior to field use.
- J. Shrinkage: Concrete so identified on the drawings shall be proportioned for a maximum allowable unit shrinkage as noted on the drawings, measured at 28 days after curing in lime water as determined by ASTM C 157 (using air storage). Submit results of test for each class of applicable concrete after every 500 cubic yards placed.
- K. Chloride Ion Content:
  - 1. Unless noted otherwise, the maximum water soluble chloride ion concentration in hardened concrete measured at ages from 28 to 42 days contributed from all ingredients including water, aggregates, cementitious materials, and admixtures shall not exceed the limits specified in ACI 318-14 Table 19.3.2.1 "Requirements for concrete by exposure class" depending on to which Corrosion Exposure Class (C0, C1 or C2) the concrete is subject as noted on the drawings. Water-soluble chloride ion tests shall conform to ASTM C 1218. One test shall be run for each class of concrete before the design mixture submittal and each time a change is made to the design mixture (such as change in aggregate type or source).
  - 2. The chloride ion content in all concrete used for prestressed or post-tensioned concrete shall not exceed 0.06 percent by mass of cementitious materials. For the purpose of determining chloride ion content in all concrete used for prestressed or post-tensioned concrete, mass of supplementary cementitious material shall not exceed the mass of the portland cement.
  - 3. The Concrete Supplier shall certify that the chloride ion content in all concrete design mixtures used on the project does not exceed the limits stated above.

# 2.4 CONCRETE MIXING

A. Ready-Mix Concrete: Comply with requirements of ANSI/ASTM C 94.

# PART 3 - EXECUTION

# 3.1 SLUMP LIMIT

A. The slump, as measured in the field where concrete cylinders are taken, shall be within plus or minus 1-1/2 inches of the design slump noted in the approved Design Mixture submittal. Self-Consolidating Concrete shall have a slump/flow of plus or minus two inches of the design slump/flow noted on the approved Design Mixture submittal. Water may be added to the concrete in the field only to the extent that the prescribed water/cementitious ratio noted in the approved Design Mixture submittal is not exceeded. The responsibility for adding water to trucks at the job site shall rest only with the Contractor's designated representative. The Contractor is responsible that all concrete placed in the field is in conformance with the Contract Documents.

#### 3.2 VAPOR RETARDER INSTALLATION

- A. Install and repair damaged vapor retarder in accordance with ASTM E 1643 and manufacturer's instructions.
- B. Lap all seams per manufacturer's instruction (6" minimum lap) and seal all joints in the field with the specified pressure sensitive tape. Heat-welded joints done in a shop prior to delivery is an acceptable method to minimize the number of field joints.
- C. Seal all pipe penetrations through the vapor retarder with a boot made from the vapor retarder material and tape or mastic.

#### 3.3 JOINTS IN CONCRETE

- A. Construction Joints: Locate and install construction joints as indicated on the drawings or if not shown on drawings, located so as not to impair strength and appearance of the structure, as acceptable to Architect/Engineer.
  - 1. Keyways: Provide keyways with a depth of one tenth of the member thickness (1 1/2" minimum or as shown on the drawings) in construction joints only where shown on the drawings.
  - 2. Joint Construction: Place construction joints in the center one third of suspended spans and grade beams and as shown on the drawings for slabs-on-grade and walls unless shown otherwise. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise shown on the drawings. Dowels that cross construction joints shall be supported during concreting operations so as to remain parallel with the slab or wall surface and at right angles to the joint. Submit all construction joint locations as a shop drawing submittal.
- B. Contraction Joints in Slabs-on-Grade and Unbonded Topping Slabs: Install contraction joints at locations and spacings as indicated on the drawings or if not shown on drawings, located so as not to impair strength and appearance of the structure, as acceptable to Architect/Engineer. Maximum joint spacing shall be per the drawings and be perpendicular to the slab surface. Use one of the two following methods (sawed or formed) to create the joints. Do not use the formed joint in areas subject to vehicular traffic or in industrial slabs.
  - 1. Sawed Joints:
    - a. Primary Method: Early-Entry, dry-cut method, using Soff-Cut saws. Finisher must have documented successful experience in the use of this method prior to this project. Install cuts within one to four hours, depending on air temperature, after final finish as soon as the concrete surface is firm enough to not be torn or damaged by the blade at each saw cut location. Use 1/8 inch thick blade, cutting to a depth of one quarter of the slab thickness but not less than one inch. Cut to a depth of one third of the slab thickness for slabs reinforced with steel fibers or synthetic fibers.

- b. Optional Method (where Soff-Cut System method equipment is not available, subject to limitations): This method may not be used when there is no dowel passing through the contraction joint. Use a conventional saw to cut joints within four to 12 hours after finishing as soon as the concrete has hardened sufficiently to prevent aggregates from being dislodged by the saw. Complete cutting before shrinkage stresses become sufficient to produce cracking. Use 1/8 inch thick blade, cutting to a depth of one quarter of the slab thickness but not less than one inch. Cut to a depth of one third of the slab thickness for slabs reinforced with steel fibers.
- 2. Formed Joints: Form contraction joints by inserting premolded plastic hardboard or fiberboard strip into fresh concrete until top surface of strip is flush with slab surface. The depth is to be one quarter of the slab thickness, but not less than one inch. Tool slab edges round on each side of insert. After concrete has cured, remove inserts and clean groove of loose debris.
- 3. Joint Filler: Provide in both contraction and saw-cut construction joints when specified.
  - a. Remove dirt and debris from the joint by vacuuming immediately prior to filling joint. Clean the joint of curing compounds and sealers.
  - b. Filler material shall be applied to the joints when the building is under permanent temperature control, but no less than 90 days after slab construction.
  - c. Follow the manufacturer's recommended procedure for installing filler material. The joint filler must be flush with the adjacent concrete. A concave profile on the top of the joint filler is unacceptable and will be grounds for removal and replacement.
- 4. The Contractor shall protect the joints from damage caused by wheeled traffic or other sources during construction until a joint-filler material (if specified) has been installed.

# 3.4 INSTALLATION OF EMBEDDED ITEMS

- A. General: Set and build into work anchorage devices and other embedded items required for other work that is attached to, or supported by, cast-in-place concrete. Use setting drawings, diagrams, instructions and directions provided by suppliers of items to be attached thereto unless directed otherwise by these specifications. Install reglets to receive top edge of foundation sheet waterproofing where specified by the Architect, and to receive thru-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, relieving angles and other conditions.
- B. Edge Forms and Screed Strips for Slabs: Set edge forms or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in finished slab surface. Provide and secure units sufficiently strong to support types of screed strips by use of strike-off templates or accepted compacting type screeds.
- C. Do not install sleeves in any concrete member except where shown on the structural drawings or approved by the Architect and Engineer.
- D. Securely fasten embedded plates, angles, anchor rods and other items to be built into the concrete to the formwork or hold in place with templates. Insertion of these items into concrete after concrete placement is prohibited.

# 3.5 CONCRETE PLACEMENT

- A. Pre-placement Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast-in. Notify other crafts to permit installation of their work; cooperate with other trades in setting such work. Moisten wood forms immediately before placing concrete where form coatings are not used.
- B. Concrete Batch Trip Tickets: The Contractor shall collect and retain concrete batch trip tickets. Compressive strength, slump, air content, and temperature tests shall be identified by reference to a particular trip ticket. Tickets shall contain the information specified in ASTM C 94. Each ticket shall also show the amount of water that may be added in the field for the entire batch that will not exceed the specified water cement ratio for the design mixture. The Contractor and Testing Laboratory shall immediately notify the Architect/Engineer and each other of tickets not meeting the criteria specified.
- C. Causes for Rejection of Concrete: The Contractor shall reject concrete delivered to the site for any of the following reasons:
  - 1. Wrong class of concrete (incorrect design mixture number).
  - 2. Environmental condition limits shall be as follows unless appropriate provisions in concrete practices have been made for cold or hot weather:
    - a. Cold Weather: Air temperature must be 40°F and rising or the average daily temperature cannot have been lower than 40°F for three consecutive days unless the temperature rose about 50°F for at least one-half of any of those 24 hour periods.
    - b. Hot Weather: Environmental conditions must be such that cause an evaporation rate from the concrete surface of 0.2 pounds per square foot per hour or less as determined by the figure "NRMCA Nomograph for Estimating Evaporation Rate on the Basis of Menzel Formula" in Appendix A of ACI 305.1.
    - c. Concrete may be placed at other environmental condition ranges only with the approval of the job inspector for the Testing Laboratory or other duly appointed representative.
  - 3. Concrete with temperatures exceeding 95°F.
  - 4. Air contents outside the limits specified in the design mixtures.
  - 5. Slumps outside the limits specified.
  - 6. Water added to the mix that exceeds the maximum allowed water-to-cementitious material ratio.
  - 7. Excessive Age: Concrete shall be discharged within 90 minutes of plant departure or before it begins to set if sooner than 90 minutes and it shall be discharged before the drum has revolved 300 revolutions, unless approved by the Testing Laboratory job inspector or other duly appointed representative.
- D. Coordinate the installation of joint materials and vapor retarders with placement of forms and reinforcing steel.
- E. Comply with ACI 301 and as herein specified:
  - 1. Concrete Temperature: The maximum acceptable concrete temperature at the truck discharge point shall be 95°F.

- 2. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete that has hardened sufficiently to cause the formation of seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as herein specified. Deposit concrete as nearly as practicable to its final location to avoid segregation. Spread concrete using short-handled, square-ended shovels, or come-alongs.
- 3. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers not deeper than 24" and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.
- 4. Consolidate placed concrete by mechanical vibrating equipment supplemented by handspading, rodding or tamping. Use internal vibrators of the largest size and power that can properly be used in the work.
- 5. Do not vibrate Self-Consolidating Concrete.
- 6. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine. Place vibrators to penetrate rapidly placed layer and at least 6" into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of mix.
- 7. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until the placing of a panel or section is completed. Place concrete for beams, girders, brackets, column capitals, haunches, and drop panels at the same time as concrete for slabs. Do not place concrete over columns and walls until concrete in columns and walls is no longer plastic and has been in place at least one hour.
- 8. Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners of forms, eliminating air and stone pockets that may cause honeycombing, pitting, or planes of weakness.
- 9. Bring slab surfaces to correct level with straightedge and strikeoff. Use highway straightedges, bull floats, or darbies to smooth surface free of humps or hollows before excess moisture or bleedwater appears on the surface. Do not disturb slab surfaces prior to beginning finishing operations.
- 10. Maintain reinforcing in proper position during concrete placement operations.
- 11. Protect adjacent finish materials against damage and spatter during concrete placement.
- 12. Placing Concrete by Pump: If concrete is placed by using a pump, the grout used for pump priming must not become a part of the completed structure unless an engineered grout design mix and grout location are approved in advance by the Engineer.

# 3.6 FINISH OF FORMED SURFACES

- A. General: Formed surfaces shall have the finishes as described below and as shown on the drawings after formwork is removed and repairs made.
- B. Matching Mockup Finish: In all areas where a special finish is required or a mock-up is required below, Contractor shall prepare a 100 square foot mock-up to match the required finish. The mock-up should match the finish on a sample panel furnished to the Contractor. If a sample is not furnished, provide finish to match SF2.0 or any other finish specified for the project. Protect mock-up from damage for the duration of project. Approval of mock-up by Architect is required before proceeding with application of finish in project.
- C. Classifications and Finish Requirements:

- 1. Surface Finish 1.0 (SF-1.0):
  - a. No formwork facing material is specified.
  - b. Patch voids larger than 1-1/2 inch wide or 1/2 inch deep.
  - c. Remove projections larger than 1.0 inch.
  - d. Provide surface tolerance Class D as specified in ACI 117.
  - e. Tie holes need not be patched.
- 2. Surface Finish 2.0 (SF-2.0):
  - a. Provide specified formwork-facing material.
  - b. Patch voids larger than 3/4 inch wide or 1/2 inch deep.
  - c. Patch tie holes.
  - d. Remove projections larger than 1/4 inch.
  - e. Provide surface tolerance Class B as specified in ACI 117.
  - f. Provide mock-up of concrete surface appearance.
- D. Standard Finish: Provide SF-1.0 on all concrete surfaces not exposed to view in the final condition unless otherwise specified.
- E. Exposed Finishes: Provide SF-2.0 on all concrete surfaces exposed to view in final condition unless otherwise specified.
- F. Related Unformed Surfaces: At tops of walls, horizontal offsets and similar unformed surfaces occurring adjacent to formed surfaces, strike-off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

# 3.7 CONCRETE FINISH MEASUREMENT AND TOLERANCES

- A. Testing Procedure: ASTM E 1155.
- B. Tolerance on Floor Elevations: Construction tolerance on absolute floor elevation from the specified elevation as shown on the drawings shall be as specified below, taken from ACI 117:
  - 1. Slab-on-Grade Construction:  $\pm 3/4$ ".
  - 2. Top Surfaces of Formed Slabs Measured Prior to Removal of Supporting Shores:  $\pm 3/4$ ".
  - 3. Top Surfaces of All Other Slabs:  $\pm 3/4$ ".
- C. Random Traffic Floor Finish Tolerances:
  - 1. Specified overall values for flatness  $(SOF_F)$  and levelness  $(SOF_L)$  shall conform to the values listed below for the floor surface classification noted for each slab category noted.
    - a. Conventional:
      - 1)  $SOF_F: 20.$
      - 2) SOF_L: 15.

- 2. Minimum local values for flatness ( $MLF_F$ ) and levelness ( $MLF_L$ ) shall equal 3/5 of the  $SOF_F$  and  $SOF_L$  values, respectively, unless noted otherwise. The  $MLF_F$  and  $MLF_L$  values shall apply to the minimum areas bounded by the column lines and half-column lines, or the minimum areas bounded by the construction and contraction joints, whichever are the smaller areas.
- 3. The  $SOF_L$  and  $MFL_L$  tolerance values shall apply only to level slabs-on-ground or to level, uncambered suspended slabs that are shored such that it cannot deflect from the time the floor is placed to the time it is measured.
- 4. Slabs specified to slope shall have a tolerance from the specified slope of 3/8" in 10 feet at any point.
- D. Construction Requirements to Achieve Specified Floor Finish Tolerances:
  - 1. Forms shall be properly leveled, in good condition, and securely anchored including special attention to ends and transitions.
  - 2. Bearing surfaces for straightedges such as form edges or previously poured slabs shall be kept clean of laitance, sand, gravel, or other foreign elements.
  - 3. Screeds shall be maintained in good condition with true round rolling wheels and level cutting edges. The use of optical sighting equipment such as lasers is recommended for checking levelness and straightness. The Contractor shall promptly adjust or replace equipment when test results indicate substandard work.
  - 4. Highway straightedges are recommended for use in lieu of bullfloats for all slab placement and finishing operations. If mineral, non-oxidizing metallic, or metallic floor hardeners are used, the slab shall be wood bullfloated immediately after the straightedge.
- E. Contractor Responsibility for Concrete Floor Finish Requirements: Floor finish requirements shown below (flatness and levelness tolerances) are minimum requirements that apply unless stricter requirements are contained in instructions for installation of applied floor products in which case the Contractor is responsible for attaining the values prescribed by the manufacturer of such products.
- F. Concrete Floor Finish Tolerance for Slab-on-Grade Construction:
  - 1. Concrete Placement: Concrete shall be placed and screeded to predetermined marks set to elevations prescribed on the drawings.
- G. Remedial Measures for Slab Finish Construction Not Meeting Specified Tolerances:
  - 1. Application of Remedial Measures. Remedial measures specified herein are required whenever either or both of the following occur:
    - a. The composite overall values of  $F_F$  or  $F_L$  of the entire floor installation measure less than specified values.
    - b. Any individual test section measures less than the specified absolute minimum  $F_{\rm F}$  or  $F_{\rm L}$  value.
  - 2. Modification of Existing Surface:

- a. If, in the opinion of the Architect/Engineer or Owner's Representative, all or any portion of the substandard work can be repaired without sacrifice to the appearance or serviceability of the area, then the Contractor shall immediately undertake the approved repair method.
- b. The Contractor shall submit for review and approval a detailed work plan of the proposed repair showing areas to be repaired, method of repair, and time to affect the repair.
- c. Repair method(s), at the sole discretion of the Architect/Engineer or Owner's Representative, may include grinding (floor stoning), planing, retopping with self-leveling underlayment compound or repair topping, or any combination of the above.
- d. The Architect/Engineer or Owner's Representative maintains the right to require a test repair section using the approved method of repair for review and approval to demonstrate a satisfactory end product. If, in the opinion of the Architect/Engineer or Owner's Representative, the repair is not satisfactory an alternate method of repair shall be submitted or the defective area shall be replaced.
- e. The judgment of the Architect/Engineer or Owner's Representative on the appropriateness of a repair method and its ability to achieve the desired end product shall be final.
- f. All repair work shall be performed at no additional cost to the Owner and with no extension to the construction schedule.
- 3. Removal and Replacement:
  - a. If, in the opinion of the Architect/Engineer or Owner's Representative, all or any portion of the substandard work cannot be satisfactorily repaired without sacrifice to the appearance or serviceability of the area, then the Contractor shall immediately commence to remove and replace the defective work.
  - b. Replacement section boundaries shall be made to coincide with the test section boundaries as previously defined.
  - c. Sections requiring replacement shall be removed by sawcutting along the section boundary lines to provide a neat clean joint between new replacement floor and existing floor.
  - d. The new section shall be reinforced the same as the removed section and doweled into the existing floor as required by the Engineer. No existing removed reinforcing steel may be used. All reinforcing steel shall be new steel.
  - e. Replacement sections may be retested for compliance at the discretion of the Architect/Engineer or Owner's Representative.
  - f. The judgment of the Architect/Engineer or Owner's Representative on the need for replacement shall be final.
  - g. All replacement work shall be performed at no additional cost to the Owner and with no extension to the construction schedule.

### 3.8 CONCRETE CURING AND PROTECTION

- A. General:
  - 1. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Maintain concrete with minimal moisture loss at a relatively constant temperature for the period necessary for hydration of the cement and hardening of concrete.

Limit moisture loss to a maximum of 0.05 pounds per square foot per hour for concrete containing silica fume and 0.2 pounds per square foot per hour for all other concrete before and during finishing operations. If using an evaporation retarder, apply in accordance with manufacturer's instructions after screeding and bull floating, but before power floating and troweling.

- 2. Curing shall commence as soon as free water has disappeared from the concrete surface after placing and finishing. The curing period shall be seven days for all concrete except high early strength concrete that shall be cured for three days minimum.
- 3. Alternatively, curing times may be reduced if either of the following provisions is complied with:
  - a. If tests are made of cylinders kept adjacent to the structure and cured by the same methods, curing measures may be terminated when the average compressive strength has reached 70% of the specified compressive strength.
  - b. If the temperature of the concrete is maintained at a minimum of 50°F for the same length of time required for laboratory cured cylinders of the same concrete to reach 85% of the specified compressive strength, then curing may be terminated thereafter.
- 4. Curing shall be in accordance with ACI 301 procedures. Avoid rapid drying at the end of the curing period.
- B. Curing Unformed Surfaces: Cure unformed surfaces, such as slabs, floor topping, and other flat surfaces by one or a combination of the methods specified below, as applicable. The Contractor shall choose a curing method that is compatible with the requirements for subsequent material usage on the concrete surface.
- C. Curing Methods:
  - 1. Method 1 Moisture Curing: Provide moisture curing by one of the following methods:
    - a. Keep concrete surface continuously wet by covering with water.
    - b. Continuous water-fog spray.
    - c. Covering concrete surface with specified absorptive cover, thoroughly saturating cover with water, and keeping continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4" lap over adjacent absorptive covers.
  - 2. Method 2 Moisture-Retaining Cover Curing: Provide moisture-retaining cover curing as follows:
    - a. Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3" and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape. Water may be added to concrete surface to prevent drying before the cover is installed, but the surface shall not be flooded with water if a non-absorptive cover is used.
  - 3. Method 3 Curing or Curing and Sealing Compound: Provide curing, liquid membraneforming curing, or curing and sealing compound as follows:

- a. Apply specified compound to concrete slabs as soon as final finishing operations are complete (within two hours and after surface water sheen has disappeared). Apply uniformly in continuous operation by power-spray or roller in accordance with manufacturer's directions. Do not allow to puddle. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period. Apply second coat for sealing two to three hours after the first coat was applied.
- b. Do not use membrane-forming curing and sealing compounds on surfaces which are to be covered with coating material applied directly to concrete, liquid floor hardener, waterproofing, dampproofing, membrane roofing, flooring (such as ceramic or quarry tile, glued-down carpet, vinyl composition tile, linoleum, sheet vinyl, rubber, athletic flooring, synthetic turf, or wood), paint, or other coatings and finish materials. Dissipating resin type cures are acceptable in these locations.

### 3.9 HOT WEATHER CONCRETING

- A. Definition:
  - 1. Conditions warranting hot weather concreting practices are defined as any combination of high air temperature, low relative humidity, and wind velocity tending to impair the quality of fresh or hardened concrete or otherwise result in abnormal properties. If conditions cause an evaporation rate of 0.2 pounds per square foot per hour or greater as calculated by the figure "NRMCA Nomograph for Estimating Evaporation Rate on the Basis of Menzel Formula" in Appendix A of ACI 305.1, then precautions shall be taken to prevent plastic shrinkage cracks from occurring.
- B. Specification: Follow hot weather concreting practices specified below when required to limit the concrete temperature at the truck discharge point to the stated maximum acceptable temperature.
- C. Records: Under hot weather conditions, the Contractor shall keep records of outside air temperature, concrete temperature at truck discharge and general weather conditions.
- D. Hot Weather Concreting Requirements: The following items, all or in part as required, shall be followed to limit the concrete temperature to the stated maximum acceptable temperature and to minimize the possibility of plastic shrinkage cracks from developing.
  - 1. Design the concrete mixtures specifically for hot weather conditions replacing some cement with fly ash or other pozzolan and using a water reducing retarding admixture (ASTM C 494 Type D).
  - 2. Use the largest size and amount of coarse aggregate compatible with the job.
  - 3. Use sunshades and/or windbreaks.
  - 4. Delay construction of indoor slabs-on-grade until the walls and roof are constructed.
  - 5. Cool and shade aggregate stockpiles.
  - 6. Use ice as part of the mixing water or cool the water with liquid nitrogen. Do not place concrete that contains unmelted ice.
  - 7. Limit the number of revolutions at mixing speed to 125 maximum.
  - 8. Reduce time between mixing and placing as much as possible.
  - 9. Do not add water to ready-mixed concrete at the job site unless it is part of the amount required initially for the specified water-cement ratio and the specified slump.

