Request for Competitive Sealed Proposals

UNT ESSC ISSC 1ST & 2ND FLOOR RENOVATIONS

RFCSP769-23-263939CS

DOCUMENT 001100
RFCSP752-23-263939CS
ADVERTISEMENT FOR COMPETITIVE SEALED PROPOSAL

University of North Texas
UNT ESSC ISSC 1st Floor & 2nd Floor Renovations
Pre-Proposal Meeting and Site Visit: March 21, 2023, at 1:00 PM CST
Response due: April 13, 2023, at 2:00 PM CST
HUB Plan due: April 14, 2023, at 2:00 PM CST
Date of Virtual Opening: April 18, 2023, at 1:00 PM 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 **RFCSP752-23-263939CS** will be received by the Owner electronically through Jaggaer link provided below.

Proposals will be received up to 2:00 p.m. CST on **April 13, 2023.** HUB Sub-contracting Plans must be received up to 2:00 p.m. CST on **April 14, 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 1:00 p.m. CST on **April 18, 2023, via Teams meeting:**

Microsoft Teams meeting

Join on your computer, mobile app or room device
Click here to join the meeting
Meeting ID: 231 093 498 001
Passcode: VNLQRP
Download Teams | Join on the web
Or call in (audio only)
+1 940-304-2772,,825586954# United States, Denton
Phone Conference ID: 825 586 954#
Find a local number | Reset PIN
Learn More | Meeting options

Project Description

This project to build an integrated student services support center. The center will modernize, streamline and holistically support the student experience, while improving efficiency and service. The physical center will reduce student telephone inquiries; reduction in case load and increase productivity; improve overall retention and persistence; reduction of student related bad debt.

The work will be done in accordance with the plans and project manual. Contractor to provide detailed construction schedule according to the phases required:

* **Ph1A - partial demolition (by UNT - not part of bid)**
* **Ph1B - Build back Substantial completion of 1st floor Registrar and 2nd floor Financial Aid by July 14**
* **Ph2 - Demo and build back of ISSC Center 2nd floor from 7/17 - 10/6**
* **Ph3A - 1st floor Student Accounting finishes upgrade 10/9 - 12/1**
* **Ph3B - 1st and 2nd floor corridors/lobbies and restroom upgrades 12/4 - 1/5.**

Questions

Questions concerning this proposal should be directed to:

Carrie Stoeckert
Senior Construction Contract Coordinator
University of North Texas System
Strategic Infrastructure, Planning & Construction
Carrie.stoeckert@untsystem.edu

All questions must be received no later than 2:00 p.m. CST on March 28, 2023. All questions and answers will be posted to the website by 5:00 p.m. CST on March 31, 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 in person at 2204 West Prairie Street, Denton, Texas in the Custodial Training Room at 1**:00 p.m. CST** on **March 21, 2023.**

Site Visit: Site visit will be conducted on **March 21, 2023,** beginning immediately after the pre-proposal meeting. We will meet in front of the U**niversity of North Texas Union building**. 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 (http://www.txsmartbuy.com/sp), at the UNT System website at https://finance.untsystem.edu/vendor-resources/bid-inquiry/bid-opportunities.php and the UNTS Jaggaer website: https://bids.sciquest.com/apps/Router/PublicEvent?CustomerOrg=UNTS .

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).

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 (http://www.window.state.tx.us/procurement/prog/hub/hub-forms/hub-sbcont-plan--allfms.pdf). 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 submit the HUB Subcontracting Plan as a separate document, separate from your RFCSP electronic response through the UNTS Jaggaer link provided above.

Questions regarding the completion of the HUB Subcontracting Plan should be directed to Lisa Martinez-Tovar or Michelle McCauley at 940-369-5500 or hub@untsystem.edu .

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

DOCUMENT 002100
RFCSP752-23-263939CS
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 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 in person in the Custodial Training Room located at 2204 West Prairie Street, Denton, Texas.

March 21, 2023, at 1:00 p.m. CST

There will be a site visit on directly after the pre-proposal meeting. This will be the only site visit conducted. We will meet at the front of the University of North Texas Union building.