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- 10. Schedule concrete placement for early morning, late afternoon, or night.
- 11. Have all forms, equipment, and workers ready to receive and handle concrete.
- 12. Maintain one standby vibrator for every three vibrators used.
- 13. Keep all equipment and material cool by spraying with water including exteriors of forms, reinforcing steel, subgrade, chutes, conveyors, pump lines, tremies, and buggies.
- 14. Protect slab concrete at all stages against undue evaporation by applying a fog spray or mist above the surface or applying a monomolecular film. Where high temperatures and/or placing conditions dictate, use water-reducing retarding admixture (Type D) in lieu of the water-reducing admixture (Type A) as directed by the Owner's Testing Laboratory.
- 15. Provide continuous curing, preferably with water, during the first 24 hours using wet burlap, cotton mats, continuous spray mist, or by applying a curing compound meeting ASTM C 1315. Continue curing for three days minimum.
- 16. Cover reinforcing steel with water soaked burlap so that steel temperature will not exceed ambient air temperature immediately before placement of concrete.
- 17. As soon as possible, loosen forms and run water down the inside. When forms are removed, provide a wet cover to newly exposed surfaces.

### 3.10 COLD WEATHER CONCRETING

- A. Definition:
  - 1. Concrete shall not be placed when the outside air temperature is 40°F or less unless cold weather concreting practices are followed as specified below.
  - 2. Cold weather concreting practices should also be followed whenever the average daily air temperature is expected to be less than 40°F for more than three successive days. The average daily air temperature is the average of the highest and lowest temperature occurring during the period from midnight to midnight. The requirement for adhering to these coldweather concreting practices may be terminated when the air temperature is above 50° F for more than half of any 24 hour duration.
  - 3. Cold-weather concreting practices invoked shall keep the temperature of the concrete immediately after placing within the following temperature ranges:
    - a.  $55^{\circ}$  to  $75^{\circ}$  F for sections less than 12 inches in the least dimension.
    - b. 50° to 70° F for sections 12 to 36 inches in the least dimension.
    - c. 45° to 65° F for sections 36 to 72 inches in the least dimension.
    - d.  $40^{\circ}$  to  $60^{\circ}$  F for sections greater than 72 inches in the least dimension.
  - 4. Concrete Protection: Protect the concrete immediately after placing and during the defined protection period such that the concrete does not freeze nor fall below the temperature levels stated in the above paragraph. For concrete not loaded during construction, the protection period shall be for a minimum of three days if cold-weather conditions persist. The time may be reduced to a minimum of two days if Type III cement or an accelerating admixture is used or if an additional 100 pounds of cement per cubic yard is added to the concrete mix. Concrete fully loaded during construction shall be protected during cold weather conditions for whatever time is required to obtain the required strength as determined by nondestructive strength tests (Windsor probe, Swiss Hammer Test) on the in-place concrete. Protect concrete surfaces from freezing for the first 24 hours even if cold-weather conditions do not officially exist due to high volatility in ambient temperatures.

- 5. Protection Deficiency: If the temperature requirements during any portion of the protection period are not met but the concrete surface did not freeze, the protection period shall be extended until twice the deficiency expressed in degree-hours is made up. Deficiency degree-hours are defined as the average deficiency in temperature below the required value times the number of hours the deficiency persisted. Make-up degree hours are the average increase in temperature above the minimum value times the hours required to make up twice the deficiency degree-hours. Contact the Architect/Engineer if the concrete surface was allowed to freeze during the protection period.
- 6. Protection Removal: As the protection is being removed the decrease in temperature measured at the surface of the concrete in a 24 hour period shall not exceed the following:
  - a. 50° F for sections less than 12 inches in the least dimension.
  - b.  $40^{\circ}$  F for sections 12 to 36 inches in the least dimension.
  - c.  $30^{\circ}$  F for sections 36 to 72 inches in the least dimension.
  - d. 20° F for sections greater than 72 inches in the least dimension.
- 7. The maximum concrete temperature heated by artificial means at point of placement shall not exceed 90°F.
- B. Records: Under cold weather conditions, the Contractor shall keep records of outside air temperature, concrete temperature as placed and general weather conditions. The temperature record shall be taken no less than two times per 24 hour duration.
- C. Cold Weather Concreting Requirements: The following items, all or in part as required, should be followed to assure acceptable concrete in cold weather conditions:
  - 1. Design the concrete mixture to obtain high early strength by using higher cement content, a high early strength cement (Type III), or a specified non-chloride accelerator (ASTM C 494 Type C or E).
  - 2. Protect the concrete during curing period using insulating blankets, insulated forms, enclosures, and/or heaters.
  - 3. Concrete cured in heated enclosures shall have heaters vented to prevent exposure of concrete and workmen to noxious gases.
  - 4. Frozen subgrade shall be thawed prior to concrete placement and snow and ice shall be removed from forms.
  - 5. Temperature of embedments in concrete must be heated to above 32°F prior to placing concrete
  - 6. Heat the mixing water and then blend hot and cold water to obtain concrete no more than 10°F above the required temperature.
  - 7. Heat the aggregates by circulating steam in pipes placed in the storage bins for air temperatures consistently below 32°F. When either water or aggregate is heated to over 140°F, combine them in the mixer first to obtain a maximum temperature of the mixture not to exceed 140°F in order to prevent flash set of the concrete.
  - 8. Uniformly thaw aggregates far in advance of batching to prevent moisture variations in the stockpile.
  - 9. Cover warmed stockpiles with tarps to retain heat.
  - 10. Place air entraining admixture in the batch after the water temperature has been reduced by mixing with cooler solid materials.
  - 11. Use wind screens to protect concrete from rapid cooling.
  - 12. Place vertical pump lines inside the building, if possible, for concrete being pumped.
  - 13. Maintain artificial heat as low as possible to reduce temperature stresses during cooling.

- 14. Avoid water curing of concrete except for parking garage structures. Apply the required curing compound to unformed surfaces as soon as possible to prevent drying of concrete from heated enclosures.
- 15. Delay form stripping as long as possible to help prevent drying from heated enclosures and to reduce damage to formed surfaces caused by premature stripping.
- 16. Provide triple thickness of insulating materials at corners and edges vulnerable to freezing.
- 17. Wrap protruding reinforcing bars with insulation to avoid heat drain from the warm concrete.
- 18. Gradually reduce the heat at the end of the heating period to reduce likelihood of thermal shock.

### 3.11 MISCELLANEOUS CONCRETE ITEMS

- A. Steel Pan Stairs: Provide concrete fill for steel pan stair treads and landings and associated items. Cast-in safety inserts and accessories as shown on drawings. Screed, tamp and finish concrete surfaces as scheduled.
- B. Adhesive Anchors: All drilled holes for adhesive anchors shall be within six degrees of perpendicular to the surface of the concrete member.

### 3.12 INVESTIGATION OF LOW CONCRETE STRENGTH TEST RESULTS

- A. Contractor Responsibility for Low Strength Concrete:
  - 1. If the average of any three consecutive strength tests falls below the required f'c for a class of concrete but no individual strength test is more than 500 PSI below the required f'c, the Contractor shall immediately notify the Engineer by telephone or email and take immediate steps to increase the average of subsequent strength tests.
  - 2. If any individual strength test falls more than 500 PSI below the required fc, the Contractor shall immediately notify the Engineer by telephone or e-mail and take immediate steps to assure that the load-carrying capacity of the structure is not jeopardized.
- B. Additional Field Tests to Confirm Low Concrete Strengths:
  - 1. The cost of all investigations of low-strength concrete, as defined by any individual strength test being more than 500 PSI below the required f'c, shall be borne by the Contractor.
  - 2. Code-Prescribed Acceptance: The only accepted field-test methods of determining actual in-situ concrete strength is by the way of core tests as prescribed by ACI 318.
  - 3. Non-Destructive Tests: If any individual strength test falls more than 500 PSI below the required fc, the Engineer may request that non-destructive field tests be performed on the concrete in question using Swiss Hammer, Windsor Probe, or other appropriate methods as approved by the Engineer. Report the comparative test results of the suspect concrete under consideration with identical tests done on concrete of known strength and of the same class. The Engineer considers these test results as only approximate indicators of strength and may not necessarily, by themselves, resolve the low concrete strength issue. These test results will be considered as additional information by which to make an informed judgment. The Engineer reserves the right to accept the concrete based on the results of these approximate tests or order that core tests be taken as prescribed below. At

the Contractor's option, the approximate non-destructive field-tests may be waived and core tests immediately initiated.

- 4. Core Tests: If, in the opinion of the Engineer, the likelihood of low-strength concrete is confirmed and it has been determined that the load-carrying capacity of the structure is significantly reduced as a result, the Engineer may request that core tests be taken from the area in question as directed by the Engineer. There shall be a minimum of three cores taken for each strength test more than 500 PSI below the required fc in accordance with ASTM C 42. If concrete in the structure will be dry under service conditions, cores shall be air dried (temperature 60° to 80°F, relative humidity less than 60 percent) for seven days before test and shall be tested dry. If concrete in the structure will be immersed in water for at least 40 hours and tested wet. The Contractor shall fill all holes made by drilling cores with an approved drypack concrete.
- 5. Acceptance Criteria for Core Test: Concrete in an area represented by core tests shall be considered adequate if the average of three cores is equal to at least 85% of the required f'c and no single core is less than 75% of the required f'c. If approved by the Engineer, locations of erratic core strengths may be retested to check testing accuracy.
- 6. Load Test: If the concrete strength is not considered adequate based on core tests and the structural adequacy remains in doubt, the Engineer may order a load test as specified in ACI 318 be conducted for the questionable portion of the structure.
- 7. Strengthening or Demolition of the Structure: If the structural adequacy of the affected portion of the structure remains in doubt following the load test, the Engineer may order the structure to be strengthened by an appropriate means or demolished and rebuilt at the Contractor's expense.

### 3.13 CONCRETE SURFACE REPAIRS

- A. Defective Areas:
  - 1. Formed Surfaces: Concrete surfaces requiring repairs shall include all cracks in excess of 1/64" in width and any other defects that affect the durability or structural integrity of the concrete. Voids, including honeycombing and rock pockets, and tie holes shall be repaired as required by the specified Surface Finish.
  - 2. Unformed Surfaces: Concrete surfaces requiring repair shall include all surface defects such as crazing, cracks in excess of 1/64" in width or cracks that penetrate to reinforcement or through the member, popouts, spalling, and honeycombs.
- B. Classification:
  - 1. Structural Concrete Repair: Major defective areas in concrete members that are load carrying (such as shear walls, beams, joists and slabs), are highly stressed, and are vital to the structural integrity of the structure shall require structural repairs. Structural concrete repairs shall be made using a two-part epoxy bonder, epoxy mortar, or specified polymer repair mortar. The Engineer shall determine the locations of required structural concrete repairs.
  - 2. Cosmetic Concrete Repair: Defective areas in concrete members that are non-load carrying and minor defective areas in load carrying concrete members shall require cosmetic concrete repair when exposed to view and not covered up by architectural finishes. Cosmetic concrete repairs may be made using a polymer repair mortar and compatible bonding agent. The Architect/Engineer shall determine the locations of required cosmetic

concrete repairs. Stains and other discolorations that cannot be removed by cleaning and are exposed to view will require cosmetic repair. Cosmetic concrete repair in exposed-to-view surfaces will require Architect's approval prior to patching operation.

3. Slab Repairs: High and low areas in concrete slabs shall be repaired by removing and replacing defective slab areas unless an alternate method, such as grinding and/or filling with self-leveling underlayment compound or repair mortar is approved by the Architect/Engineer. Repair of slab spalls and other surface defects shall be made using epoxy products as specified above and as determined by the Engineer. The high strength flowing repair mortar may be used for areas greater than one inch in depth.

### 3.14 FIELD QUALITY CONTROL

- A. Field Testing: The following tests shall be completed by the Testing Laboratory:
  - 1. During Concrete Placement:
    - a. Record the amount of water added and note if it exceeds the amount allowed to be added shown in the approved design mixture.
    - b. Mold concrete test cylinders as specified below in "Concrete Test Cylinders" Paragraph below.
    - c. Perform tests to determine slump, concrete temperature, unit weight, and air entrainment as specified below.
    - d. Record information for concrete test reports as specified below.
    - e. Pick up and transport to Laboratory cylinders cast the previous day.
  - 2. After Concrete Placement:
    - a. In-situ Concrete Strength Verification for Form Stripping: The Testing Laboratory shall perform the tests necessary to determine the concrete strength prior to form stripping:
      - 1) If concrete strength for form stripping is to be determined using field-cured cylinders, the cylinder shall be broken at the time of form removal as directed by the Contractor.
    - b. Investigation of Low Strength Concrete Test Results:
      - 1) Cost of Investigations for Low Strength Concrete: The Contractor shall reimburse the Owner for the costs of investigations of low strength concrete.
      - 2) Scope of Investigations: See above for the investigations that may be required by the Engineer. The Testing Laboratory will conduct these investigations if required.
    - c. Post-Installed Anchors in Concrete:
      - 1) Verify that all drilled holes for adhesive anchors are within six degrees of perpendicular to the surface of the concrete member.
  - 3. Standards for Concrete Tests:

- a. Concrete Test Cylinders: Mold and test concrete cylinders as described below:
  - Cylinder Molding and Testing: Cylinders for strength tests shall be molded and Laboratory cured in accordance with ASTM C 31 and tested in accordance with ASTM C 39. Cylinders may be either 6" in diameter by 12" or 4" in diameter by 8", however, the diameter of the cylinder shall be at least three times the nominal maximum size of the coarse aggregate in the mix tested. All of the cylinders for each class of concrete shall be of the same dimension for all sets of that class.
  - 2) Field Samples: Field samples for strength tests shall be taken in accordance with ASTM C 172 at the point of placement.
  - 3) Quantity of Cylinders: Each set of test cylinders shall consist of a minimum of four standard test cylinders. If concrete strength for form stripping is to be determined using field-cured cylinders, one additional cylinder per set will be required for formed slab and pan-formed beam floors for the purpose of evaluating the concrete strength at the time of form stripping. This cylinder shall be stored on the floor where form removal is to occur under the same exposure conditions as the floor concrete. The cylinder shall be cured under field conditions in accordance with ASTM C 31. Field-cured test cylinders shall be molded at the same time and from the same samples as laboratory-cured test specimens. The Contractor shall reimburse the Owner for the cost of making and testing these cylinders.
  - 4) Frequency of Testing: A set of test cylinders shall be made according to the following minimum frequency guidelines:
    - a) One set for each class of concrete taken not less than once a day.
    - b) Floors: One set for each 150 cubic yards or fraction thereof but not less than one set for each 5,000 square foot of floor area.
    - c) No more than one set of cylinders at a time shall be made from any single truck.
    - d) If the total volume of concrete is such that the frequency of testing as specified above would provide less than five strength tests for a given class of concrete, tests shall be made from at least five randomly selected batches or from each batch if fewer than five batches are used.
    - e) The above frequencies assume that one batch plant will be used for each pour. If more than one batch plant is used, the frequencies cited above shall apply for each plant used.
  - 5) The cylinders shall be numbered, dated, and the point of concrete placement in the building recorded.
  - 6) For concrete specified on the drawings to reach the required strength at 28 days, break one cylinder of the set at seven days, two 6" by 12" cylinders or three 4" by 8" cylinders at 28 days, and keep one in reserve for testing at the Engineer's direction.
  - 7) Cylinder Storage Box: The Contractor shall be responsible for providing a protected concrete cylinder wooden storage box at a point on the job site mutually agreeable with the Testing Laboratory for the purpose of storing

concrete cylinders until they are transported to the Laboratory. The box shall be constructed and equipped to maintain the environment specified for initial curing in ASTM C 31.

- 8) Transporting Cylinders: The Testing Laboratory shall be responsible for transporting the cylinders to the Laboratory in a protected environment such that no damage or ill effect will occur to the concrete cylinders including loss of moisture, freezing temperatures or jarring.
- 9) Information on Concrete Test Reports: The Testing Laboratory shall make and distribute concrete test reports after each job cylinder is broken. Such reports shall contain the following information:
  - a) Truck number and ticket number.
  - b) Concrete Batch Plant.
  - c) Design mixture number.
  - d) Accurate location of pour in the structure.
  - e) Strength requirement.
  - f) Date cylinders made and broken.
  - g) Technician making cylinders.
  - h) Concrete temperature at placing.
  - i) Air temperature at point of placement in the structure.
  - j) Amount of water added to the truck at the batch plant and at the site and whether or not it exceeds the amount allowed by the design mixture.
  - k) Slump.
  - l) Unit weight.
  - m) Air content.
  - n) Cylinder compressive strengths with type of failure if concrete does not meet Specification requirements. Seven day breaks are to be flagged if they are less than 60% of the required 28 day strength. 28 day breaks are to be brought to the attention of the Architect and Engineer in writing if either cylinder fails to meet specification requirements.
- b. Slump Tests: Slump Tests (ASTM C 143) shall be completed at the beginning of concrete placement for each batch plant and for each set of test cylinders made. The slump test shall be made from concrete taken from the end of the concrete truck chute. The concrete shall be considered acceptable if the slump is within the slump tolerance noted in the approved design mixture submittal for that class of concrete.
- c. Air Entrainment: Air entrainment tests (ASTM C 231 or C 173, C 173 only for lightweight concrete) shall be made at the same time slump tests are made as cited above. Samples for air entrainment tests shall be taken **at the point of placement**.
- d. Concrete Temperature: Concrete temperature at placement shall be measured (ASTM C 1064) at the same time slump tests are made as cited above.
- e. Unit Weight Test: ASTM C 138.
- f. Floor Flatness and Levelness Measuring:
  - 1) If requested by Engineer or Architect, the Testing Laboratory shall measure the floor for flatness and levelness according to ASTM E 1155.

- 2) Measurement of the finished concrete surface profile for any test section shall be made when requested by the Representative at his option. Notwithstanding, measurements shall be made within 72 hours after completion of finishing operations. For structural elevated floors measurement shall also be made prior to removal of forms and shores. The Contractor shall be notified immediately after the measurements of any section are complete and a written report of the floor measurement results shall be submitted within 72 hours after finishing operations are complete.
- 3) The concrete surface profile shall be measured using equipment manufactured for the purpose such as a Dipstick Floor Profiler as manufactured by the Edward W. Face Company in Norfolk, Virginia, F-Meters manufactured by Allen Face & Company in Norfolk, Virginia, optical, or laser means or other method specified in ASTM E 1155.
- 4) Each floor test section and the overall floor area shall conform to the twotiered measurement standard as specified herein.
  - a) Minimum Local Value (MLV). The minimum local  $F_F/F_L$  values represent the absolute minimum surface profile that will be acceptable in any one floor test section.
  - b) Specified Overall Value (SOV). The specified overall  $F_F/F_L$  values represent the minimum values acceptable for all combined floor test sections representing the overall floor.
- 5) For purposes of this specification a floor test section is defined as the smaller of the following areas:
  - a) The area bounded by column and/or wall lines.
  - b) The area bounded by construction and/or control joint lines.
  - c) Any combination of column lines and/or control joint lines.
  - d) Test sample measurement lines within each test section shall be multidirectional along two orthogonal lines as defined by ASTM E 1155.
  - e) The precise layout of each test section shall be determined by the Testing Laboratory and shall be submitted for Architect/Engineer review and approval.
- 4. Evaluation and Acceptance of Concrete:
  - a. Strength Test: A strength test shall be defined as the average strength of two six inch cylinder breaks or three four inch cylinder breaks from each set of cylinders tested at the time indicated above.
  - b. Quality Control Charts and Logs: The Testing Laboratory shall keep the following quality control logs and charts for each class of concrete containing more than 2,000 cubic yards. The records shall be kept for each batch plant and submitted on a weekly basis with cylinder test reports:
    - 1) Number of strength tests made to date.

- 2) Strength test results containing the average of all strength tests to date, the high test result, the low test result, the standard deviation, and the coefficient of variation.
- 3) Number of tests under specified strength.
- 4) A histogram plotting the number of strength test cylinders versus compressive strength.
- 5) Quality control chart plotting compressive strength test results for each test.
- 6) Quality control chart plotting moving average for strength where each point plotted is the average strength of three previous test results.
- 7) Quality control chart plotting moving average for range where each point plotted is the average of 10 previous ranges.
- c. Acceptance Criteria: The strength level of an individual class of concrete shall be considered satisfactory if both of the following requirements are met:
  - 1) The average of all sets of three consecutive strength tests equal or exceed the required fc.
  - 2) No individual strength test falls below the required fc by more than the greater of 10% of f'c or 500 PSI.
- d. If either of the above Acceptance Criteria requirements is not met, the Testing Laboratory shall immediately notify the Engineer by telephone. Steps shall immediately be taken to increase the average of subsequent strength tests.
- 5. Testing Reports: Compressive strength, slump, air, and temperature tests shall be identified by reference to a particular trip ticket.
- B. Field Inspection: The scope of the work to be performed by the inspector on the jobsite shall be as follows:
  - 1. Before Concrete Placement:
    - a. Inspect concrete formwork per Specification 031000 "Concrete Forming and Accessories."
    - b. Inspect concrete reinforcing per Specification 032000 "Concrete Reinforcing."
    - c. Inspect bolts and rods to be embedded in concrete for proper grade, size, length, and embedment.
    - d. For slabs-on-grade, verify that the moisture retarder is provided, is lapped properly, and is not torn or punctured.
    - e. Verify that there is no standing water in pour area and that all debris has been removed from the area and from the formwork.
    - f. Verify that openings and sleeves in slabs or walls are correct size and location. Verify that the openings are shown on the structural drawings and notify the Engineer immediately of any openings in the field that are not shown on the drawings.
    - g. Verify that horizontal and vertical sleeves through girders, beams, or joists have been approved by the Engineer and that approved reinforcement is provided.
    - h. Verify the tops of previously poured columns and/or walls are 1/2 inch below the deck soffit.
  - 2. During Concrete Placement: Provide continuous monitoring to:

- a. Upon arrival of concrete, inspect the concrete to verify that the proper concrete mix number, type of concrete, concrete strength is being placed at the proper location. Verify that the mix meets the project specifications and is not over 90 minutes old at the time of placement. Report concrete not meeting the specified requirements and immediately notify the Contractor, Batch Plant Inspector, Architect, Engineer, and Owner.
- b. Inspect plastic concrete upon arrival at the jobsite to verify proper batching. Observe mix consistency and adding of water as required to achieve target slumps in design mixtures.
- c. Verify that the Contractor is following appropriate Hot Weather or Cold Weather concreting practices consistent with any extreme environmental conditions at the point of placement in the structure.
- d. Verify that concrete deposited is uniform and that vertical drop does not exceed six feet and is not permitted to drop freely over reinforcement causing segregation.
- e. Verify that the formwork has remained stable during the concreting operation.
- f. Verify that there are no cold joints.
- g. Verify that the concrete is properly vibrated.
- h. Inspect bolts embedded in concrete during concrete placement for verification that they have been properly installed to the specified embedment.
- i. Verify that the finishing of the concrete surface is done according to specifications.

The Testing Laboratory shall report any irregularities that occur in the concrete at the job site or test results to the Contractor, Architect, Owner, and Engineer.

- 3. After Concrete Placement:
  - a. Verify that the curing process is according to Specifications and that any curing compound used is applied in accordance with the manufacturer's recommendations.
  - b. Verify that sawcut control joints in slab-on-grades are cut within 12 hours of placement.
  - c. Post-Installed Anchors in Concrete: Provide inspection of post-installed anchor installations at the frequency noted in the specifications and in accordance with the published, currently valid, Evaluation Service Report (ESR) for each anchor product. Post-installed anchors include anchors and reinforcing steel. Inspection of post-installed anchors shall include but not be limited to the following:
    - 1) Periodic Inspection: Verify initial installation of post-installed anchors in concrete for each individual installer with each individual anchor product in accordance with the requirements stated below for each type of anchor. Periodically inspect anchor installation after the initial verification.
    - 2) Continuous Inspection: Verify each installation of post-installed anchors in concrete in accordance with the requirements stated below for each type of anchor.
    - 3) All Post-Installed Anchors: Verify that the anchor is installed in accordance with manufacturer's printed installation instructions as well as the following design requirements.
      - a) Concrete type, concrete strength and concrete thickness are in accordance with design drawings.
      - b) Anchor manufacturer and product, including material, is in accordance with design drawings or approved substitution.
      - c) Anchor diameter, length and installed embedment depth.

- d) Drill bit type and diameter.
- e) Anchor edge distance and spacing.
- f) Hole diameter and depth.
- g) Hole cleaning procedure and cleanliness.
- h) Anchor maximum tightening torque.
- 4) Adhesive Anchors: In addition to the requirements for All Post-Installed Anchors, verify adhesive identification and expiration date.
  - a) The installation of all adhesive anchors shall be continuously inspected when anchors are subject to sustained tension loads, such as anchors for shelf angles, or when anchors are installed in an upwardly inclined condition.

END OF SECTION 033000

### SECTION 051200 – STRUCTURAL STEEL FRAMING

### PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification sections provided in Architect's project manual for UNT Music Jazz Practice Lab project, apply to work of this section.

### 1.2 SUMMARY

A. Section includes labor, materials, services, equipment, and appliances required in conjunction with or related to the furnishing, fabrication, delivery, and erection of all structural steel, as defined below. Include all supplementary parts, members, and connections necessary to complete the structural steel work, regardless of whether all such items specifically are shown or specified on the drawings. Steel deck are specified in other Division 05 sections.

### 1.3 REFERENCES

### A. Definitions:

- 1. Erection Drawings: Field installation or member-placement drawings that are prepared by the Fabricator to show the location and attachment of the individual shipping pieces.
- 2. Professional Engineer: A professional engineer who is licensed to practice engineering in the state where the project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for projects with structural steel framing that are similar to that indicated for this Project in material.
- 3. Shop Drawings: Drawings of the individual structural steel shipping pieces that are to be produced in the fabrication shop.
- 4. Structural Steel: Structural steel shall be defined as that work prescribed in Section 2.1 of AISC 303.
- B. Reference Standards:
  - 1. Codes and Standards: Comply with provisions of following codes, specifications, and standards, except where more stringent requirements are shown or specified.
    - a. All federal (OSHA), state, and local laws that govern safety requirements for steel erection and other requirements if more stringent than the codes and standards enumerated below. OSHA requirements include regulation 29 CFG 1926, Part R, "Safety Standard for Steel Erection".
    - b. AISC, "Steel Construction Manual."
    - c. AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," except as noted herein.

- 1) Certain sections in this specification contain requirements that are more restrictive and/or different than contained in this standard. In such cases, the requirements of this specification shall control.
  - d. ANSI/AISC 360, "Specification for Structural Steel Buildings."
  - e. ANSI/AWS D1.1, "Structural Welding Code Steel."
  - f. ANSI/AWS D1.4, "Structural Welding Code Reinforcing Steel."
  - g. Research Council on Structural Connections (RCSC), "Specification for Structural Joints using High-Strength Bolts."
  - h. The Society of Protective Coatings, "SSPC Painting Manual", Volumes 1 and 2.

### 1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
  - 1. Quality Control:
    - a. The Contractor is responsible for quality control, including workmanship and materials furnished by his subcontractors and suppliers.
    - b. The Contractor shall coordinate the fabrication and erection of all structural steel work with the work of other trades.
    - c. The Fabricator alone shall be responsible for all errors of detailing, fabrication, and for the correct fitting of the structural members.
    - d. The Fabricator shall coordinate connection details, joint fit-up procedures, and field adjustment requirements with Erector. The Contractor shall coordinate provision of all erection bolts, lifting lugs, or other devices required for erection with the Fabricator and the Erector and for interference with architectural finishes and constraints.
  - 2. Document Conflict and Precedence:
    - a. In case of conflict among documents, including architectural and structural drawings and specifications, notify Architect and Engineer prior to submitting proposal. In case of conflict between and/or among the structural drawings and specifications, the strictest interpretation shall govern, unless specified otherwise in writing by the Architect and Engineer.
    - b. Questions about Contract Documents: The Contractor shall notify promptly the Architect and Engineer whenever design of members and connections for any portion of the structure are not indicated clearly or when other questions exist about the Contract Documents. Such questions shall be resolved prior to the submission of shop drawings.
  - 3. Materials and installed work may require testing and retesting, as directed by the governing building code or the Engineer, at any time during progress of work.
    - a. The Contractor shall provide adequate notification to the Owner's Testing Agency of construction operation including the project schedule to allow the Testing Agency to schedule inspections. Failure to notify sufficiently

may result in additional costs incurred by the Testing Laboratory that may be back-charged to the Contractor by the Owner.

- b. The Contractor shall cooperate with laboratory personnel, provide access to the work, and provide access to manufacturer's operations.
- c. The Contractor shall cooperate with the Owner's Testing Laboratory when Arbitration Testing and Inspection is called for due to a disagreement regarding the tension in installed bolts that have been inspected according to the Testing and Inspection portion of this specification section.
- d. The Contractor shall provide to the laboratory certificates and representative samples of materials proposed for use in the work in quantities sufficient for accurate testing as specified.
- e. The Contractor shall furnish labor, equipment, and facilities as required for sampling and testing by the laboratory and other facilitates the required inspections and test.
- f. Inspection or testing by the Owner does not relieve the Contractor of his responsibility to perform the Work in accordance with the Contract Documents. Test not specifically indicated to be done at the Owner's expense, including retesting of rejected materials and installed work, shall be done at the Contractor's expense.
- B. Preinstallation Meetings:
  - 1. At least 14 days prior to beginning structural steel erection, the Contractor shall hold a meeting to review the detailed quality control and construction requirements and to determine the procedures for producing proper structural steel construction. Also, review requirements for submittals, status of coordinated work, and availability of materials. Establish work progress schedule and procedures for materials inspection, testing, and certification.
  - 2. The Contractor shall require responsible representatives of every party who is concerned with the structural steel work to attend the conference, including, but not limited to, the following:
    - a. Contractor's Superintendent.
    - b. Laboratory responsible for field quality control.
    - c. Special Inspector or Laboratory responsible for shop inspection or testing.
    - d. Structural steel detailer.
    - e. Structural steel fabricator.
    - f. Structural steel erector.
    - g. Owner's and Architect's Representative.
    - h. Engineer.
  - 3. Minutes of the meeting shall be record, typed, and printed by the contractor and distributed to all parties concerned within five days of the meeting. One copy of the minutes shall be transmitted to the following for information purposes:
    - a. Owner's Representative.
    - b. Architect.
    - c. Engineer.
  - 4. The Engineer shall be present at the conference. The Contractor shall notify the Engineer at least seven days prior to the scheduled date of the conference.

- C. Alternates: Substitutions for the member sizes, type(s) of steel connection details, or any other modifications proposed will be considered by the Architect and Engineer only under the following conditions:
  - 1. The request has been made and accepted prior to the submission of shop drawings. All substitutions shall be marked clearly and indicated on the shop drawings as a substitute.
  - 2. There is a substantial cost advantage or time advantage to the Owner or that the proposed revision is necessary to obtain the required materials or methods at the proper times to accomplish the work in the time scheduled.
  - 3. Sufficient sketches, engineering calculations, and other data have been submitted to facilitate checking by the Architect and Engineer, including cost reductions or savings in time to complete the work.
  - 4. In no case shall such substitutions result in additional cost to the Owner.

### 1.5 SUBMITTALS

- A. Product Data: Submit producer's or manufacturer's specifications and installation instructions for following products to show compliance with specifications, including the specified standards):
  - 1. Welding Electrodes.
  - 2. Structural Steel Primer Paint.
- B. Shop Drawings:
  - 1. Preliminary Connection Review: Submit preliminary details of proposed connections not less than 14 days in advance of the start of preparation of detailed shop drawings. Proposed variations from the details shown on the drawings will be considered and such variations must have preliminary approval from the Engineer prior to the preparation of detailed shop drawings. Failure to adhere to the requirements of this paragraph obligates the Contractor to take responsibility for any and all resulting delays in the detailing and fabrication of structural steel.
  - 2. Detailed Shop Drawings: Submit drawings showing complete details and schedules for fabrication and assembly of structural steel members. Drawings shall include the following minimum information:
    - a. Details of cuts, connections, camber, holes, and other pertinent data.
    - b. Indication of welds by standard AWS symbols, and show size, length, and type of each weld.
    - c. Indication of type, size, and length of bolts, distinguishing between shop and field bolts.
    - d. Connection material specification and sizes.
    - e. Joints or groups of joints in which a specific assembly order, welding sequence, welding technique, or other special precautions are required.
    - f. Holes, flange cuts, slots, and openings shall be made as required by the structural drawings, all of which shall be properly located by means of templates.
    - g. Setting drawings, templates, and directions for installation of anchor rods and other anchorages.
    - h. Non-Destructive Testing (NDT) to be performed by the Fabricator.

- i. A letter sealed by the Fabricator's Professional Engineer responsible for the design of any of the connections shown on the shop drawings attesting that the engineer has reviewed the shop drawings and that the connections detailed and shown on the shop drawings conform to the engineer's design.
- 3. All drawings submitted for review shall have blank space for a 2" high and 3.5" wide shop drawing stamp of the Engineer as part of the title block
- C. Certificates:
  - 1. Structural Steel: Submit for each type.
- D. Delegated Design Submittals:
  - 1. Stair Design Submittals: The Fabricator's licensed professional engineer shall submit complete design calculations of the stair design and its connections to the steel framing of landing and concrete floor slab. The Engineer reserves the right to reject all shop drawings submitted without complete design calculations.
- E. Test and Evaluations Reports: Submit certified reports of tests required by this Specification. Include data on type(s) of tests conducted and test results.
- F. Field Quality Control Submittals:
  - 1. Surveys: Submit for each survey required.
- G. Qualification Statements:
  - 1. Submit qualification data, including required certifications, for firms and persons specified in the "Qualifications" section under Part 1, to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
  - 2. Submit a resume from the structural steel detailer showing a minimum of two years of experience selecting or completing structural steel connection details using information found in tables in the AISC "Steel Construction Manual".
  - 3. Submit Welding Procedure Specifications (WPS) in accordance with ANSI/AWS D1.1 for all welded joints. Submit test reports showing successful passage of qualification tests for all non-prequalified WPSs.
  - 4. Provide certification that welders to be employed in work have satisfactorily passed AWS qualification tests as specified in the "Qualifications" section under Part 1. If recertification of welders is required, retesting will be at Contractor's responsibility.
  - 5. A fabricator that is registered with the local building official and is approved to perform fabrication without special inspection shall submit a certificate of compliance stating that the work was performed in accordance with the approved construction documents.
- H. Minutes of Preinstallation Meeting: Submit for review.

### 1.6 QUALITY ASSURANCE

A. Scope of Work:

- 1. Contract Obligations:
  - a. Owner Responsibility: The Owner shall pay for initial shop and field inspections and tests as required during the fabrication and erection of the structural steel.
  - Testing Laboratory Responsibility: The inspection by the Testing b. Laboratory of the Fabricator's work shall be in sequence, timely, and performed in such a manner so that corrections can be made without delaying the progress of the work. Inspections shall be performed by qualified technicians with a minimum of two years of experience in structural steel testing and inspection. Refer to "Qualifications of Welding Inspectors" Paragraph below. The Testing Laboratory shall provide test reports of inspections. All test reports shall indicate types and locations of defects found during inspection, the measures required and performed to correct such defects, statements of final approval of welding and bolting of shop and field connections, and other fabrication and erection data pertinent to the safe and proper welding and bolting of shop and field connections. Weld inspection reports shall be signed by an inspector with current certification as an AWS Certified Welding Inspector (CWI). In addition to the parties listed in this Specification the Fabricator and Erector shall receive copies of the test reports.
  - c. Rejection of Material or Workmanship: The Owner, Architect, Engineer, and Testing Laboratory reserve the right to reject any material or workmanship not in conformance with the Contract Documents at any time during the progress of the work. However, this provision does not allow waiving the obligation for timely, in sequence inspections.
- B. Testing Laboratory Requirements: The Owner's Testing Laboratory shall:
  - 1. Verify the fabrication shop's certification from AISC.
  - 2. Review field welder qualifications by certification or verify by retesting. Obtain welder certificates.
- C. Qualifications:
  - 1. Fabricator:
    - a. The structural steel fabricator shall have not less than five years of experience in the successful fabrication of structural steel similar to this project.
  - 2. Detailer:
    - a. The structural steel detailer shall have not less than two years of experience in the successful detailing of structural steel similar to this project including experience in selecting or completing structural steel connection details using information found in tables in the AISC "Steel Construction Manual.
    - b. The structural steel erector shall have not less than **two** years of successful experience in the erection of structural steel of a similar nature to this project.

- 3. Welding Qualifications: Qualify welding processes and welding operators in accordance with AWS "Structural Welding Code Steel".
- 4. Professional Engineer:
  - a. The Professional Engineer employed by the Fabricator for stair design shall be experienced in the specific area design with demonstrated experience of not less than three projects of similar scope and complexity.
- 5. Independent Testing Laboratory:
  - a. Any testing laboratory retained to perform tests that are required by this specification shall meet the basic requirements of ASTM E 329 and shall submit to the Owner, Architect, and Engineer evidence of current accreditation from the American Association for Laboratory Accreditation, the AASTHO Accreditation Program or the "NIST" National Voluntary Laboratory Accreditation Program.
  - b. The Testing Laboratory shall be an Approved Agency by the Building Official to perform Special Inspections and other tests and inspections as outlined in the applicable building code.
  - c. Tests and inspections shall be conducted in accordance with specified requirements, and if not specified, in accordance with the applicable standards of the American Society for Testing and Materials or other recognized and accepted authorities in the field.
  - d. Qualification of Welding Inspectors:
  - 1) Inspectors performing visual weld inspection shall meet the requirements of AWS D1.1 Section 6.1.4. Inspectors shall have current certification as an AWS Certified Welding Inspector (CWI). Assistant inspectors, if any, shall be supervised by an Inspector and shall be qualified by training and experience to perform the specific functions to which they are assigned.
  - 2) Inspectors performing nondestructive examinations of welds other than visual inspection (MT, PT, UT, and RT) shall meet the requirements of AWS D1.1, Section 6.14.6.

### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to site at such intervals to ensure uninterrupted progress of work.
- B. Deliver anchor rods and anchorage devices, which are to be embedded in cast-in-place concrete or masonry, in ample time so as not to delay work.
- C. Store materials to permit easy access for inspection and identification. Keep steel members off ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration. Do not store materials on structure in a manner that might exceed allowable loads on or cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed by Architect/Engineer.

### PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Structural Steel:
  - 1. All hot rolled steel plates, and shapes shall be new steel conforming to ASTM A 6.
  - 2. Comply with the provisions of the following ASTM Specifications as appropriate for the grades and types, and at the locations as specified on the drawings:
    - a. Structural Steel Wide Flange and WT Shapes: High Strength Steel, ASTM A 992.
    - b. Channels: High Strength Steel, ASTM A 572, Grade 50.
    - c. Angle Shapes: Carbon Steel, ASTM A 36.
    - d. Structural Steel Plates Carbon Steel, ASTM A 36.
    - e. Square and Rectangular HSS: ASTM A 500, Grade B (Fy = 46 ksi).
  - 3. Structural Steel Surfaces: For fabrication of work which will be exposed to view in the completed structure, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names and roughness. Remove such blemishes by grinding, or by welding and grinding, prior to cleaning, treating and application of surface finishes.
  - 4. Potential Non-conforming Material: For structural steel for which evidence exists that the steel may not conform to ASTM requirements, the Contractor, where permitted by the Engineer, shall engage the services of an independent testing laboratory to test the material according to ASTM A 6 and submit certified test reports that verify conformity to ASTM standards. Tests shall be made for each 10 tons of affected material unless otherwise directed by the Engineer.
- B. Structural Bolts and Threaded Fasteners: Structural bolts and threaded fasteners shall comply with the following ASTM Specifications as appropriate for the types and at the locations as specified on the drawings:
  - 1. ASTM F 3125 Grade A325 Type 1.
  - 2. Threaded Round Stock:
    - a. ASTM A 36.
  - 3. Washers: All washers shall be circular, flat and smooth and shall conform to the requirements of Type A washers in ANSI Standard B23.1. Washers for high strength bolts shall be hardened and conform to ASTM F 436. Beveled washers for American Standard Beams and channels shall be square or rectangular, shall taper in thickness (16 2/3% slope) with an average thickness of 5/16". When an outer face of a bolted part has a slope greater than 1:20 with respect to a plane normal to the bolt axis, a beveled washer shall be used. Washers to be used with A490 bolts larger than 1 inch in diameter and installed over oversized or short-slotted holes and other similar situations shall conform to ASTM F 436 except with 5/16 inch minimum thickness.
  - 4. New Bolts: All bolts shall be new and shall not be reused.
- C. Electrodes for Welding:

- 1. Provide electrodes that comply with AWS D1.1, "Structural Welding Code Steel" and that can produce welds that have a minimum Charpy V-notch toughness of 20 ft-lbs at 40° F, unless noted otherwise in these specifications or on the drawings.
- 2. Electrodes for various welding processes shall be as specified below:
  - a. SMAW:
  - 1) E70XX low hydrogen.
  - b. SAW:
  - 1) F7X-EXXX.
    - c. GMAW:
  - 1) ER70S-X.
  - d. FCAW:
  - 1) E7XT-X.
- 3. Electrodes shall be compatible with parent metal joined.
- D. Anchor Rods:
  - 1. All anchor rods shall conform to ASTM F 1554. unless noted otherwise on the drawings and shall be of the yield strength as specified below as appropriate for the types and at the locations as specified on the drawings:
    - a. Grade 55 (1/4 inch to 4 inches in diameter), complying with Supplementary Requirement S1 of ASTM F 1554.
  - 2. Nuts: All nuts with anchor rods shall be heavy hex head conforming to ASTM A 563.
  - 3. Washers: Unless indicated otherwise, washers for all base plates shall be in accordance with the AISC "Steel Construction Manual", Table 14-2 with holes 1/16" larger than the anchor rod diameter. Washers shall conform to ASTM A 36 steel.
- E. Structural Steel Primer Paint:
  - 1. Unless noted otherwise, at interior, conditioned spaces, primer paint shall be one of the following types with the indicated surface preparation:
    - a. Zinc oxide, raw linseed oil and alkyd primer, surface prepared according to SSPC-SP-2 (Hand Tool Cleaning) unless noted otherwise in this specification.
    - b. SSPC-Paint 23 acrylic primer, surface prepared according to SSPC-SP-6 (Commercial Blast Cleaning).
    - c. Fast-curing, lead- and chromate-free, universal modified-alkyd primer with good resistance to normal atmospheric corrosion, complying with performance requirements of FS TT-P-664, surface prepared according to SSPC-SP-2 (Hand Tool Cleaning) unless noted otherwise in this

specification. The contractor is responsible for supplying a paint that complies with the VOC requirements of all local governing agencies.

- 2. Refer to Architect's drawings and specifications for final paint finish requirements of structural steel. Primer paint shall be compatible with final paint requirements.
- F. Non-Shrink Grout: Provide grout type(s) as specified on the drawings:
  - a. **6,000** PSI for supporting concrete 3,000 PSI and less.

### 2.2 FABRICATION

- A. Structural steel members for which shop drawings have not been reviewed shall not be fabricated. Any steel detailed or fabricated prior to the Initial Survey from Part 3 below is at contractor's risk.
- B. All fabricated material and connections shall fit within architectural constraints.
- C. The omission from the shop drawings of any materials required by the Contract Documents shall not relieve the Contractor of the responsibility of furnishing and installing such materials, even though the shop drawings may have been reviewed.
- D. Shop Fabrication and Assembly:
  - 1. Fabricate and assemble structural assemblies in shop to greatest extent possible. Fabricate items of structural steel in accordance with AISC Specification and as indicated on approved final shop drawings. Provide camber in structural members where indicated.
  - 2. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence which will expedite erection and minimize field handling of materials.
  - 3. Milled surfaces of built-up sections shall be completely assembled or welded before milling.
- E. Dimensional Tolerances: Dimensional tolerances of fabricated structural steel shall conform to Section 6.4 of the AISC Code of Standard Practice.
- F. Splices in Structural Steel: Splicing of structural steel members in the shop or the field is prohibited without prior approval of the Engineer. Any member having a splice not shown and detailed on approved shop drawings will be rejected.
- G. Compression Joints: Ends of columns, except as otherwise noted, and other compression joints at splices and other connections as noted on the drawings which depend on contact bearing as part of the splice strength shall be finished to bear in accordance with AISC Specification M2.6 so as to provide complete true bearing in accordance with AISC Specification M4.4.
- H. Cutting: Manual oxygen cutting shall be done only with a mechanically guided torch. An unguided torch may be used provided the cut is not within 1/8 inch of the finished dimension and final removal is completed by means such as chipping or grinding to produce a smooth surface quality free of notches or jagged edges. All corners shall be smooth and rounded to a minimum 1/2" radius.

- I. Holes for Other Work: Provide holes required for securing other work to structural steel framing, and for passage of other work through steel framing members as shown on the contract documents, and/or the final shop drawings.
  - 1. Provide specialty items as indicated to receive other work.
  - 2. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame cut holes or enlarge holes by burning. Drill holes in bearing plates.
- J. Lifting and Erection Devices: The Fabricator shall be responsible for designing, detailing, and furnishing all lifting devices and erection aids required for erection. Such devices shall be removed after erection if they interfere with architectural finish requirements.

### 2.3 WELDING

- A. Code: All shop and field welding shall conform to all requirements in the "Structural Welding Code Steel", ANSI/AWS D1.1, as published by the American Welding Society (AWS).
- B. Welder Certification: All shop and field welders shall be certified according to all the applicable AWS procedures for the welding process and welding position used. Each welder shall be assigned an identifying symbol or mark and all shop and field welded connections containing complete or partial joint penetration welds, multi-pass fillet welds, and fillet welds greater than 5/16" shall be identified by the symbol or mark of the welder responsible for the connection.
- C. Minimum Size and Strength:
  - 1. Fillet Welds: Minimum size of fillet welds shall be as specified in Table J2.4 in AISC Specification, Chapter J.
  - 2. Partial-Penetration Groove Welds: The minimum effective throat thickness of partialpenetration groove welds shall be as specified in Table J2.1 in AISC Specification, Chapter J.
  - 3. Minimum Strength of Welded Connections: Except as specified below in "Connections" or noted otherwise on the drawings, all shop and field welds shall develop the full tensile strength of the member or element joined. All members with moment connections as indicated on the drawings shall be welded to develop the full flexural capacity of the member, unless noted otherwise on the drawings.
- D. Filler Metal Requirements: Weld metal shall be as specified in Table J2.5 in AISC Specification, Chapter J and other requirements of this specification.
- E. Welding Procedure Specification:
  - 1. All welding shall be performed in accordance with a Welding Procedure Specification (WPS) as required in AWS D1.1 and reviewed by the Owner's Testing Laboratory and by the Architect/Engineer. The WPS variables shall be within the parameters established by the filler-metal manufacturer. Engage the services of an independent Testing Laboratory to provide the qualification testing required by AWS D 1.1, Chapter 4, part B to qualify any non-prequalified WPS needed for the project. The independent Testing Laboratory shall prepare Welding Procedure Qualification Records (WPQR) documenting the successful qualification of each Welding Procedure Specification.