2. PROJECT PROPOSED SCHEDULE

March 15, 2023		Issue RFCSP
March 21, 2023	1:00 p.m.	Pre-Proposal Conference
March 21, 2023	1:00 p.m.	Site Visit-after Pre-Proposal Conference
March 28, 2023	2:00 p.m.	Deadline for Submission of Questions
March 31, 2023	5:00 p.m.	Responses to Questions Post on Website
April 13, 2023	2:00 p.m.	Deadline for Submission of Proposal
April 14, 2023	2:00 p.m.	Deadline for HUB Sub-Contracting Plan
April 18, 2023	1:00 p.m.	Public Opening - Virtual
April 2023		Formal Contract Award Notification
April 2023		Agreement Authorized
May 2023		Anticipated Notice to Proceed

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. Respondents are to provide a detailed schedule of work and timeline for the project from start to substantial completion.

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. Please submit your Hub-Subcontracting Plan as a separate file. Your HUB Sub-Contracting Plan will be due 24 hours after submission of your proposal. 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 Your response and HSP should be electronically submitted as separate PDF files 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 2:00 p.m. CST on April 13, 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 2:00 p.m. CST on April 14, 2023. Failure to submit the HUB Sub-contracting plan will disqualify your proposal.**

Please submit your response electronically thru the UNT System Jaggaer site at: https://bids.sciquest.com/apps/Router/PublicEvent?CustomerOrg=UNTS

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 April 18, 2023, promptly at 1:00 p.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: 231 093 498 001
Passcode: VNLQRP
Download Teams | Join on the web
Or call in (audio only)
+1 940-304-2772,,825586954# United States, Denton
Phone Conference ID: 825 586 954#
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:

Carrie Stoeckert, Senior Construction Contract Coordinator
University of North Texas System
Strategic Infrastructure, Planning & Construction

Please submit solicitation questions to: carrie.stoeckert@untsystem.edu

All questions must be received no later than March 28, 2023, at 2:00 p.m. CST. All questions and answers will be posted to the website by 5:00 p.m. CST, March 31, 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://bids.sciquest.com/apps/Router/PublicEvent?CustomerOrg=UNTS ,
and http://www.txsmartbuy.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 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.
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. Three (3) years' experience with similar scale projects, resumes of key team members working on project. Experience working higher education within an occupied building.
D. Proposer's current workload and availability of personnel and equipment required to timely complete the project.
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.
G. The responsibility and reputation of the proposer, including claims and litigation experiences.
H. The proposer's safety record.
I. The sufficiency of the proposer's financial resources.

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, BEST VALUE 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 carrie.stoeckert@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: http://comptroller.texas.gov/purchasing/vendor/cmbl/. Non-HUB respondents are identified from various sources including the CBML.

C. Questions regarding completing the HSP should be directed to Lisa Martinez-Tovar, Assistant HUB Coordinator or Ashley Salazar-Hernandez at 940-369-5500 or hub@untsystem.edu . 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
RFCSP752-23-263939CS

UNT ESSC/ISSC 1ST FLOOR & 2ND FLOOR RENOVATIONS

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 April 13, 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 April 14, 2023. Failure to submit the HUB plan will disqualify your proposal.

The scope of work of this RFCSP is General Construction for the UNT West/Maple Intellihot Boiler Installations 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: Carrie Stoeckert
Senior Construction Contract Coordinator
University of North Texas System

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 ESSC Project Manual	**Prepared by: Stantec**
UNT Eagle Student Services Center Issue for Construction 2023/02/03	**Prepared by: Stantec**

For transparency purposes, please include a financial proposal which covers the scope of work. This should include the larger components such as demolition, salvage, install, etc. These components should be included within the base bid.

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. **(Not including bond cost):**