### F. Welding Procedures:

- 1. All welding processes shall comply with the requirements of ANSI/AWS D1.1 unless noted otherwise.
- 2. Built-up sections assembled by welding shall be free of warpage and all axes shall have true alignment.
- 3. Welds not specified shall, if possible, be continuous fillet welds developing the minimum strength, as specified above, using not less than the minimum fillet welds as specified by AISC.
- 4. The toughness and notch sensitivity of the steel shall be considered in the formation of all welding procedures to prevent brittle and premature fracture during fabrication and erection.
- 5. The Welding Procedure Specification shall be followed without deviation unless specific approval for change is obtained from the Owner's Testing Laboratory and the Architect/Engineer.
- 6. Before welding, particular attention shall be paid to surface preparation, fit up, and cleanliness of surfaces to be welded.
- 7. Minimum preheat and interpass temperatures for structural steel welding shall be as specified in ANSI/AWS D1.1, except that no welding shall be performed when the ambient temperature is lower than 0 degrees F. The temperature shall be measured from the side opposite that upon which the preheat is applied.
- 8. The heat, input, length of weld, and sequence of weld shall be controlled to prevent distortions. The surfaces to be welded and the filler metals to be used shall be subject to inspection before any welding is performed.
- 9. Welds shall be sound throughout. There shall be no crack in any weld or weld pass. Welds shall be considered sound if they conform to AWS requirements, as confirmed by non-destructive testing.
- 10. Welds shall be free from overlap.
- 11. Craters shall be filled to the full cross section of the welds.
- 12. For high-strength low-alloy steels, follow welding procedures as recommended by steel producer for exposed and concealed connections.
- 13. Fabricator and Erector shall coordinate welding responsibility at all welded joints.
- G. Stress Relieving: All welding sequences shall be such as to reduce the residual stresses due to welding to a minimum value. If high residual stresses are present, stress relieving of joints shall be required. Welded connections shall be detailed and designed to minimize the accumulation and concentration of through-thickness strains due to weld shrinkage.

### 2.4 BOLTING

- A. Bolt Diameter: Minimum bolt diameter shall be 3/4 inch. The difference in diameter between bolts of differing sizes used on the project shall be not less than ¹/₄".
- B. Connection Type: Unless noted otherwise on the drawings, all bolted connections shall be snugtightened using high-strength bolts in standard holes (hole diameter nominally 1/16 inch greater than the nominal bolt diameter) with threads included in the shear planes. Notwithstanding, the contractor shall be responsible to adhere to provisions of ANSI/AISC 360 Section J1.10, which lists circumstances under which certain connections require pretensioned high strength bolts.

- C. Oversize, Short-Slotted and Long-Slotted Holes: The dimensions and washer requirements of oversize, short-slotted, and long-slotted holes shall conform to ANSI/AISC 360 Table J3.3.
- D. Fastener Tension:
  - 1. High strength bolts in snug-tightened joints shall be tightened to a snug tight condition only. Do not pretension bolts in snug-tightened joints the same as if they were in slipcritical joints. The snug-tightened condition is defined as the tightness that exists when all plies are in firm contact. This may usually be attained by a few impacts of an impact wrench or the full effort of an ironworker using an ordinary spud wrench.
- E. Washers: Washers under the bolt head and/or nut shall be used as required by the RCSC Specification.
- F. Bolt Lubrication: All bolts shall be well lubricated at time of installation. Dry, rusty bolts are not be allowed.
- G. Impact Wrenches: Properly sized and lubricated air impact wrenches with adequate air pressure shall be utilized for all bolt installation.
- H. New Bolts: All bolts shall be new and shall not be reused.

### 2.5 SURFACE PREPARATION AND SHOP PRIME PAINTING

- A. Specification: Surface preparation, paint, and painting practices shall conform to the "SSPC Painting Manual", Volumes 1 and 2.
- B. Scope: All steel shall remain unpainted, except the following:
  - 1. Shop paint surfaces that are to remain exposed to view in the final construction.
  - 2. Coordinate all shop painting of structural steel with Architect's painting requirements as specified on the architectural drawings and in the specifications. The Fabricator shall be responsible for determining all painting requirements (which surfaces are to be painted or left unpainted) on the project prior to fabrication.
- C. Additional Painting Requirements:
  - 1. Extend shop paint to 2" from location of welds on surfaces that are to be field welded.
  - 2. All unpainted mating surfaces of all elements that are welded together into an assembly that is permanently exposed to the exterior shall be seal welded in addition to structural welding requirements.
  - 3. If individual elements (including the mating surfaces) of an assembly that is required to be painted are painted prior to welding into an assembly, then all painted surfaces affected by welding shall be touched-up and repaired (according to manufacturer's instructions, if any) to prevent corrosion bleeding.
  - 4. The fabricator shall be responsible to ensure that all elements of all assemblies that are to be painted are fabricated so that no exposed surface shall be subject to stains due to corrosion bleeding during the warranty period of the paint.

- D. Surface Preparation Unpainted Steel: All structural steel that is not specified to receive a shop coat of primer paint shall be prepared in accordance with Society for Protective Coatings specifications as follows:
  - 1. SSPC-SP 2, "Hand Tool Cleaning" or SSPC-SP 3, "Power Tool Cleaning" unless otherwise specified.
- E. Surface Preparation and Primer Paint Shop Painted Steel:
  - 1. Surface Preparation: Prepare the surface of all structural steel specified to be shop painted as required by the paint manufacturer or the Society for Protective Coatings specifications, but not less than the following:
    - a. SSPC-SP 2, "Hand Tool Cleaning" or SSPC-SP 3, "Power Tool Cleaning" unless otherwise specified.
  - 2. Priming: Immediately after surface preparation, apply primer to all structural steel specified to be shop primed in strict accordance with manufacturer's instructions and the Society for Protective Coatings specifications. Apply paint at a rate to conform to the manufacturer's written instructions and to provide a dry film thickness of not less the 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, welds, and all exposed surfaces. Apply two coats to surfaces that are inaccessible after assembly or erection. Change the color of the second coat to distinguish it from the first coat.
  - 3. Finish Coat: Coordinate shop primer paint requirements with architectural drawings and specifications. The primer selected must be compatible with any specified finish coat.
- F. Shop Touch-Up Painting: The Fabricator shall provide for cleaning and touch-up painting of welds, bolted connections (including nuts, bolts, washers, filler plates, member end supplement plates and welds, if any), and abraded areas. Prior to shipment, apply paint to exposed areas using same materials and surface preparation as used for shop painting. Paint shall be applied by brush or spray with minimum dry film thickness of 1.5 mils.

### 2.6 SOURCE QUALITY CONTROL

- A. The Testing Laboratory shall provide the following tests at the designated fabrication shops:
  - 1. Test welds completed in the shop according to "Weld Testing" Paragraph below.
  - 2. Test bolted connections completed in the shop according to "High-Strength Bolt Testing" Paragraph below.

### PART 3 - EXECUTION

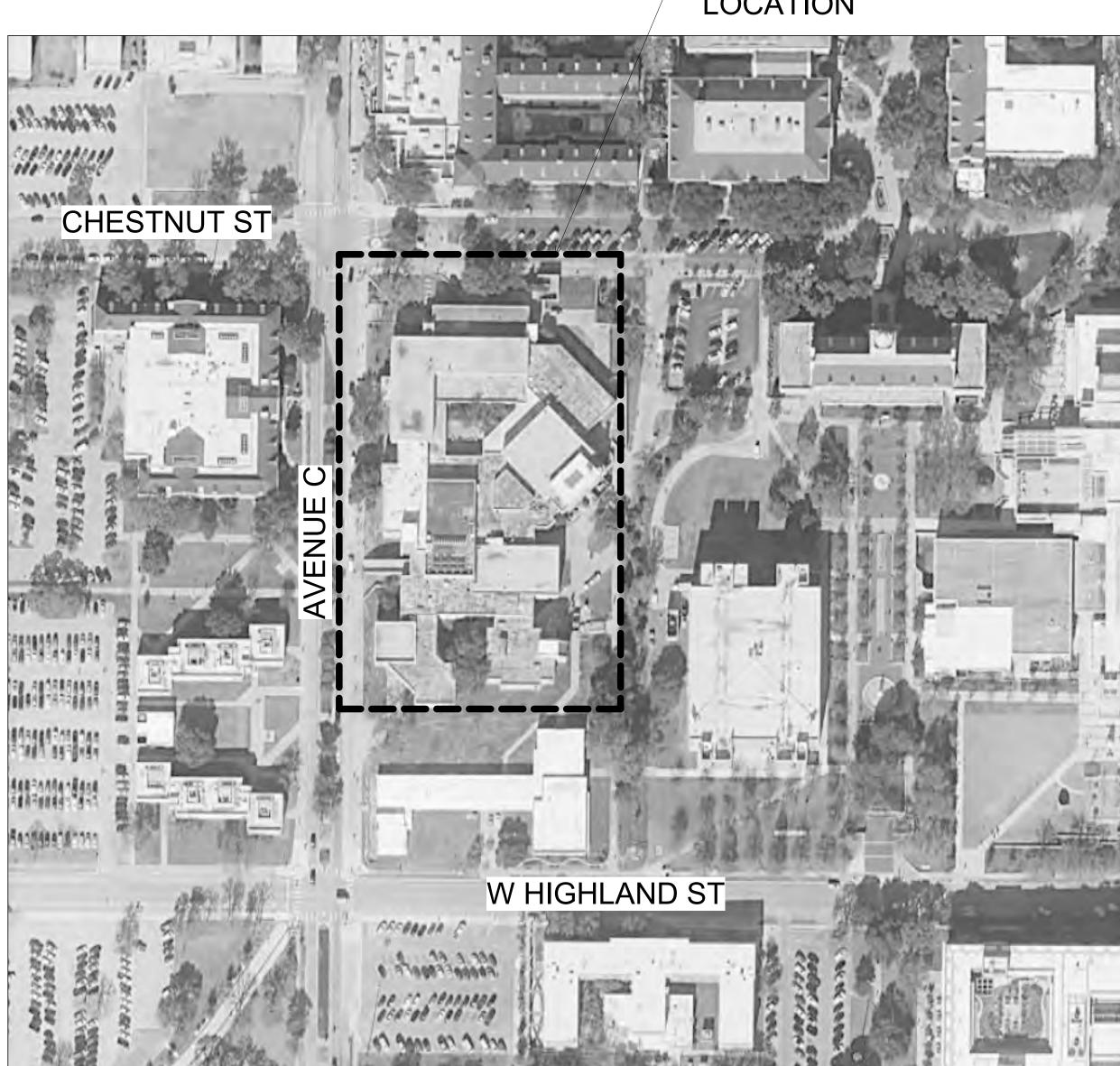
### 3.1 EXAMINATION

A. Inspection Prior to Erection: Erector shall examine areas and conditions under which structural steel work is to be installed and notify the Contractor and the Architect/Engineer in writing of conditions detrimental to proper and timely completion of the work.

### 3.2 FIELD QUALITY CONTROL

- A. Field Testing: The Testing Laboratory shall provide the following tests in the field:
  - 1. Test welds completed in the field according to "Weld Testing" Paragraph below.
- B. Weld Inspection and Process Monitoring: The Testing Laboratory shall make the following inspections of the welds and welding processes. Welds performed in the fabricating shop may be inspected in the field unless continuous monitoring of the welding process is herein specified or if access in the field due to other work or shop finishes makes field inspection impractical:
  - 1. Approve Welding Procedure Specifications submitted by the Contractor. Approve any changes submitted by the Contractor to any WPS that has already been approved. Obtain the Welding Procedure Qualification Record (WPQR) for each successful WPS qualification.
  - 2. Periodically observe joint preparation, assembly practice, welding techniques including preheating and sequence, and the performance of welders with sufficient frequency to assure compliance with code and contract document requirements. Check preheating to assure conformance with AWS D1.1, Section 5.6. Verify procedure for control of distortion and shrinkage stresses.
  - 3. Periodically provide visual inspection of the root pass of partial and complete joint penetration welds.
  - 4. Visually inspect 100 % of welds for proper size, length, location, and weld quality in accordance with AWS D1.1 requirements. Unless specifically noted otherwise, all welding shall be considered statically loaded nontubular connections.
- C. Weld Testing:
  - 1. Perform nondestructive examination services using a qualified technician with the necessary equipment to perform the following:
    - a. Nondestructive examination conducted in accordance with the specific requirements for the item being examined including radiographic (RT), ultrasonic (UT), magnetic particle (MT), or dye-penetrant inspection (PT). Nondestructive inspection procedures shall conform to AWS D1.1.
    - b. Interpret, record, and report results of the nondestructive tests.
    - c. Mark for repair, any area not meeting Specification requirements. Correction of rejected welds shall be made in accordance with AWS D1.1.
    - d. Re-examine repair areas and interpret, record, and report the results of examinations of repair welds.
    - e. Verify that quality of welds meet the requirements of AWS D1.1.
  - 2. Acceptance Criteria:
    - a. Visual, MT, PT shall be per AWS D1.1 Table 6.1.
    - b. UT testing shall be per AWS D1.1 6.13.1 and Table 6.2.
  - 3. The costs of repairing defective welds and the costs of retesting by the Testing Laboratory providing services for the Owner shall be borne by the Contractor. If removal of a backing strip is required by the Testing Laboratory to investigate a suspected weld defect, such cost shall be borne by the Contractor.

## UNT MUSIC JAZZ LAB STRUCTURAL MODIFICATIONS





## APPROXIMATE PROJECT LOCATION

	SHEET LIST
SHEET NUMBER	SHEET NAME
CVR	COVER SHEET
S0.01	GENERAL NOTES
S0.02	GENERAL NOTES
S1.00	ENLARGED DEMO PLAN
S2.00	OVERALL PLAN
S2.01	ENLARGED PLAN
S2.02	ENLARGED PLAN
S2.03	ENLARGED PLAN
S3.00	DETAILS
S3.01	DETAILS
S3.02	DETAILS

**<u>NOTE</u>: THE STRUCTURAL DRAWINGS ARE ISSUED AS PART OF THE** PROJECT 'University of North Texas Music Jazz Practice Labs'

ALL OTHER INFORMATION FOR BIDDING AND CONSTRUCTION, SUCH AS ARCHITECTURAL, MECHANICAL, ELECTRICAL, ETC., ARE ISSUED UNDER A SEPARATE PACKAGE FROM SMITH GROUP ISSUED ON OCTOBER 14, 2022 AND SUBSEQUENT REVISIONS.

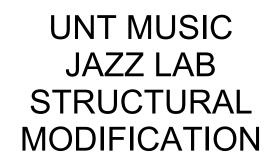


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214.740.6200

Project Name :

Keyplan



## UNIVERSITY OF NORTH TEXAS

Issues/Revisions :									
	ISSUED FOR								
	CONSTRUCTION								
No.		Description							
	11/10/22	Issued for Construction							
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	ct Number : 22037.00	Drawn By : GB							
Appro AA	oved By :	Checked By : JK							



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Drawing Title :

## COVER SHEET

Sheet No. :



1.	DESIGN CRITERIA		6.	UTILITY SERVICE: MAINTAIN IN SERVICE AND PROTECT T
A.	GENERAL BUILDING CODE			DEMOLITION OPERATIONS. SERVICE DURING SELECTIVE
	1. THE REPAIR DOCUMENTS ARE BASED ON THE REQUIREMENTS OF THE INTERNATIONAL EXISTING BUILDING CODE 2018 WITH CITY OF DENTON AMENDMENTS TO THE 2018 INTERNATIONAL BUILDING CODE.		7.	PROTECT ADJACENT PAVING SEWERS, ETC.), AND DRAINA
в.	DEAD LOADS		8.	ALL AREAS OUTSIDE OF DEM FROM DAMAGE BY CONTRAC INCIDENTAL DAMAGE TO THI
	<ol> <li>PARTITIONS: AN ALLOWANCE OF 10 PSF OR THE ACTUAL WEIGHT OF THE WALL, WHICHEVER IS GREATER, HAS BEEN MADE FOR PARTITIONS AS A UNIFORMLY DISTRIBUTED DEAD LOAD.</li> </ol>	F.	PRE	PARATION
C.	LIVE LOADS 1. DESIGN LIVE LOADS ARE BASED ON THE MORE RESTRICTIVE OF THE UNIFORM LOAD LISTED BELOW OR THE CONCENTRATED LOAD LISTED ACTING OVER AN AREA 2.5 FEET SQUARE, OR IN THE CASE OF STAIR TREADS, 4 SQUARE INCHES. A. STAIRS: 100 PSF OR 300 POUNDS B. LIGHT STORAGE SPACE: 125 PSF		1.	COLLECT, AND DISPOSE OF FLAMMABLES, OR OTHER DA PROCEEDING WITH SELECTI A. PROTECT EXISTING SI LANDSCAPING TO REM B. ERECT A PLAINLY VISI INDIVIDUAL TREES OR
<u>II.</u>	SELECTIVE DEMOLITION		2.	OF TREES TO REMAIN.
A.	RESPONSIBILITY OF THE CONTRACTOR FOR STABILITY OF THE STRUCTURE DURING DECONSTRUCTION / DEMOLITION 1. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PROVIDE ALL		2.	TIMES. FIRE ALARMS AND SM OPERATIONAL AT ALL TIMES REQUIRED AND IN CONFORM AUTHORITIES
	REQUIRED BRACING DURING DEMOLITION TO MAINTAIN THE STABILITY AND SAFETY OF ALL STRUCTURAL ELEMENTS DURING THE DEMOLITION PROCESS. CONTRACTOR SHALL ENGAGE A PROFESSIONAL ENGINEER TO SURVEY CONDITION OF BUILDING TO DETERMINE WHETHER REMOVING ANY ELEMENT MIGHT RESULT IN STRUCTURAL DEFICIENCY OR UNPLANNED COLLAPSE OF ANY PORTION OF STRUCTURE OR ADJACENT STRUCTURES DURING SELECTIVE DEMOLITION OPERATIONS.		3.	TEMPORARY FACILITIES: PR OTHER PROTECTION REQUIN DAMAGE TO ADJACENT BUIL A. PROVIDE PROTECTION AROUND SELECTIVE D OCCUPIED PORTIONS
в.	DEFINITIONS		4.	CONTRACTOR TO PROVIDE A
	1. REMOVE: DETACH ITEMS FROM EXISTING CONSTRUCTION AND LEGALLY DISPOSE OF THEM OFF-SITE, UNLESS INDICATED TO BE REMOVED AND SALVAGED OR REMOVED AND REINSTALLED.		6.	TEMPORARY PARTITIONS: EI PARTITIONS AND TEMPORAR MIGRATION AND TO SEPARA
	2. REMOVE AND SALVAGE: DETACH ITEMS FROM EXISTING CONSTRUCTION AND DELIVER THEM TO OWNER READY FOR REUSE. OWNER TO IDENTIFY ITEMS TO BE REUSED OR SALVAGED.		7.	TEMPORARY SHORING: PRO EXTERIOR SHORING, BRACIN PRESERVE STABILITY AND T
	3. EXISTING TO REMAIN: EXISTING ITEMS OF CONSTRUCTION THAT ARE NOT TO BE REMOVED AND THAT ARE NOT OTHERWISE INDICATED TO BE REMOVED, REMOVED AND SALVAGED, OR REMOVED AND REINSTALLED.			UNCONTROLLED MOVEMENT DEMOLISHED. STRENGTHEN REQUIRED DURING PROGRE
C.	MATERIAL OWNERSHIP	G.	EXE	CUTION OF SELECTIVE DEMOL
D.	<ol> <li>EXCEPT FOR ITEMS OR MATERIALS INDICATED TO BE REUSED, SALVAGED, OR OTHERWISE INDICATED TO REMAIN OWNER'S PROPERTY, DEMOLISHED MATERIALS SHALL BECOME CONTRACTOR'S PROPERTY AND SHALL BE REMOVED FROM PROJECT SITE. THE MATERIALS REMOVED SHALL BE DISPOSED OF IN A PROPER AND LEGAL MANNER PER FEDERAL/STATE OR LOCAL ORDINANCES.</li> <li>QUALITY ASSURANCE</li> </ol>		1.	METHODS REQUIRED TO CO GOVERNING REGULATIONS A. USE CUTTING METHOD CONSTRUCTION TO RE B. DO NOT USE CUTTING OF FLAMMABLE MATEI
D.	<ol> <li>DEMOLITION FIRM QUALIFICATIONS: AN EXPERIENCED FIRM THAT HAS SPECIALIZED IN DEMOLITION WORK SIMILAR IN MATERIAL AND EXTENT TO THAT INDICATED FOR THIS PROJECT.</li> </ol>			CONDITION AND CONT FLAME-CUTTING OPER PORTABLE FIRE-SUPP OPERATIONS. C. MAINTAIN ADEQUATE
	2. PROFESSIONAL QUALIFICATIONS OF ENGINEER ENGAGED BY CONTRACTOR: CURRENT REGISTRATION IN THE STATE WHERE THE PROJECT IS LOCATED.			D. REMOVE DECAYED, VE DANGEROUS OR UNSU DISPOSE OF OFF-SITE
	<ol> <li>REGULATORY REQUIREMENTS: COMPLY WITH GOVERNING OWNER, LOCAL, STATE, FEDERAL, AND EPA NOTIFICATIONS AND REGULATIONS BEFORE BEGINNING SELECTIVE DECONSTRUCTION / DEMOLITION. COMPLY WITH HAULING AND DISPOSAL REGULATIONS OF AUTHORITIES HAVING JURISDICTION.</li> </ol>			E. LOCATE SELECTIVE DE DEBRIS AND MATERIAL ON SUPPORTING WALL F. DISPOSE OF DEMOLIS
	4. PHOTO DOCUMENTATION OF EXISTING CONDITIONS OF THE BUILDING AND ADJOINING PROPERTIES SHALL BE PERFORMED BY CONTRACTOR PRIOR TO DEMOLITION. PHOTOS SHALL BE SUBMITTED TO OWNER AND		2.	EXISTING FACILITIES: COMPI USING AND PROTECTING OT SELECTIVE DEMOLITION OPE REMOVED AND SALVAGED IT
	<ul> <li>ENGINEER OF RECORD.</li> <li>5. PRE-DEMOLITION CONFERENCE: CONDUCT CONFERENCE AT PROJECT SITE TO ADDRESS THE FOLLOWING:</li> <li>A. INSPECT AND DISCUSS CONDITION OF CONSTRUCTION TO BE</li> </ul>		0.	A. CLEAN SALVAGED ITEL B. STORE ITEMS IN A SEC C. TRANSPORT ITEMS TO BY OWNER.
	SELECTIVELY DEMOLISHED. B. REVIEW STRUCTURAL LOAD LIMITATIONS OF EXISTING STRUCTURE AS APPROPRIATE FOR THE PROPOSED MEANS AND METHODS. C. REVIEW AND FINALIZE SELECTIVE DEMOLITION SCHEDULE AND		4.	EXISTING ITEMS TO REMAIN OWNER (PRIOR TO BEGINNIN AND HENCE BE PROTECTED PERMITTED BY OWNER, ITEM
	VERIFY AVAILABILITY OF MATERIALS, DEMOLITION PERSONNEL, EQUIPMENT, AND FACILITIES NEEDED TO MAKE PROGRESS AND AVOID DELAYS.		5.	OR PROTECTED LOCATION. CONCRETE SLABS-ON-GRAD DEMOLISHED, THEN BREAK
E.	PROJECT CONDITIONS	н.	DISF	POSAL OF DEMOLISHED MATER
	<ol> <li>CONDUCT SELECTIVE DEMOLITION SO OWNER'S OPERATIONS WILL NOT BE DISRUPTED. PROVIDE NOT LESS THAN 72-HOUR NOTICE TO OWNER OF ACTIVITIES THAT WILL AFFECT OWNER'S OPERATIONS.</li> </ol>		1. 2.	GENERAL: PROMPTLY DISPO ALLOW DEMOLISHED MATER BURNING: DO NOT BURN DEI
	2. MAINTAIN ACCESS TO EXISTING WALKWAYS, CORRIDORS, AND OTHER ADJACENT OCCUPIED OR USED FACILITIES. DO NOT CLOSE OR OBSTRUCT WALKWAYS, CORRIDORS, OR OTHER OCCUPIED OR USED FACILITIES WITHOUT WRITTEN PERMISSION FROM AUTHORITIES HAVING JURISDICTION.		3.	DISPOSAL: TRANSPORT DEM PROPERTY AND LEGALLY DI
	3. OWNER ASSUMES NO RESPONSIBILITY FOR CONDITION OF AREAS TO BE	Ш	14.1	ONRY
	<ul> <li>SELECTIVELY DEMOLISHED.</li> <li>A. CONDITIONS EXISTING AT TIME OF INSPECTION FOR BIDDING PURPOSE WILL BE MAINTAINED BY OWNER AS FAR AS PRACTICAL.</li> <li>B. BEFORE SELECTIVE DEMOLITION, OWNER WILL REMOVE ITEMS WITHIN SPACE AS NEEDED.</li> </ul>	Α.	SCO 1.	PE REFER TO REPAIR DRAWING MASONRY REPLACEMENT.
	4. IF MATERIALS SUSPECTED OF CONTAINING HAZARDOUS MATERIALS ARE ENCOUNTERED, DO NOT DISTURB; IMMEDIATELY NOTIFY ENGINEER AND OWNER. THESE MATERIALS SHALL BE REMOVED AS DISPOSED AS	В.	CON 1.	CRETE MASONRY UNITS. CONCRETE STRENGTH OF M SHALL BE 1,800 PSI MINIMUM
	<ul> <li>APPROVED BY GOVERNING AGENCY.</li> <li>5. STORAGE OR SALE OF REMOVED ITEMS OR MATERIALS ON-SITE WILL NOT BE PERMITTED.</li> </ul>		2.	UNITS SHALL CONFORM TO A

## **GENERAL NOTES**

C.

EXISTING UTILITIES INDICATED TO REMAIN THEM AGAINST DAMAGE DURING SELECTIVE MAINTAIN FIRE-PROTECTION FACILITIES IN E DEMOLITION OPERATIONS.

IG (ASPHALT OR CEMENT ROADWAYS. AGE DITCHES AS NEEDED.

MOLITION SCOPE ARE TO BE PROTECTED CTOR. RESTORE AREAS SUBJECT TO EIR PRE-DEMOLITION CONDITION.

RAIN, PURGE, OR OTHERWISE REMOVE, CHEMICALS, GASES, EXPLOSIVES, ACIDS, ANGEROUS MATERIALS BEFORE IVE DEMOLITION OPERATIONS. SITE IMPROVEMENTS, APPURTENANCES, AND

MAIN. IBLE FENCE AROUND DRIP LINE OF

R AROUND PERIMETER DRIP LINE OF GROUPS

ACCESS TO EXITS AND EXIT STAIRS AT ALL MOKE DETECTION SYSTEM SHALL REMAIN S. PROTECT SMOKE DETECTORS AS MANCE TO LOCAL CODES AND LOCAL

ROVIDE TEMPORARY BARRICADES AND IRED TO PREVENT INJURY TO PEOPLE AND LDINGS AND FACILITIES TO REMAIN. N TO ENSURE SAFE PASSAGE OF PEOPLE DEMOLITION AREA AND TO AND FROM S OF ADJACENT FACILITIES.

ALL NECESSARY PEDESTRIAN CONTROL

ERECT AND MAINTAIN DUSTPROOF RY ENCLOSURES TO LIMIT DUST AND DIRT ATE AREAS FROM FUMES AND NOISE

OVIDE AND MAINTAIN INTERIOR AND ING, OR STRUCTURAL SUPPORT TO TO PREVENT UNEXPECTED OR IT OR COLLAPSE OF CONSTRUCTION BEING N OR ADD TEMPORARY SUPPORTS WHEN ESS OF SELECTIVE DEMOLITION.

LITION

ING CONSTRUCTION AS INDICATED. USE OMPLETE THE WORK WITHIN LIMITATIONS OF AND AS FOLLOWS:

DS LEAST LIKELY TO DAMAGE REMAIN OR ADJOINING CONSTRUCTION. G TORCHES UNTIL WORK AREA IS CLEARED RIALS. AT CONCEALED SPACES VERIFY TENTS OF HIDDEN SPACE BEFORE STARTING RATIONS. MAINTAIN FIRE WATCH AND PRESSION DEVICES DURING FLAME-CUTTING

VENTILATION WHEN USING CUTTING

ERMIN-INFESTED, OR OTHERWISE UITABLE MATERIALS AND PROMPTLY

DEMOLITION EQUIPMENT AND REMOVE ALS SO AS NOT TO IMPOSE EXCESSIVE LOADS LS, SLABS, OR FRAMING. SHED ITEMS AND MATERIALS PROMPTLY.

PLY WITH OWNER'S REQUIREMENTS FOR THER BUILDING FACILITIES DURING PERATIONS.

ITEMS: COMPLY WITH THE FOLLOWING:

-MS CURE AREA UNTIL DELIVERY TO OWNER. O OWNER'S STORAGE AREA AS DESIGNATED

: CONTRACTOR TO COORDINATE WITH ING WORK) ON ITEMS THAT ARE TO REMAIN D DURING THE DEMOLITION PROCESS. WHEN MS MAY BE REMOVED TO A SUITABLE AND/

DE: SAW-CUT PERIMETER OF AREA TO BE UP AND REMOVE.

RIALS

OSE OF DEMOLISHED MATERIALS. DO NOT RIALS TO ACCUMULATE ON-SITE.

EMOLISHED MATERIALS.

MOLISHED MATERIALS OFF OWNER'S ISPOSE OF THEM.

GS FOR DETAILS AND LOCATION OF

MASONRY UNITS (BASED ON NET AREA)

ASTM C 55 OR ASTM C 90 AND SAMPLED IN C 140.

ASTM C 270, PROPORTION SPECIFICATION. PROVIDE AN AVERAGE COMPRESSIVE STRENGTH AT 28 DAYS OF 1,800 PSI MINIMUM. D. GROUT 1. MIX DESIGN A. FOR FILLING SPACES 4" OR LARGER IN BOTH HORIZONTAL DIRECTIONS, USE "COARSE GROUT" WITH A MINIMUM COMPRESSIVE

1. USE ONLY PORTLAND CEMENT/LIME, TYPE S, MORTAR CONFORMING TO

- STRENGTH OF 2,000 PSI. THE GROUT SHALL BE TESTED IN ACCORDANCE WITH ASTM C1019. FOR FILLING SPACES LESS THAN 4" IN ONE OR BOTH HORIZONTAL DIRECTIONS, USE "FINE GROUT" PROPORTIONED PER ASTM C 476.
- B. USE 3,000 PSI NORMALWEIGHT CONCRETE FOR FILLING SPACES 10" AND LARGER IN BOTH DIRECTIONS. THE GROUT SHALL BE TESTED IN ACCORDANCE WITH ASTM C 1019.
- C. ALL GROUT MIX DESIGN SUBMITTALS SHALL INCLUDE THE RESULTS OF THE TESTS PERFORMED IN ACCORDANCE WITH ASTM C 1019.
- D. SLUMP RANGE AT POINT OF FINAL DISCHARGE: 8" TO 11".
- E. THE USE OF AIR ENTRAINING ADMIXTURES IS NOT ALLOWED.

### IV. CONCRETE

MORTAR

- A. CLASSES OF CONCRETE
- CONCRETE SHALL CONFORM TO THE FOLLOWING REQUIREMENTS:

LOCATION	COMP STRENG TH PSI	TYPE	EXPO- SURE CLASS	MAX. W/C RA- TIO	MAX. AGG. SIZE (IN.)
EXTERIOR SLAB, STAIR LANDING	4000PSI	NWC	F0,S0, W0,C1	0.45	3/4"

NOTES:

F'C SHALL BE AT 28-DAYS UNLESS NOTED OTHERWISE ON THE DRAWINGS.

- Β. HORIZONTAL CONSTRUCTION JOINTS IN CONCRETE POURS
- THERE SHALL BE NO HORIZONTAL CONSTRUCTION JOINTS IN ANY CONCRETE POURS UNLESS SHOWN ON THE DRAWINGS. THE ENGINEER SHALL APPROVE ALL DEVIATIONS OR ADDITIONAL JOINTS IN WRITING.
- C. REINFORCING STEEL
- ALL REINFORCING STEEL SHALL BE ASTM A 615 GRADE 60 UNLESS NOTED OTHERWISE ON THE DRAWINGS OR IN THESE NOTES.
- D. PLACEMENT OF WELDED WIRE REINFORCEMENT
  - WHEREVER WELDED WIRE REINFORCEMENT IS SPECIFIED AS REINFORCEMENT, IT SHALL BE CONTINUOUS ACROSS THE ENTIRE CONCRETE SURFACE AND PROPERLY LAPPED PER ACI 318, 12.18 AND 12.19.
- REINFORCING STEEL COVERAGE E.
  - REINFORCING STEEL COVERAGE SHOULD CONFORM TO THE REQUIREMENTS SPECIFIED ON THE DRAWINGS.
- SPLICES AND HOOKS IN REINFORCING STEEL E.
  - REFER TO DRAWING DETAILS FOR SPLICE AND HOOK REQUIREMENTS OF REINFORCING STEEL BEING SUPPLEMENTED.

V. STRUCTURAL STEEL

- A. MATERIAL
  - HOT ROLLED STRUCTURAL MEMBERS: ALL HOT ROLLED STEEL PLATES. SHAPES, AND BARS SHALL BE NEW STEEL CONFORMING TO ASTM SPECIFICATION A 6.
  - ASTM SPECIFICATION AND GRADE: CLEARLY MARK THE GRADE OF STEEL ON EACH PIECE, WITH A DISTINGUISHING MARK VISIBLE FROM FLOOR SURFACES, FOR THE PURPOSE OF FIELD INSPECTION OF PROPER GRADE OF STEEL. UNLESS NOTED OTHERWISE ON THE DRAWINGS, STRUCTURAL STEEL SHALL BE AS FOLLOWS:
  - A. W-SHAPE BEAMS: ASTM A 992
  - B. L-SHAPES: ASTM A 36
  - C. RECTANGULAR HSS: ASTM A 500
  - D. BASE PLATES: ALL BASE PLATES SHALL CONFIRM TO ASTM A36 UNLESS NOTED OTHERWISE ON THE DRAWINGS.
- В. CONNECTIONS
  - REFER TO THE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
- C. STRUCTURAL BOLTS AND THREADED FASTENERS
  - A 325 BOLTS: ALL BOLTS IN STRUCTURAL CONNECTIONS SHALL CONFORM TO ASTM A 325 TYPE 1, UNLESS INDICATED OTHERWISE ON THE DRAWINGS.
  - THREADED ROUND STOCK: THREADED RODS SHALL CONFORM TO: 2 A. ASTM A 36.
- WELDING D.
  - UNLESS NOTED OTHERWISE, ELECTRODES FOR WELDING SHALL CONFORM TO E70XX (SMAW), F7XX-EXXX (SAW), ER70S-X (GMAW), OR E7XT-X (FCAW).

- C.

- REQUIREMENTS OF THE CONTRACT DOCUMENTS. THE CONTRACT STRUCTURAL DRAWINGS AND SPECIFICATIONS REPRESENT THE ALTERATION MADE TO THE STRUCTURE, AND, EXCEPT WHERE SPECIFICALLY SHOWN. DO NOT INDICATE THE METHOD OR MEANS OF CONSTRUCTION. THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE WORK AND SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, PROCEDURES, TECHNIQUES, AND SEQUENCE.
- OPENINGS THROUGH FLOORS, ROOFS, AND WALLS FOR DUCTS, PIPING,
- REFER TO DRAWINGS OF EXISTING FACILITY FOR COMPLETE INFORMATION INCLUDING: EXPANSION JOINT SYSTEMS, PREVIOUS REPAIRS PERFORMED IN THE FACILITY, LOCATION AND SIZE OF STRUCTURAL MEMBERS (BEAMS, COLUMNS, WALLS, ETC.), SLAB
- THICKNESS, AND OTHER INFORMATION RELEVANT TO THE PROJECT. IF CERTAIN FEATURES ARE NOT FULLY SHOWN OR SPECIFIED ON THE DRAWINGS OR IN THE SPECIFICATIONS, THEIR CONSTRUCTION SHALL BE OF THE SAME CHARACTER AS SHOWN OR SPECIFIED IN SIMILAR CONDITIONS.
- R

### E. GROUT

GROUT IF REQUIRED BELOW STRUCTURAL STEEL BASE PLATES SHALL BE NON-METALLIC, NON-SHRINK GROUT WITH A MINIMUM STRENGTH OF 6,000 PSI WHEN BEARING ON 3,000 PSI CONCRETE OR LESS, A STRENGTH OF 8,000 PSI WHEN BEARING ON CONCRETE BETWEEN 3,000 AND 4,000 PSI, AND, UNLESS NOTED OTHERWISE ON THE DRAWINGS, A STRENGTH OF 8,000 PSI WHEN BEARING ON CONCRETE GREATER THAN 4.000 PSI.

### VI. SUBMITTALS

A. SUBMITTAL LIST AND SCHEDULE

- THE CONTRACTOR SHALL PREPARE A DETAILED LIST AND SCHEDULE OF ALL SUBMITTAL ITEMS TO BE SENT TO THE STRUCTURAL ENGINEER PRIOR TO THE START OF CONSTRUCTION. THIS LIST SHALL BE UPDATED AND REVISED AND KEPT CURRENT AS THE JOB PROGRESSES. THE SUBMITTAL LIST SHALL BE ORGANIZED AS SHOWN BELOW:
- SHOP DRAWINGS DESIGN CALCULATIONS
- PRODUCT DATA, CERTIFICATES, REPORTS, AND OTHER LITERATURE

SUBMITTALS TO BE PROVIDED TO STRUCTURAL ENGINEER

- PRODUCT SUBMITTALS: IN ADDITION TO THE SUBMITTALS REQUIRED BY THE PROJECT SPECIFICATIONS, THE FOLLOWING SUBMITTALS SHALL BE PROVIDED:
- A. BOLTS, RODS, NUTS, WASHERS AND ASSOCIATED COMPONENTS.
- SUBMITTAL REQUIREMENTS: ALL SHOP DRAWINGS MUST BE REVIEWED AND ELECTRONICALLY STAMPED BY THE CONTRACTOR PRIOR TO SUBMITTAL.
- CONTRACTOR SHALL PROVIDE THE SUBMITTAL IN ELECTRONIC PORTABLE DOCUMENT FORMAT (PDF) PER THE SPECIFICATIONS.
- THE OMISSION FROM THE SHOP DRAWINGS OF ANY MATERIALS REQUIRED BY THE CONTRACT DOCUMENTS TO BE FURNISHED SHALL NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY OF FURNISHING AND INSTALLING SUCH MATERIALS, REGARDLESS OF WHETHER THE SHOP DRAWINGS HAVE BEEN REVIEWED AND APPROVED.

### REPRODUCTION

THE USE OF ELECTRONIC FILES OR REPRODUCTIONS OF THESE CONTRACT DOCUMENTS BY ANY CONTRACTOR, SUBCONTRACTOR, ERECTOR, FABRICATOR, OR MATERIAL SUPPLIER IN LIEU OF PREPARATION OF SHOP DRAWINGS SIGNIFIES THEIR ACCEPTANCE OF ALL INFORMATION SHOWN HEREON AS CORRECT, AND OBLIGATES THEMSELVES TO ANY JOB EXPENSE, REAL OR IMPLIED, ARISING DUE TO ANY ERRORS THAT MAY OCCUR HEREON

### VII. MISCELLANEOUS

A. CONTRACT DOCUMENTS

- IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO OBTAIN ALL CONTRACT DOCUMENTS AND LATEST ADDENDA AND TO SUBMIT SUCH DOCUMENTS TO ALL SUBCONTRACTORS AND MATERIAL SUPPLIERS PRIOR TO THE SUBMITTAL OF SHOP DRAWINGS, FABRICATION OF ANY STRUCTURAL MEMBERS, AND ERECTION IN THE FIELD.
- CONTRACTOR SHALL FULLY AND PROPERLY IMPLEMENT THE ENGINEERING CONTROLS, WORK PRACTICES, AND RESPIRATORY PROTECTION AGAINST TOXIC AND HAZARDOUS SUBSTANCES INCLUDING RESPIRABLE CRYSTALLINE SILICA ACCORDING TO OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION, OSHA 1926.1153. WALTER P MOORE DOES NOT HAVE CONTROL OVER. CHARGE OF, OR RESPONSIBILITY FOR THE CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES OR PROCEDURES, OR FOR SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK, NOR SHALL WALTER P MOORE BE RESPONSIBLE FOR THE CONTRACTOR'S FAILURE TO PERFORM THE WORK IN ACCORDANCE WITH THE
- AND/OR CONDUIT SHALL BE COORDINATED BY THE CONTRACTOR. CONTRACTOR SHALL VERIFY SIZES AND LOCATIONS OF HOLES AND OPENINGS WITH THE MECHANICAL, ELECTRICAL, PLUMBING, AND FIRE PROTECTION DRAWINGS AND THE RESPECTIVE SUBCONTRACTORS.

DRAWING CONFLICTS

THE CONTRACTOR SHALL COMPARE THE ARCHITECTURAL AND STRUCTURAL DRAWINGS AND REPORT ANY DISCREPANCY BETWEEN EACH SET OF DRAWINGS AND WITHIN EACH SET OF DRAWINGS TO THE ARCHITECT AND ENGINEER PRIOR TO THE FABRICATION AND INSTALLATION OF ANY STRUCTURAL MEMBERS.

C. CONFLICTS IN STRUCTURAL REQUIREMENTS

WHERE CONFLICT EXISTS AMONG THE VARIOUS PARTS OF THE STRUCTURAL CONTRACT DOCUMENTS, STRUCTURAL DRAWINGS, GENERAL NOTES, AND SPECIFICATIONS, THE STRICTEST REQUIREMENTS, AS INDICATED BY THE ENGINEER. SHALL GOVERN.



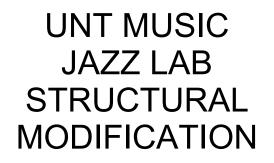
Walter P Moore and Associates, Inc. 500 N Akard Street, Suite 2300 Dallas, Texas 75201

214.740.6200

Project Name :

Client :

Kevplan



## UNIVERSITY **OF NORTH** TEXAS

Issue	ISSUED FOR CONSTRUCTION							
No.	No. Date Description							
	11/10/22	Issued for Construction						
D04.	ect Number : 22037.00 oved By :	Drawn By : GB Checked By : JK						



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Drawing Title :

## **GENERAL NOTES**

Sheet No.