$

ALTERNATE BIDS

Number	Description of Alternate Bid:	Additive/Deductive	Bid Amount:
1	Alt. A1: New Carpet in lieu of new LVT at second floor Main Corridor	☐ Additive ☐ Deductive	$
2	Alt. E1: Lighting and Controls: All work to demolish existing lighting and controls and replace with new lighting and controls	☐ Additive ☐ Deductive	
3	Alt. E2: Abandonment of Equipment Above Ceiling: All work to demolish existing already abandoned equipment, conduits, and other devices above ceilings where ceilings are to be demolished to accomplish the new work	☐ Additive ☐ Deductive	
4	Atl. M1: Existing VAV Box Replacement: All work to replace existing VAV Boxes indicated to be relocated and reused, as indicated on the drawings and specified herein. Existing controllers at existing VAV Boxes shall be reused with new VAV Boxes.	☐ Additive ☐ Deductive	
5	Alt. M2: New VAV Boxes: All work to replace all existing VAV Boxes within the scope of the work area, as indicated on the drawings and specified herein. Existing controllers at existing VAV Boxes shall be reused with new VAV Boxes.	☐ Additive ☐ Deductive	
6	Alt. Deduct-Restroom Scope	☐ 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 delinquent 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: $ _____

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.

8. By signature hereon, Respondent certifies it is a small business and/or minority/female owned business as defined 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

9. By signature hereon, Respondent certifies as follows:

   "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. By signature hereon, Respondent hereby represents, verifies, and warrants, pursuant to Texas Gov't Code 2252.201-2252.205, that it is in compliance with the requirement that any iron or steel project produced through a manufacturing process and used in the Project is produced in the United States.

21. 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.

Complete the following:

Payee ID No. _____

FEI No. _____

Company Information:

_____
(Company Name)

_____
(Street Address Line 1)

_____
(Street Address Line 2)

_____
(City, State, Zip Code)

If a Corporation
State of Incorporation: _____

Charter No: _____

Submitted by:

_____
(Authorized Signature)

_____
(Printed Name/Title)

_____
(Date)

_____
(Telephone Number)

_____
(Facsimile Number)

_____
(Email Address)

ATTACHMENT A

QUALIFICATIONS
RFCSP752-23-263939CS
UNT ESSC ISSC 1ST FLOOR AND 2ND FLOOR RENOVATIONS

ITEMS 1 THROUGH 5 TO BE SUBMITTED WITH PROPOSAL

Proposer's Name:_____

Point of Contact:_____

Address:_____

City, State, Zip:_____

Telephone No.:_____ Fax 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. Include a copy of licenses.

C. Proposed schedule (Bar chart acceptable).

2. HISTORY

A. ☐Corporation ☐Partnership ☐Sole Proprietorship ☐Joint Venture

State of Incorporation:_____

B. In continuous business since:_____

Remarks (if required):

_____

_____

_____

C. Corporate Officers, Partners or Owners of Organization:

Name	Branch Manager	Telephone Number

D. Check box(es) corresponding to the nature of your business:

☐ Large Business (100 or more employees)

☐ Small Business (fewer than 100 employees)

☐ HUB Business

☐ Other (Define) _____

E. Has your organization ever defaulted or failed to complete any work awarded?

☐ Yes ☐ No

If yes, stipulate where and why:_____

_____

_____

F. Has your organization ever paid liquidated damages or a penalty for failure to complete a contract on time?

☐ Yes ☐ No

If yes, stipulate where and why:_____

_____

_____

3. EXPERIENCE

A. Normally performs _____ % of the work with own forces. List trades below:

_____

_____

B. Propose to perform _____% of the work for project with own forces. List trades below:

_____

_____

C. List all major projects of your organization has in-progress. If more space is needed attach pages to this form using 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 Reference Contact and Telephone Number:

_____

_____

Architect Reference Contact and Telephone Number:

_____

_____

iii. 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:

_____

_____

D. Total number and dollar amount of contracts currently in progress:

Number_____ $_____

E. Largest contract currently in-process: _____

Anticipated date of completion: _____

F. Volume of work completed over last five (5) years: (Through 12/31)

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.

i. 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

ii. 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

iii. 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

iv. 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

v. 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

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? ☐Yes ☐No

If yes, does your Supervisor Safety Program include instructions on the following:

	Yes	No
Safety work practices	☐	☐
Tool box safety meetings	☐	☐
First aid procedures	☐	☐
Accident investigation	☐	☐
Fire protection	☐	☐
New 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.

B. Surety Company:_____

Agent:_____

Name of Contact:_____Telephone No._____

C. Bonding Capacity:_____

Limit per project:_____

Unencumbered bonding capacity:_____

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:_____Telephone No._____

GENERAL CONSTRUCTION AGREEMENT

SAMPLE

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

DRAFT

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

SAMPLE

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.

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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.