D.	EXIS	TING CONDITIONS	н.	THE STR	UCTURAL ENGINEER'S ROL
	1.	THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CONDITIONS OF THE EXISTING BUILDING AT THE JOB SITE AND REPORT ANY DISCREPANCIES FROM ASSUMED CONDITIONS SHOWN ON THE DRAWINGS TO THE ARCHITECT AND ENGINEER PRIOR TO THE FABRICATION AND ERECTION OF ANY MEMBERS. EXISTING DIMENSIONS SHOWN ON THE DRAWINGS ARE FOR GENERAL REFERENCE ONLY AND SHOULD NOT BE USED FOR FINAL CONSTRUCTION OR DETAILING.		NO TE PR TH AN FA	E ENGINEER SHALL NOT HA T BE RESPONSIBLE FOR, O CHNIQUES, SEQUENCES, O ECAUTIONS AND PROGRAM E ACTS OR OMISSION OF T Y OTHER PERSONS PERFO ILURE OF ANY OF THEM TO TH THE CONTRACT DOCUM
	2.	EXISTING CONSTRUCTION SHOWN ON THE DRAWINGS WAS OBTAINED FROM EXISTING CONSTRUCTION DOCUMENTS. THESE DRAWINGS OF EXISTING CONSTRUCTION ARE AVAILABLE FOR CONTRACTOR USE AND SHALL BE REFERENCED FOR FAMILIARIZATION WITH EXISTING CONDITIONS. HOWEVER, THE AVAILABLE DRAWINGS OF EXISTING CONSTRUCTION ARE NOT NECESSARILY COMPLETE. THE CONTRACTOR IS RESPONSIBLE FOR BEING KNOWLEDGEABLE ON INFORMATION PRESENTED IN AVAILABLE DRAWINGS AND SHALL FIELD VERIFY ALL PERTINENT INFORMATION.		2. PE P. I BE TH OB WC ST SH	RIODIC SITE OBSERVATION MOORE AND ASSOCIATES I COMING GENERALLY FAMI E WORK COMPLETED AND SERVED IS BEING PERFOR ORK, WHEN FULLY COMPLE RUCTURAL CONTRACT DO OULD NOT BE CONSTRUED
	3.	DEMOLITION, CUTTING, DRILLING, ETC. OF EXISTING WORK SHALL BE PERFORMED WITH GREAT CARE SO AS NOT TO JEOPARDIZE THE STRUCTURAL INTEGRITY OF THE EXISTING BUILDING. IF ANY ARCHITECTURAL, STRUCTURAL, OR MEP MEMBERS NOT DESIGNATED FOR REMOVAL INTERFERE WITH THE NEW WORK, THE OWNER SHALL BE	ĥ.	PE DE	ECK THE QUALITY OR QUA RIODIC IN AN EFFORT TO G FICIENCIES IN THE WORK ( IANCE STATEMENT
		NOTIFIED IMMEDIATELY AND APPROVAL OBTAINED PRIOR TO REMOVAL OF THOSE MEMBERS.		LIF	STRUCTURES REQUIRE P
	4.	THE CONTRACTOR SHALL SAFELY SHORE EXISTING CONSTRUCTION WHEREVER EXISTING SUPPORTS ARE REMOVED TO ALLOW THE INSTALLATION OF NEW WORK. ALL SHORING METHODS AND SEQUENCING OF DEMOLITION SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR AND THE CONTRACTOR'S ENGINEER.		BE INC ST RE JO	THE ENVIRONMENT. A PL/ ESTABLISHED BY THE BUIL CLUDE ITEMS SUCH AS BUT RUCTURAL STEEL, PROTEC PLACEMENT OF FAILED SE INTS, CONTROL JOINTS, RE
	4. TH WINSSCO 5. THUOFOPARCOMER 6. THRUTASUBER 7. THUSUNAN 8. THOUTASUBER 7. THUSUNAN 8. THOUTASUBER 1. NEVECOR THUSUNAN 8. THOUTASUBER 1. NEVECOR THUSUNAN 8. THOUTASUBER 1. NEVECOR THUSUNAN 1. THWAPH CO	THE CONTRACTOR SHALL PERFORM A SURVEY TO LOCATE ALL EXISTING UTILITIES (INCLUDING UNDERGROUND UTILITIES) PRIOR TO THE START OF CONSTRUCTION AND TAKE CARE TO PROTECT UTILITIES THAT ARE		ELI	EMENTS EXPOSED TO A HU
		TO REMAIN IN SERVICE. EXISTING CIVIL, MECHANICAL, ELECTRICAL, PLUMBING, AND EMERGENCY PROTECTION SYSTEM SERVICING ANY AREAS OUTSIDE THE WORK AREA ARE TO BE MAINTAINED IN OPERABLE	<u>VIII.</u> A.	2.1	G INTERPRETATION G VIEWS LABELED AS "TYPI
		CONDITION THROUGHOUT THE DURATION OF CONSTRUCTION. CONTRACTOR SHALL MAKE NECESSARY TEMPORARY CONNECTIONS TO MAINTAIN EXISTING UTILITIES IN SERVICE DURING THE WORK. TEMPORARY, LOCALIZED INTERRUPTION OF THESE SYSTEMS SHALL REQUIRE APPROVAL BY THE OWNER.		1. PA LAI AP SA	RTIAL PLANS, ELEVATIONS BELED WITH "TYPICAL" AT PLY TO ALL SITUATIONS OF ME OR SIMILAR TO THOSE THE CONTENT OF THESE
	6.	THE CONTRACTOR SHALL PROVIDE DUST, ODOR, AND NOISE PROTECTION, AND SAFETY MEASURES AS NECESSARY FOR THE DURATION OF CONSTRUCTION. PROVIDE ALL MEASURES NECESSARY TO PROTECT THE EXISTING STRUCTURE, BUILDING INTERIOR, VEHICLES, FACILITY PATRONS, AND OTHER PERSONS DURING CONSTRUCTION. SUCH MEASURES SHALL INCLUDE, BUT NOT LIMITED TO TEMPORARY BRACING, SHORING, FORMWORK, PROTECTIVE ENCLOSURES, AND TRAFFIC CONTROLS.	В.	DE AP DE SH STRUCTU	TERMINED FROM THE TITL PLY WHETHER OR NOT THI CISIONS REGARDING APPL ALL BE DETERMINED BY TH JRAL ABBREVIATIONS, SYM AT
	7.	THE CONTRACTOR SHALL PERFORM A PRE-CONSTRUCTION CONDITION SURVEY TO DOCUMENT SITE CONDITIONS PRIOR TO START OF WORK. SUBMIT SURVEY TO OWNER AND THE ENGINEER. DOCUMENT LOCATION AND CONDITION OF ANY CONSTRUCTION DESIGNATED FOR REMOVAL AND RE-INSTALLATION.		@ & # Ø (E) (N) ACI	AND NUMBER ROUND, DIAMETER EXISTING NEW AMERICAN CONCRETE
	8.	THE CONTRACTOR SHALL REPAIR ALL DAMAGE CAUSED DURING CONSTRUCTION WITH SIMILAR MATERIALS AND WORKMANSHIP TO RESTORE CONDITIONS TO LEVELS ACCEPTABLE TO THE OWNER.		AISI ARCH ASTM BLDG BOT	AMERICAN IRON AND S ARCHITECTURAL DRAW AMERICAN SOCIETY FO BUILDING BOTTOM
E.		PONSIBILITY OF THE CONTRACTOR FOR STABILITY OF THE STRUCTURE ING CONSTRUCTION		CJ CL	CONTROL JOINT CENTER LINE
	1.	NEW STRUCTURAL ELEMENTS OF THE PROJECT HAVE BEEN DESIGNED BY THE STRUCTURAL ENGINEER TO RESIST THE REQUIRED CODE VERTICAL AND LATERAL FORCES THAT COULD OCCUR IN THE FINAL COMPLETED STRUCTURE ONLY. THE ABILITY OF THE STRUCTURAL FRAME TO RESIST THE REQUIRED CODE FORCES DERIVES FROM THE COMPLETE INSTALLATION OF THE NEW STRUCTURAL ELEMENTS. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PROVIDE ALL REQUIRED BRACING DURING CONSTRUCTION TO MAINTAIN THE STABILITY AND SAFETY OF ALL STRUCTURAL ELEMENTS DURING THE CONSTRUCTION PROCESS UNTIL THE NEW MEMBERS ARE COMPLETELY INSTALLED AND ALL DESIGNATED CONCRETE ELEMENTS (IF ANY) HAVE REACHED A MINIMUM OF 75% OF THEIR DESIGN STRENGTH.		CMU COL CONC CSP DN EA ELEV ENGR EJ EW EXIST F'C FV FY	CONCRETE MASONRY U COLUMN CONCRETE CONCRETE SURFACE P DOWN EACH ELEVATION ENGINEER EXPANSION JOINT EACH WAY EXISTING CONCRETE STRENGTH FIELD VERIFY YIELD STRENGTH
F.		PONSIBILITY OF THE CONTRACTOR FOR CONSTRUCTION LOADS		FU GALV	ULTIMATE STRENGTH GALVANIZED
	J.	THE ALTERATIONS HAVE BEEN DESIGNED FOR THE LOADS IDENTIFIED WITHIN THESE STRUCTURAL DRAWINGS THAT ARE ANTICIPATED TO BE APPLIED TO THE STRUCTURE ONCE ALTERATION WORK IS COMPLETED. THE CONTRACTOR SHALL NOT OVERLOAD THE STRUCTURE DURING CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CHECKING THE ADEQUACY OF THE STRUCTURE TO SUPPORT ANY APPLIED CONSTRUCTION LOADS, INCLUDING THOSE DUE TO CONSTRUCTION VEHICLES OR EQUIPMENT, MATERIAL HANDLING OR STORAGE, SHORING OR RESHORING, OR ANY OTHER CONSTRUCTION ACTIVITY. THE CONTRACTOR SHALL SUBMIT CALCULATIONS SIGNED AND SEALED BY AN ENGINEER LICENSED IN THE STATE WHERE THE PROJECT IS LOCATED VERIFYING THE ADEQUACY OF THE STRUCTURE FOR ANY PROPOSED CONSTRUCTION LOADS THAT ARE IN EXCESS OF THE STATED DESIGN LOADS. THE STRUCTURAL ENGINEER IS NOT RESPONSIBLE TO DESIGN OR CHECK THE STRUCTURE FOR LOADS APPLIED TO THE STRUCTURE FOR ANY CONSTRUCTION ACTIVITY.		GEN GYP HORZ INFO KIPS LLV LLH LWC L LBF MAX MIN MISC MSD MSDS NTS	GENERAL GYPSUM HORIZONTAL INFORMATION 1000 POUNDS FORCE LONG LEG VERTICAL LONG LEG HORIZONTAL LIGHTWEIGHT CONCRE LENGTH POUNDS FORCE MAXIMUM MINIMUM MISCELLANEOUS MATERIAL SAFETY DAT MATERIAL SAFETY DAT NOT TO SCALE
G.	CON	TRACTOR SUBSTITUTIONS		OC OD	ON CENTER OUTSIDE DIAMETER
	1.	<ul> <li>ANY MATERIALS OR PRODUCTS SUBMITTED FOR APPROVAL THAT ARE DIFFERENT FROM THE MATERIAL OR PRODUCTS SPECIFIED IN THE STRUCTURAL CONTRACT DOCUMENTS WILL BE CONSIDERED FOR APPROVAL ONLY IF THE FOLLOWING CRITERIA ARE SATISFIED:</li> <li>A. A COST SAVINGS TO THE OWNER IS DOCUMENTED AND SUBMITTED WITH THE REQUEST.</li> <li>B. THE MATERIAL OR PRODUCT HAS BEEN APPROVED BY THE INTERNATIONAL CODE COUNCIL (ICC) AND THE ICC REPORT IS SUBMITTED WITH THE REQUEST.</li> <li>1) THE ICC ESR THAT IS SUBMITTED MUST REFERENCE THE BUILDING CODE UNDER WHICH THE PROJECT IS PERMITTED.</li> </ul>		PLF PSF QTY REINF REQD SHT SIM SOG SPA STD SLS	POUNDS PER LINER FO POUNDS PER SQUARE QUANTITY REINFORCEMENT REQUIRED SHEET SIMILAR SLAB-ON-GRADE SPACING STANDARD AISC STANDARD LONG
		2) ICC REPORTS THAT HAVE BEEN DISCONTINUED AT THE TIME OF PRODUCT INSTALLATION WILL NOT BE ACCEPTED.		SSL TBPE TYP	AISC STANDARD SHOR TEXAS BOARD OF PROF TYPICAL
	2.	SUBMITTALS NOT SATISFYING THE ABOVE CRITERIA WILL NOT BE CONSIDERED.		VERT WHMIS	VERTICAL WORKPLACE HAZARDO

## **GENERAL NOTES**

### ROLE DURING CONSTRUCTION

HAVE CONTROL NOR CHARGE OF, AND SHALL R, CONSTRUCTION MEANS, METHODS, S, OR PROCEDURES, FOR SAFETY

RAMS IN CONNECTION WITH THE WORK, FOR F THE CONTRACTOR, SUBCONTRACTOR, OR RFORMING ANY OF THE WORK, OR FOR THE TO CARRY OUT THE WORK IN ACCORDANCE SUMENTS.

ION BY FIELD REPRESENTATIVES OF WALTER ES IS SOLELY FOR THE PURPOSE OF AMILIAR WITH THE PROGRESS AND QUALITY OF ND DETERMINING, IN GENERAL, IF THE WORK ORMED IN A MANNER INDICATING THAT THE PLETED, WILL BE IN ACCORDANCE WITH THE DOCUMENTS. THIS LIMITED SITE OBSERVATION JED AS EXHAUSTIVE OR CONTINUOUS TO QUANTITY OF THE WORK, BUT RATHER O GUARD THE OWNER AGAINST DEFECTS OR RK OF THE CONTRACTOR.

E PERIODIC MAINTENANCE TO EXTEND STRUCTURAL INTEGRITY FROM EXPOSURE PLANNED PROGRAM OF MAINTENANCE SHALL BUILDING OWNER. THIS PROGRAM SHALL BUT NOT LIMITED TO PAINTING OF TECTIVE COATING FOR CONCRETE, SEALANTS, CAULKED JOINTS, EXPANSION REPAIR OF SPALLS AND CRACKS IN RE WASHING OF EXPOSED STRUCTURAL HUMID ENVIRONMENT.

### YPICAL"

NS, SECTIONS, DETAILS, OR SCHEDULES AT THE BEGINNING OF THEIR TITLE SHALL OCCURRING ON THE PROJECT THAT ARE THE SE SPECIFICALLY SHOWN. THE APPLICABILITY SE VIEWS TO LOCATIONS ON THE PLAN CAN BE ITLE OF THE VIEWS. SUCH VIEWS SHALL THEY ARE KEYED IN AT EACH LOCATION. PPLICABILITY OF THESE "TYPICAL" VIEWS THE STRUCTURAL ENGINEER.

YMBOLS, AND NOTATIONS

TE INSTITUTE O STEEL INSTITUTE AWINGS FOR TESTING AND MATERIALS

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lter moore

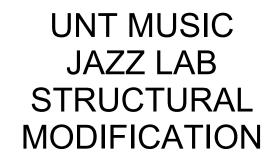
Walter P Moore and Associates, Inc. 500 N Akard Street, Suite 2300 Dallas, Texas 75201

214.740.6200

Project Name :

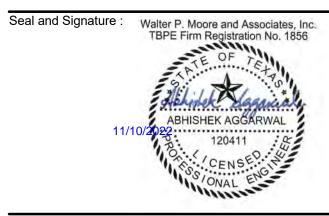
Client :

Keyplan :





	ISSUED FOR CONSTRUCTION						
No.							
	11/10/22 Issued for Construction						
	ect Number : 22037.00	Drawn By : GB					
Appr AA	oved By :	Checked By : JK					

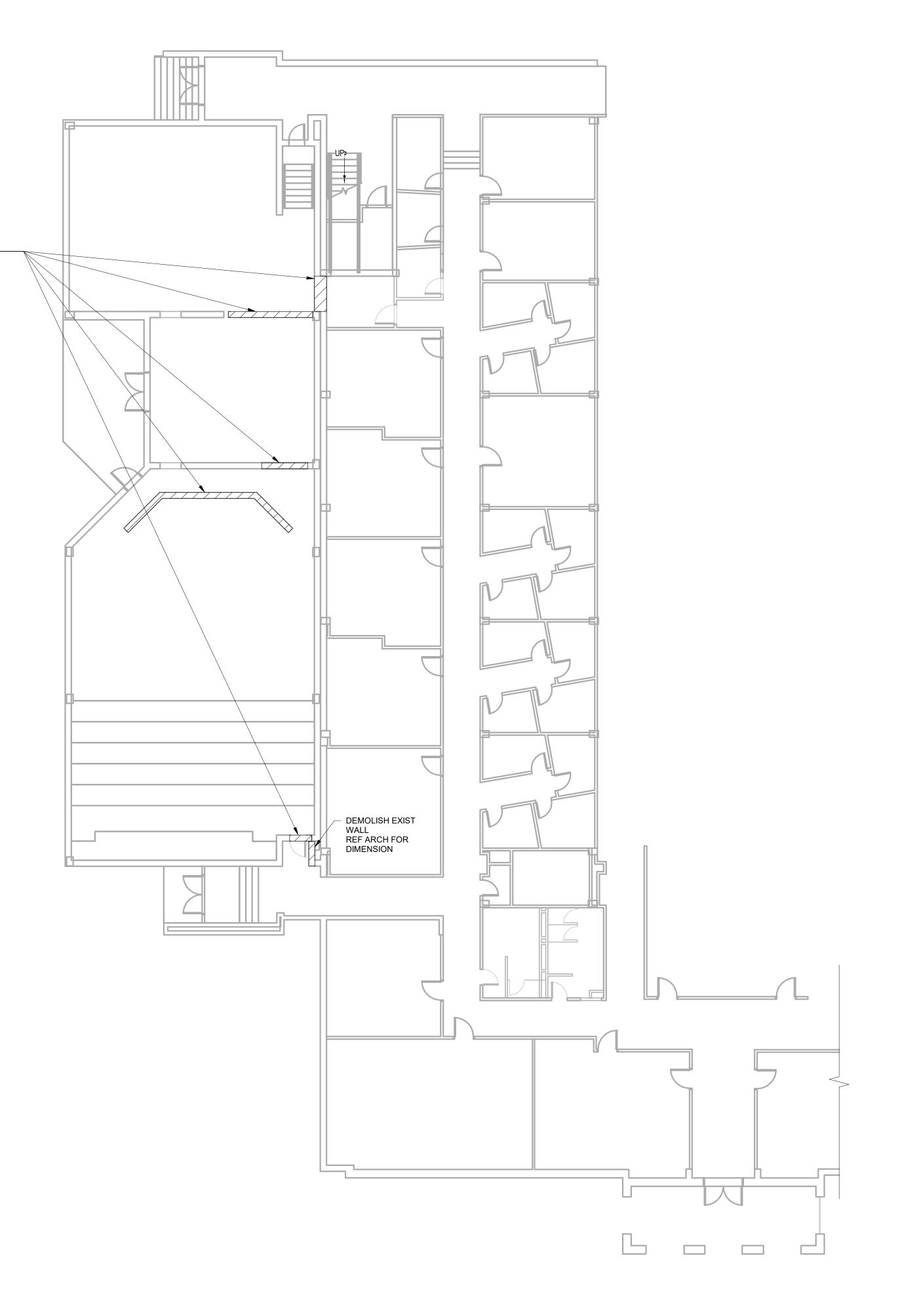


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Drawing Title :

## GENERAL NOTES



DEMOLISH EXISTING WALL — REF ARCH FOR DIMENSION. REF S3.00 FOR HEADER DETAILS WHERE PARTIAL WALL HEIGHT IS BEING REMOVED.

NOTES: 1. REFER TO ARCHITECTURAL DRAWINGS FOR ACTUAL SIZES OF OPENINGS.

) ENLARGED DEMO PLAN NO SCALE

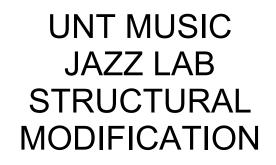


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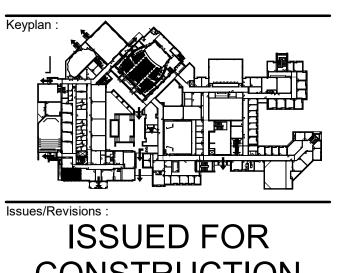
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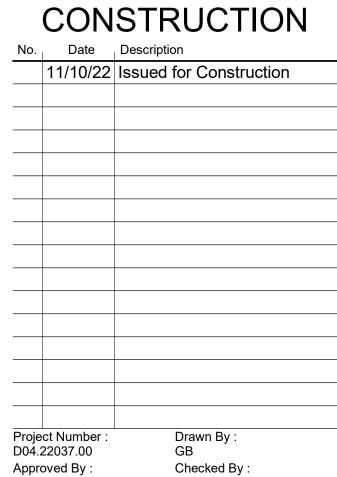
Project Name :

Client :











JK

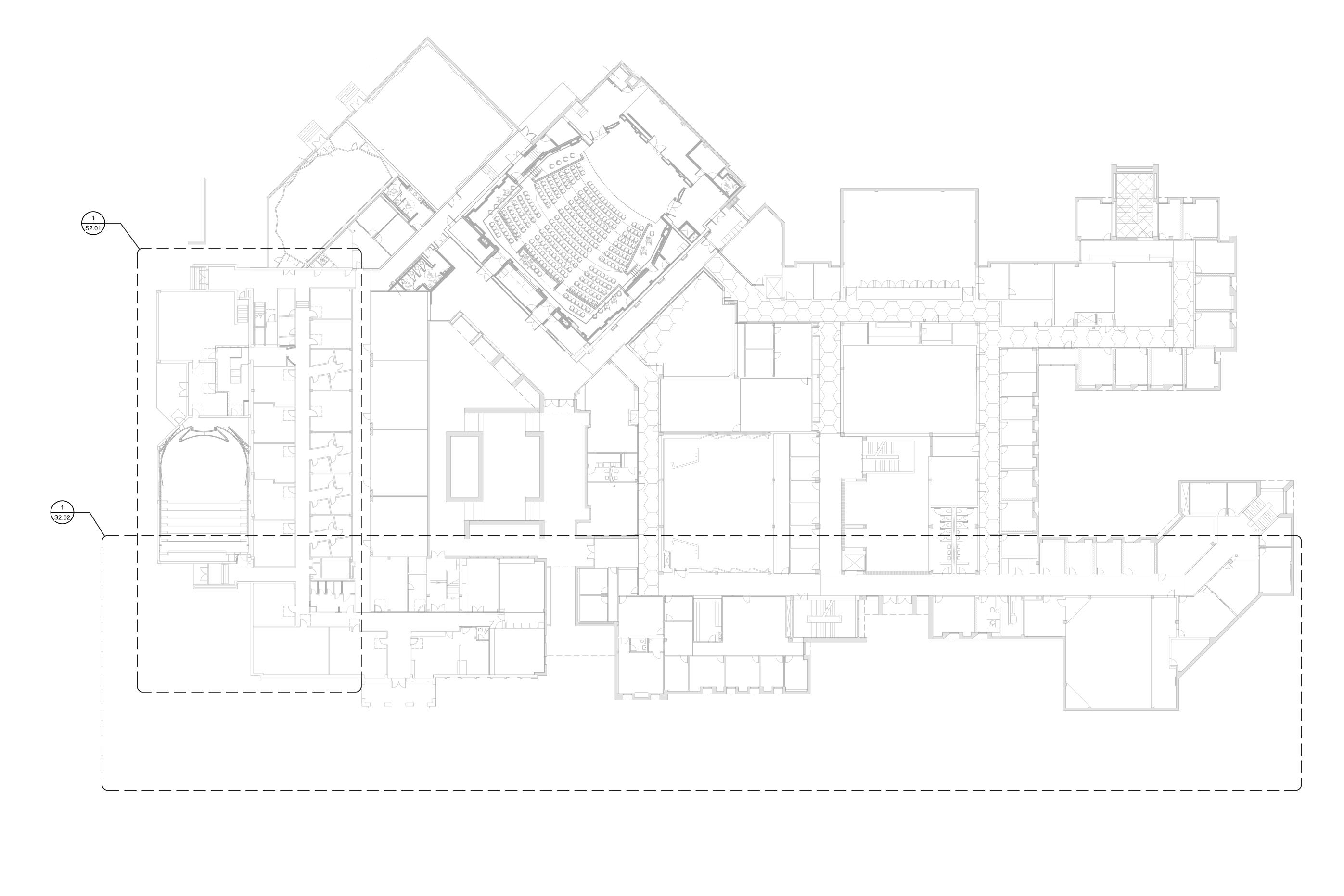
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AA





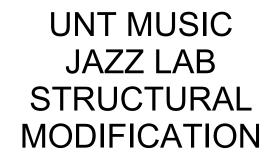




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Keyplan :	
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No. Date	Description 22 Issued for Construction
Project Numbe D04.22037.00	GB
Approved By : AA	Checked By : JK

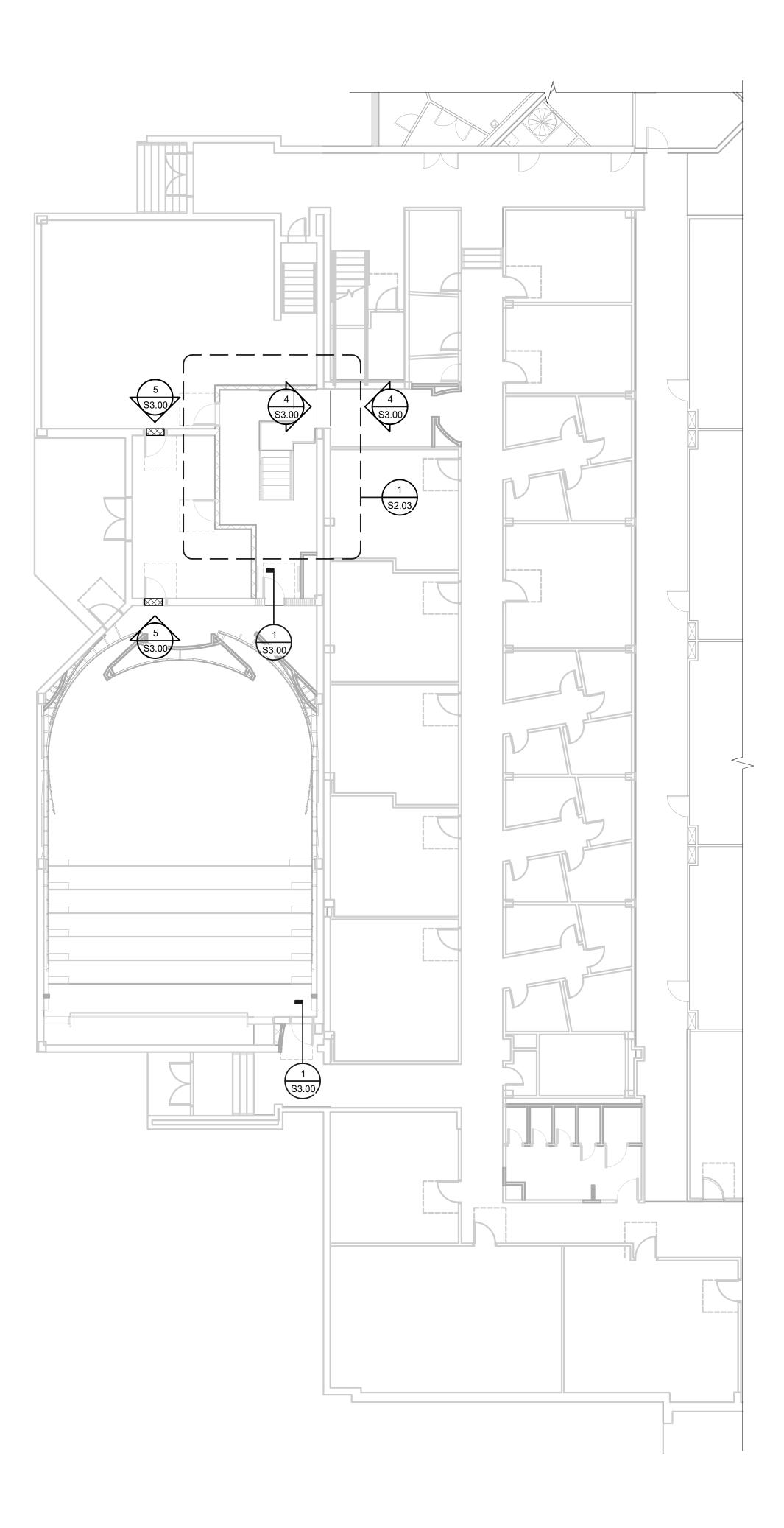


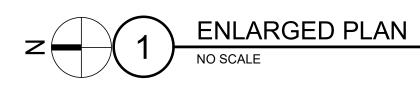
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## OVERALL PLAN



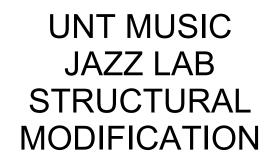




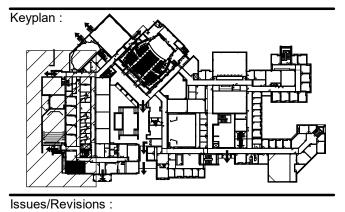
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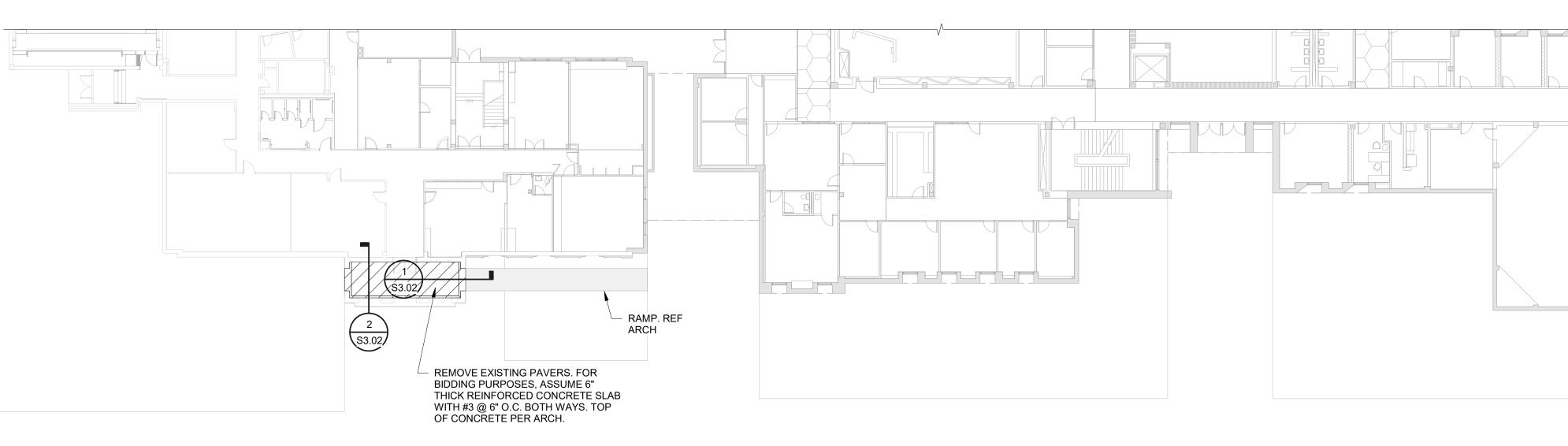


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## ENLARGED PLAN



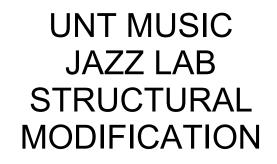




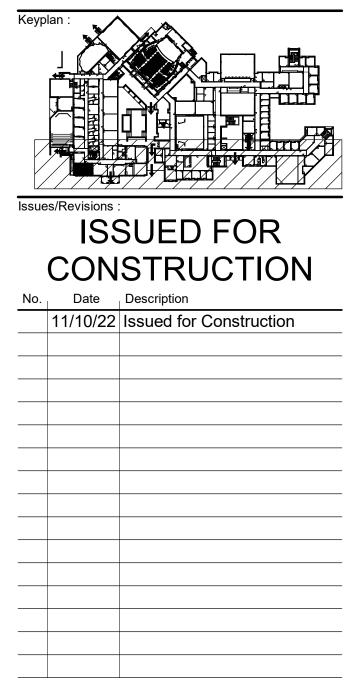
Walter P Moore and Associates, Inc. 500 N Akard Street, Suite 2300 Dallas, Texas 75201

214.740.6200

Project Name :







Project Number : D04.22037.00 Approved By : AA Drawn By : GB Checked By : JK

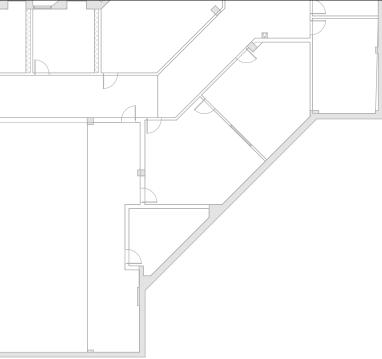


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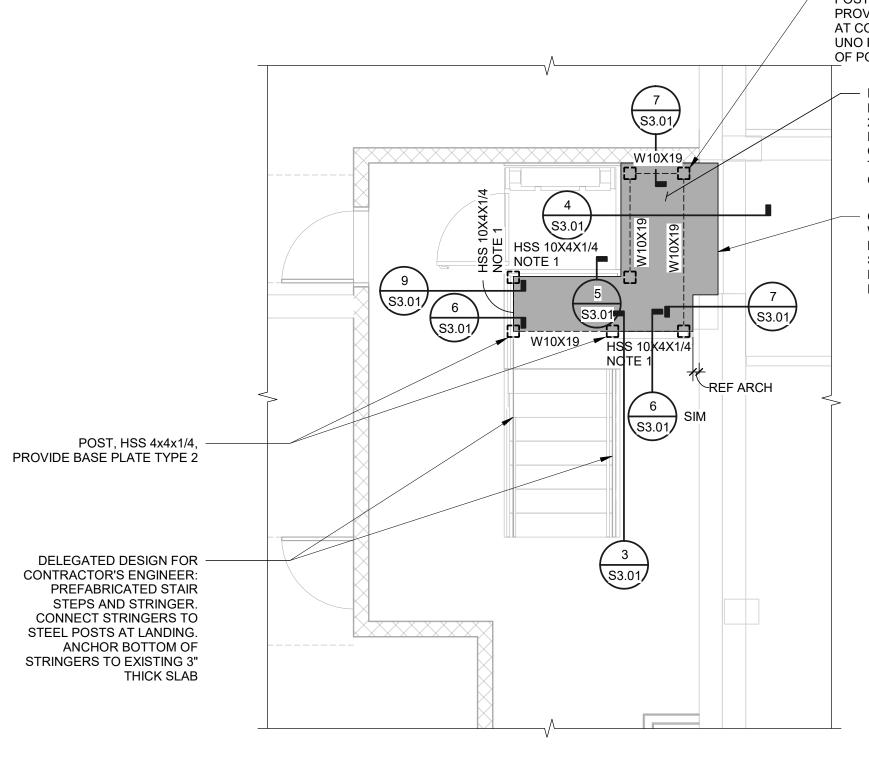
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Drawing Title :

ENLARGED PLAN



DAL-SERVER/Projects/D04/2022/22037-00 UNT_Music Jazz Lab Str Modification/3-Documentation/Drawings/Revit Structure/D04-22037-00_UNT Music Jazz Lab Str Modification_R22.rvt



NOTES: 1. PROVIDE 1/4" THICK CAP PLATE AT END OF HSS BEAMS. WELD ALL AROUND WITH 3/16 INCH WELD. 2. INSTALL 5/8" PUDDLE WELD @ 12"OC TO CONNECT FORM DECK TO ITS SUPPORTS.



POST, HSS 4x4x1/4 TYP. PROVIDE BASE PLATE TYPE 1 AT CORNER LOCATIONS, TYP UNO PROVIDE 1/4 CAP AT TOP OF POSTS, TYP

> REINFORCED CONCRETE LANDING SLAB ON GAGE 16 2C-36 NON-COMPOSITE METAL DECK GRADE 50 WITH #3 @ 6" OC EACH WAY. TOTAL THICKNESS = 6". TOP OF CONCRETE PER ARCH, NOTE 2.

 COORDINATE EXPANSION JOINT WITH ARCH MAINTAIN MINIMUM SEPARATION EQUAL TO EXISTING GAP BETWEEN EXISTING WALLS BELOW.

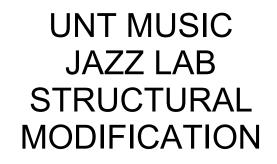


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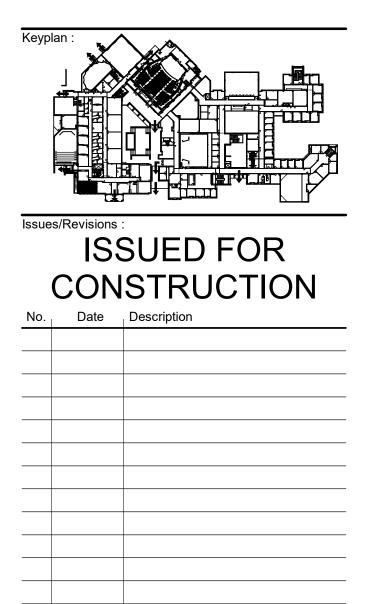
214.740.6200

Project Name :

Client :







Project Number : D04.22037.00 Approved By :

AA

Drawn By : GB Checked By : JK



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Drawing Title :

## ENLARGED PLAN

8

NO SCALE

# **TYPICAL SLAB TENSION**

3 S3.00

1. CONTRACTOR TO CREATE GAP FOR INSTALLATION OF NEW ANGLES BY

CHIPPING OUT THE EXISTING MORTAR JOINT. IF ANGLE THICKNESS

EXCEEDS MORTAR JOINT THICKNESS, CONTRACTOR TO CAREFULLY CHIP

3. IF EXISTING CMU IS NOT FULLY GROUTED, CONTRACTOR TO FILL CELLS AT NEW

HEADER FRAMING CORNER DETAIL AT OPENING

SLAB TENSION DEVELOPMENT AND LAP SPLICE LENGTHS

GRADE 60 REINFORCEMENT, NORMALWEIGHT CONCRETE

**BOTTOM BARS** 

12

16

15

20

f'c = 4000 PSI

OTHER BARS

12

16

19

25

2. CONTRACTOR TO VERIFY LOCATION OF EXISTING REINFORCEMENT PRIOR

BEYOND INTO EXISTING CMU BLOCK BELOW TO PROVIDE ENOUGH CLEARANCE

3" (MIN)-

NOTES:

NO SCALE

TO DRILLING

[12" MIN

FOR THE ANGLE INSTALLATION.

BAR

#3

#4

SIZE CLASS

LAP

A

Α

THREADED RODS WITH NON-SHRINK GROUT.

**BETWEEN TWO BUILDINGS** 

TO ROUGH

OPENING REF ARCH

## SMALLER BAR BUT MAY NOT BE LESS THAN THE "CLASS A" SPLICE LENGTH OF THE LARGER BAR.

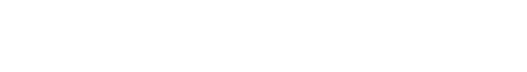
DEVELOPMENT AND LAP SPLICE LENGTHS

- CONCRETE BELOW THE BAR. LESS, TABULATED SPLICE LENGTHS FOR BOTTOM BARS SHALL BE USED.

- 6. WHEN LAP SPLICING BARS OF DIFFERENT SIZES, THE LAP LENGTH IS DETERMINED BY THE
- CONCRETE BELOW THE BAR. FOR TOP REINFORCEMENT IN SLABS THAT ARE 12" THICK OR

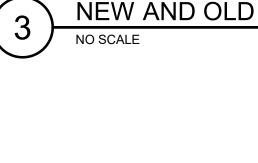
- LENGTH.
- 5. OTHER BARS INCLUDE TOP BARS AND ALL OTHER BARS THAT HAVE MORE THAN 12" OF FRESH
- 3. THE TENSION DEVELOPMENT LENGTH (Ld) IS EQUAL TO THE SCHEDULED "CLASS A" LAP SPLICE 4. A BOTTOM BAR IS DEFINED AS ANY BAR THAT DOES NOT HAVE MORE THAN 12" OF FRESH
- TABLES FOR OTHER MEMBERS

- 2. THIS TABLE SHALL BE USED FOR SLABS ONLY. REFER TO OTHER DEVELOPMENT LENGTH
- 1. ALL SPLICE LENGTHS ARE IN INCHES.



- NEW DOOR OPENING

- NEW ANGLE (NOTE 1)



BAR

SIZE

#3

#4

SPLICE LENGTH.

LARGER BAR

NO SCALE

LAP

CLASS

A

В

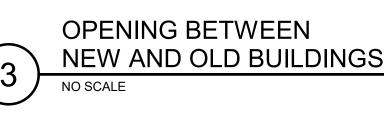
Α

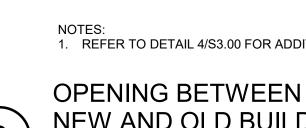
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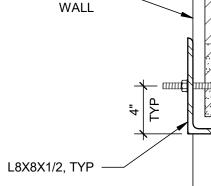
ALL SPLICE LENGTHS ARE IN INCHES.

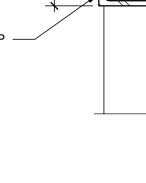
FRESH CONCRETE BELOW THE BAR.

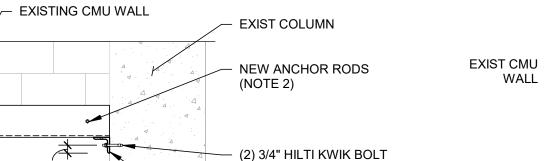
TABLES FOR OTHER MEMBERS.











WITH 3 1/4" EFFECTIVE EMBEDMENT AND

SPACED AT 4 1/2"

L4X4X1/2 8" WIDE

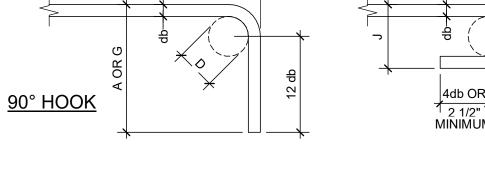
## **TYPICAL END HOOK TYPES** 10

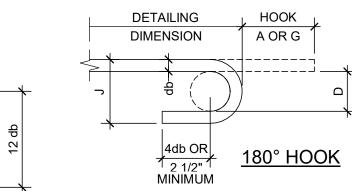
D = INSIDE DIAMETER OF BEND

NO SCALE

END HOOK DIMENSIONS						
FINISHED	180° ⊢	90° HOOK				
BEND DIAMETER D, (INCHES)	A OR G, (INCHES)	J, (INCHES)	A OR G, (INCHES)			
2 1/4	5	3	6			
3	6	4	8			
	FINISHED BEND DIAMETER D, (INCHES) 2 1/4	FINISHED BEND DIAMETER D, (INCHES) 2 1/4 5	FINISHED BEND DIAMETER D, (INCHES)180° HOOKSA OR G, (INCHES)J, (INCHES)2 1/453			

END HOOK DIMENSIONS							
	FINISHED	180° H	IOOKS	90° HOOK			
BAR SIZE	BEND DIAMETER D, (INCHES)	A OR G, (INCHES)	J, (INCHES)	A OR G, (INCHES)			

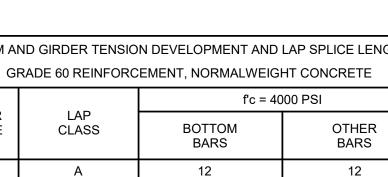






OUTSIDE FACE

OF BAR



BEAM AND GIRDER TENSION DEVELOPMENT AND LAP SPLICE LENGTHS

16

19

25

16

15

20

2. THIS TABLE SHALL BE USED FOR SLAB ONLY. REFER TO OTHER DEVELOPMENT LENGTH

3. THE TENSION DEVELOPMENT LENGTH (Ld) IS EQUAL TO THE SCHEDULED "CLASS A" LAP

5. OTHER BARS INCLUDE TOP BARS AND ALL OTHER BARS THAT HAVE MORE THAN 12" OF

THICK OR LESS, TABULATED SPLICE LENGTHS FOR BOTTOM BARS SHALL BE USED.

WHEN LAP SPLICING BARS OF DIFFERENT SIZES, THE LAP LENGTH IS DETERMINED BY

DEVELOPMENT AND LAP SPLICE LENGTHS

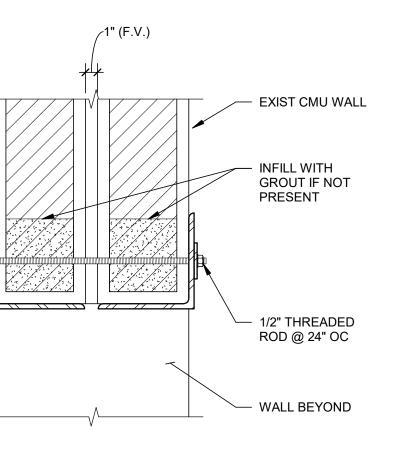
THE SMALLER BAR BUT MAY NOT BE LESS THAN THE "CLASS A" SPLICE LENGTH OF THE

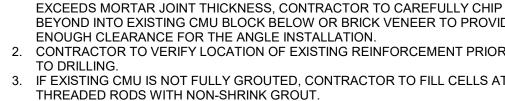
FRESH CONCRETE BELOW THE BAR. FOR TOP REINFORCEMENT IN SLABS THAT ARE 12"

4. A BOTTOM BAR IS DEFINED AS ANY BAR THAT DOES NOT HAVE MORE THAN 12" OF

TYPICAL BEAM AND GIRDER TENSION

1. REFER TO DETAIL 4/S3.00 FOR ADDITIONAL INSTALLATION GUIDELINES.





HEADER FRAMING CORNER DETAIL

1. CONTRACTOR TO CREATE GAP FOR INSTALLATION OF NEW ANGLES BY

CHIPPING OUT THE EXISTING MORTAR JOINT. IF ANGLE THICKNESS

- 2. CONTRACTOR TO VERIFY LOCATION OF EXISTING REINFORCEMENT PRIOR
- 3. IF EXISTING CMU IS NOT FULLY GROUTED, CONTRACTOR TO FILL CELLS AT NEW

DEVELOPMENT LENGTHS OF

**GRADE 60 REINFORCEMENT** 

NORMALWEIGHT CONCRETE

Lhb

8

10

1. Ldh = DEVELOPMENT LENGTH OF STANDARD HOOKS IN TENSION (INCHES).

3. Ldh = 0.7Lhb FOR #11 BARS AND SMALLER WHEN SIDE COVER (NORMAL TO PLANE OF

4. HOOKS ARE NOT CONSIDERED EFFECTIVE FOR DEVELOPING BARS IN COMPRESSION.

5. Ldh SHALL BE MULTIPLIED BY 1.2 FOR EPOXY-COATED HOOKED REINFORCING BARS.

HOOK) IS NOT LESS THAN 2 1/2 INCHES AND FOR 90° HOOKS COVER ON BAR

2. Ldh = Lhb UNLESS CONDITIONS OF NOTE 3 ARE SATISFIED.

EXTENSION BEYOND HOOK IS NOT LESS THAN 2 INCHES.

OF BAR

BAR SIZE

#3

#4

Ldh

90° HOOKS

DETAILING DIMENSION

f'c=4000 PSI

0.7 Lhb

6

7

Ldh

180° HOOKS

STANDARD HOOKS IN TENSION

\$3.00

0

14" MIN

3" (MIN

NOTES:

NO SCALE

2

– EXISTING CMU WALL

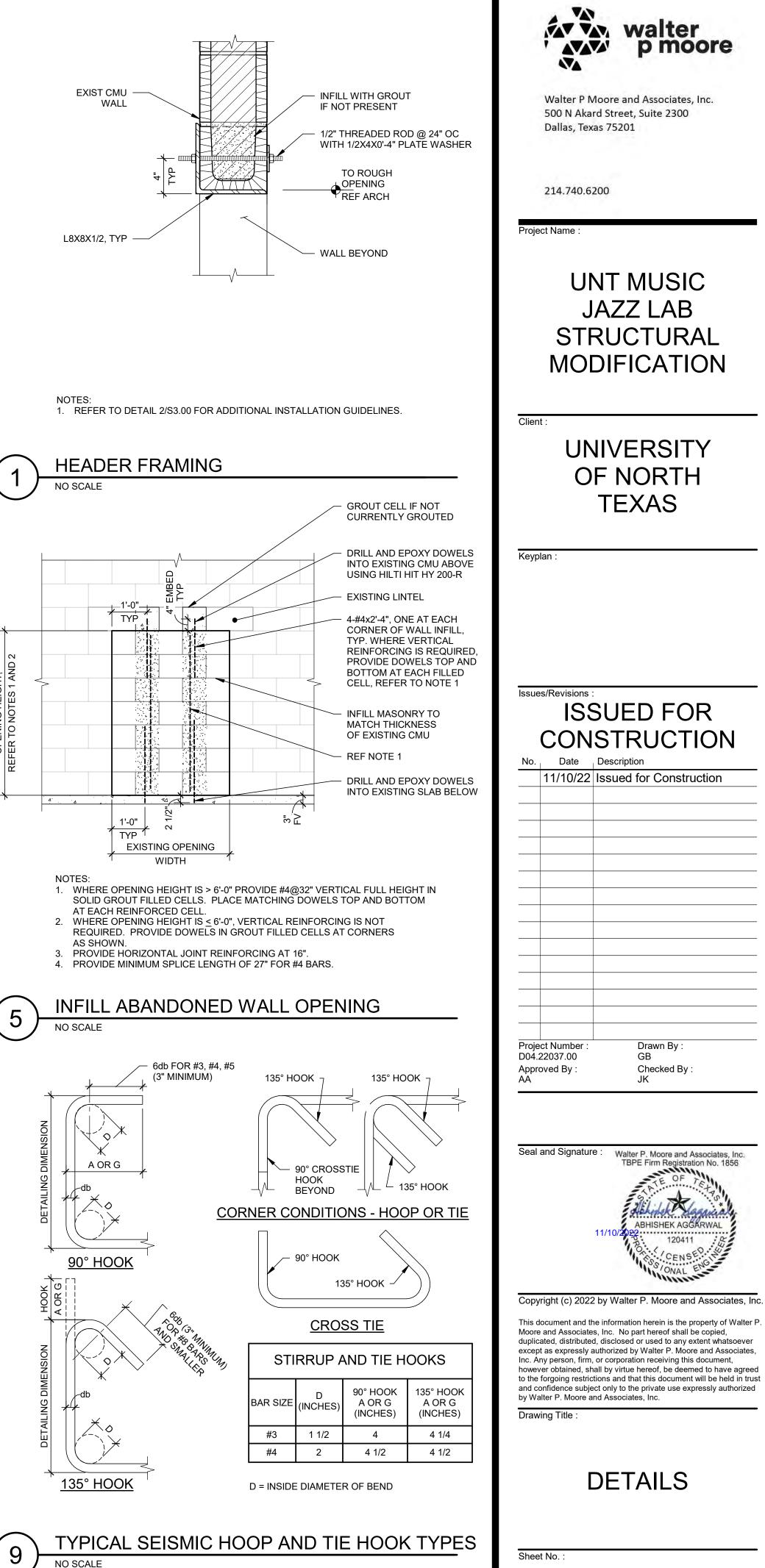
NEW ANCHOR RODS

NEW ANGLE (NOTE 1)

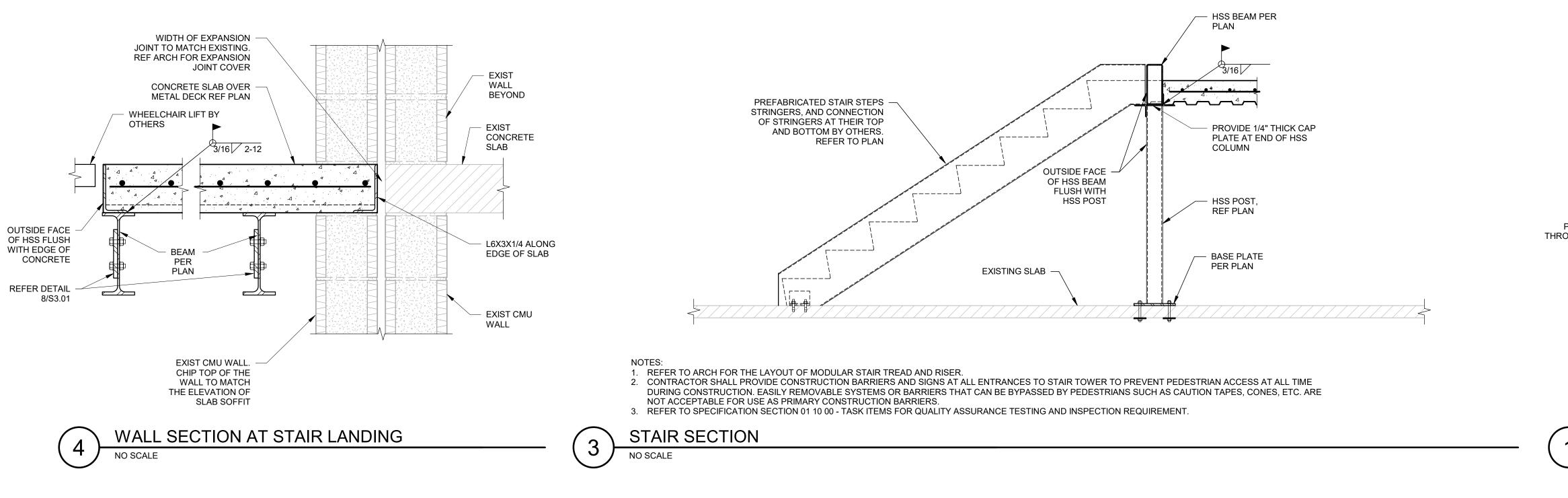
- NEW DOOR OPENING

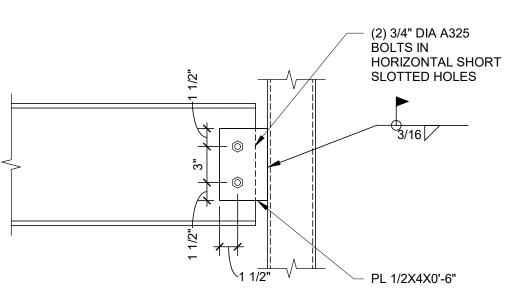
(NOTE 2)

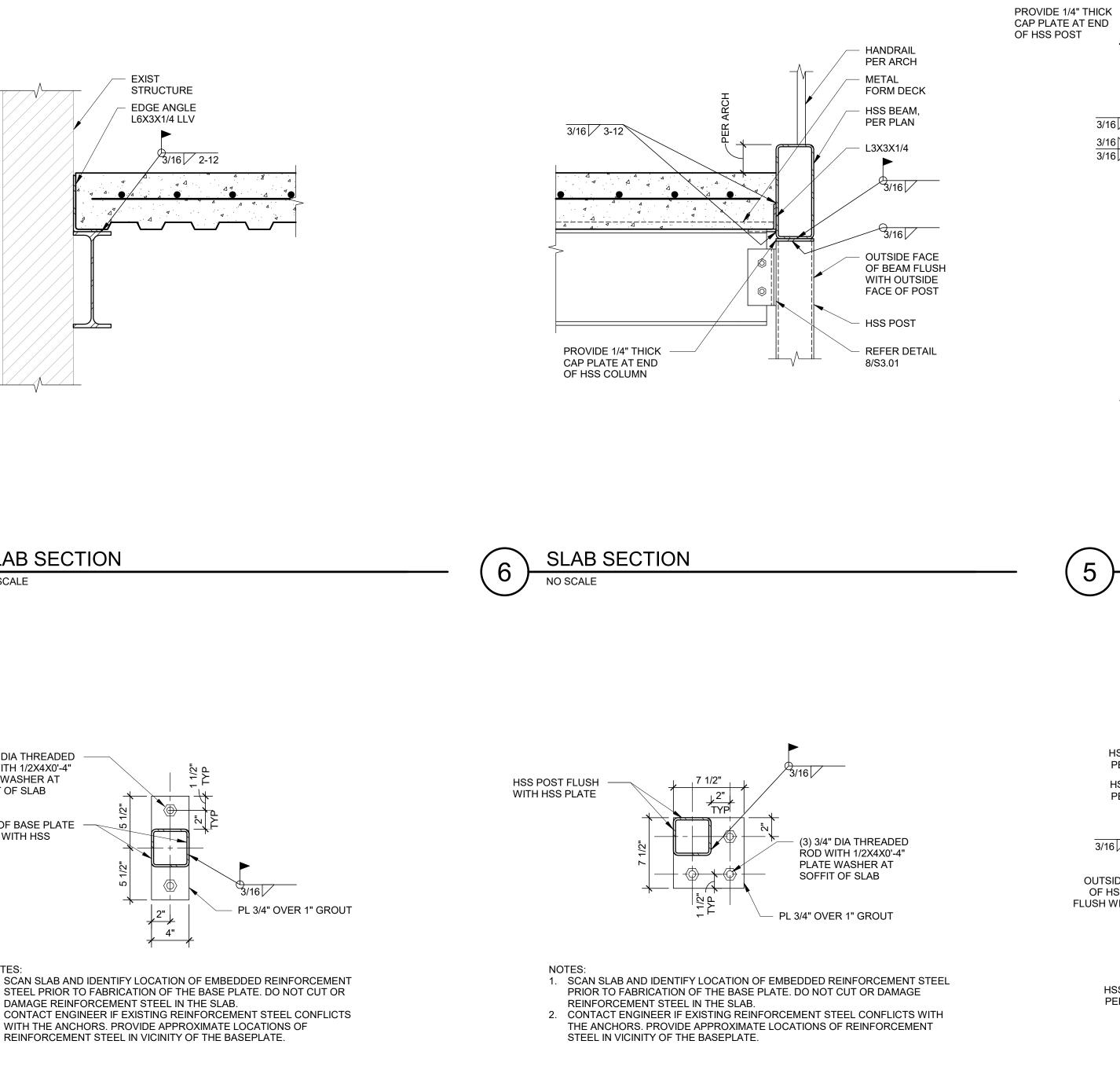
- BEYOND INTO EXISTING CMU BLOCK BELOW OR BRICK VENEER TO PROVIDE

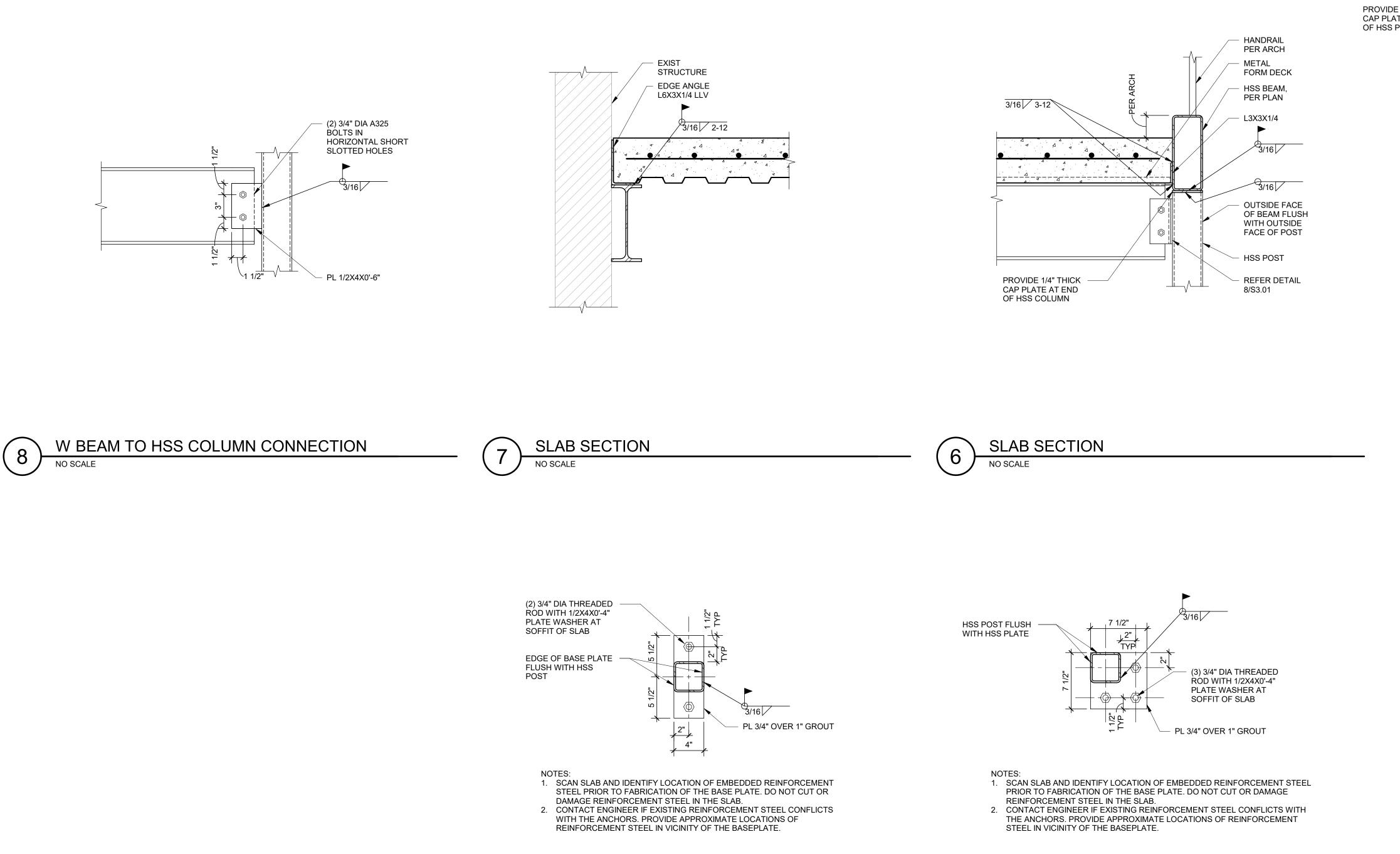


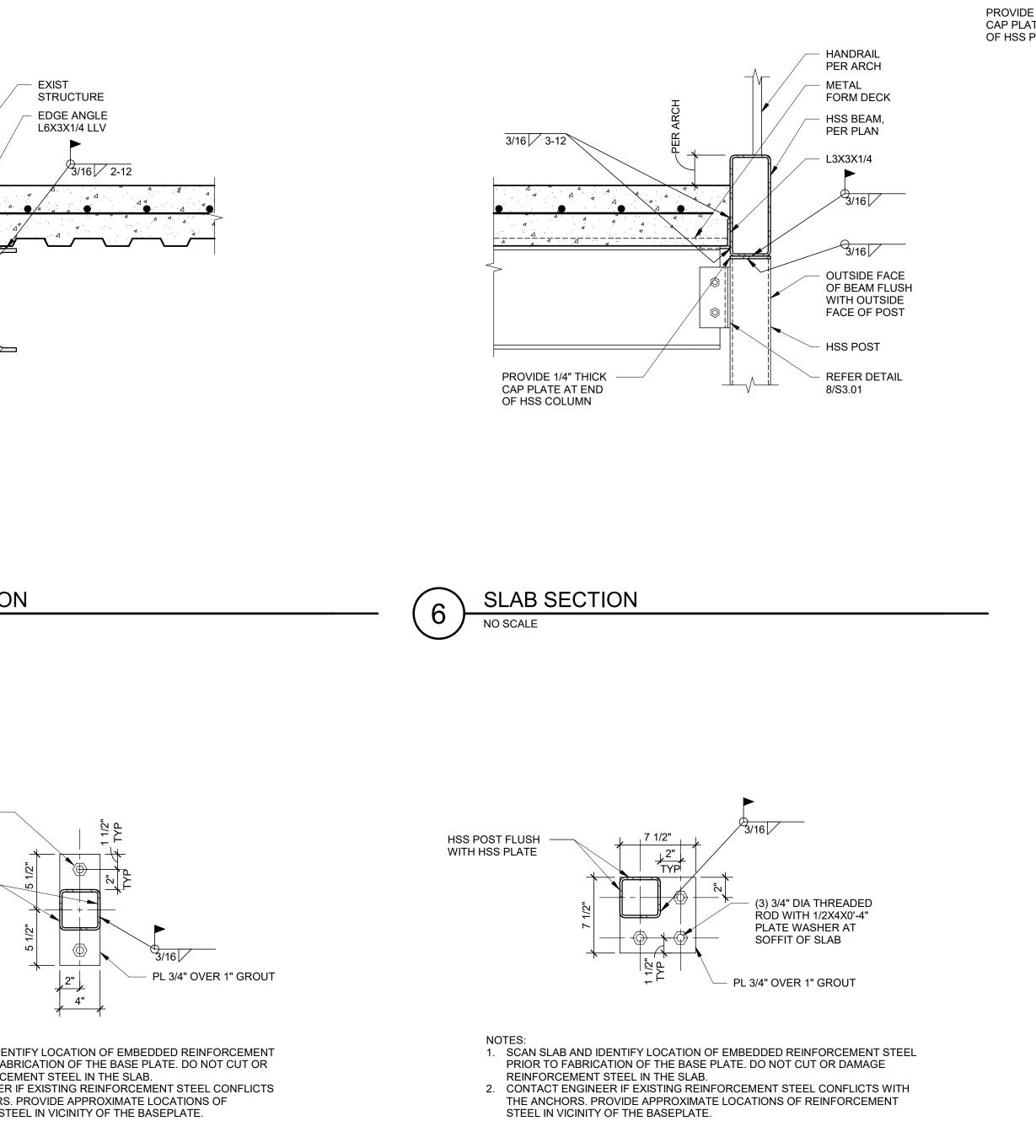
S3.00



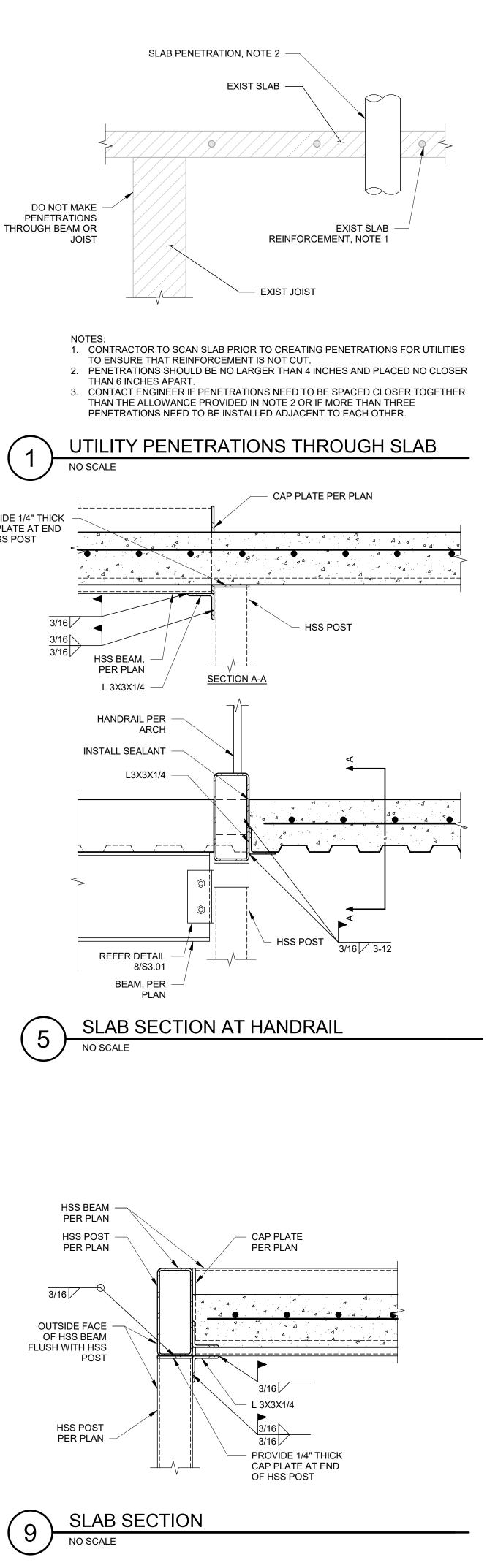




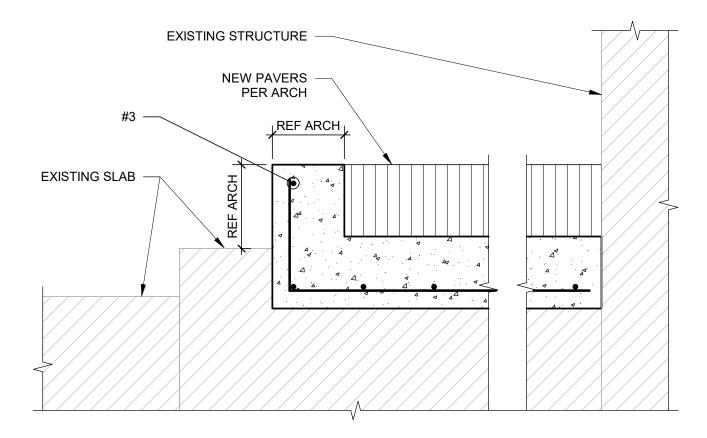


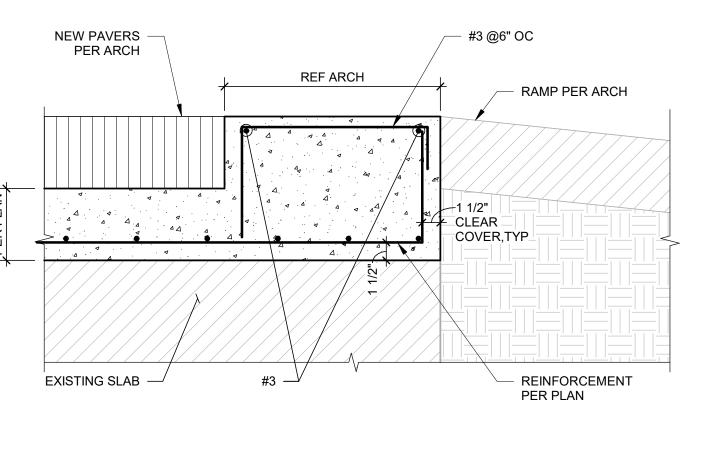






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214.740.6200 Project Name :
UNT MUSIC JAZZ LAB STRUCTURAL MODIFICATION
Client : UNIVERSITY OF NORTH TEXAS
Keyplan :
Issues/Revisions :
Project Number : Drawn By : D04.22037.00 GB Approved By : Checked By : AA JK
Seal and Signature :       Watter P. Moore and Associates, Inc. TBPE Firm Registration No. 1856         OF       OF         ABHISHEK AGGARWAL       11/10/2000         11/10/2000       120411         Censt       120411         Censt       120411         Very Censt       120411         Censt       Nore and Associates, Inc.         No part hereof shall be copied, duplicated, distributed, disclosed or used to any extent whatsoever except as expressly authorized by Walter P. Moore and Associates, Inc.         Nowever obtained, shall by virtue hereof, be deemed to have agreed to the forgoing restrictions and that this document will be held in trust and confidence subject only to the private use expressly authorize
Sheet No. : <b>S3.01</b>





NOTES: 1. SLOPE CONCRETE SLAB AWAY FROM THE EXISTING STRUCTURE.



SLAB SECTION AT STEP NO SCALE



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GB Checked By :
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DETAILS