SAMPLE DRAFT

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

SAMPLE DRAFT

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.

SAMPLE DRAFT

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.

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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;

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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;

SAMPLE

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,

SAMPLE

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

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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.**

SAMPLE DRAFT

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 shall be in full force and effect and shall be increased as necessary for each separate bid package, phase, or stage of construction 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

SAMPLE DRAFT

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.

SAMPLE

ARTICLE 12
MISCELLANEOUS

12.1 Assignment. 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 Irreparable Injury. 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 Certifications.

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

DRAFT

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 Illegal Dumping. 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 State Auditor's Right to Audit. 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 under the Agreement acts as acceptance of the authority of the state auditor,

SAMPLE DRAFT

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

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 Independent Contractor. 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.

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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 Open Records. 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 Governing Law and Venue. 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 Waivers. 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 Severability. 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.

SAMPLE

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}

By: _____
(signature)

[Authorized Signatory Name]
[Authorized Signatory Title]

Date: _____

CONTRACTOR:

{FIRM NAME}

By: _____
(signature)

_____
(typed name and title)

Date: _____

_____
Street/PO Box

_____
City, State, ZIP

_____
Telephone

_____
State of TX Vendor ID Number

SAMPLE

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	Title

ADDENDA

Number	Title

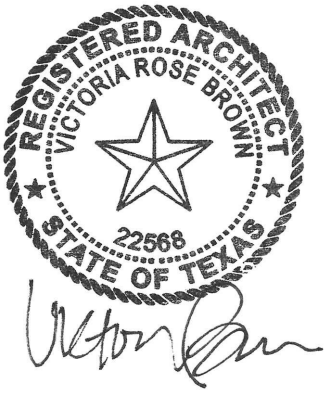
SAMPLE

Project Manual

February 3, 2023

Stantec Project No. 214001088

UNT P.O. No. 251136



Volume 1 of 1

Eagle Student Service Center

Renovation - **Bidding and Construction**

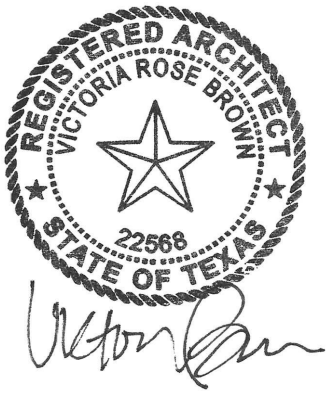
University of North Texas

Denton, Texas

The Architect's seal on the Project Manual cover represents that the information on the cover is accurate in the Architect's professional opinion, but the Architect does not assume professional responsibility for documents sealed by others that are referenced in the Project Manual. All professionals sealing specifications as a part of the design are professionally responsible for their own sealed documents.

DOCUMENT 00 01 01 - PROJECT TITLE PAGE

PROJECT MANUAL



Project Name: Eagle Student Services Center Renovation (Bidding and Construction)
Project Address: Eagle Student Services Center
1147 Union Cir
Denton, TX 76201

Owner Name: University of North Texas
City, State: Denton, Texas

Architect Project No. 214001088

Stantec Architecture Inc.
6080 Tennyson Parkway, Suite 200
Plano, Texas 75024
P 214.473.2400
www.stantec.com

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END OF DOCUMENT 00 01 01

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SECTION 000110

TABLE OF CONTENTS OF THE PROJECT MANUAL - Volume 1 of 1

Note: Refer to additional Tables of Content in this Project Manual for Architect-or-Consultant specific Tables of Content including seals, signatures, dates, and other required notation.

The Architect's seal on a Project Manual page represents that the information on the sealed page is accurate in the Architect's professional opinion, but the Architect does not assume professional responsibility for documents sealed by others that are referenced in the Project Manual. All professionals sealing specifications as a part of the design are professionally responsible for their own sealed documents.

***1** Architect's seal does not apply to this Divisions/Sections. Refer to the HVAC specifications for the seal of the Registered Professional Engineer responsible for these Divisions or Sections.

***2** Architect's seal does not apply to these Divisions/Sections. Refer to the Electrical specifications and Electronic Safety and Security specifications combined Table of Contents Table of Contents for the seal of the Registered Professional Engineer responsible for these Divisions or Sections.

\+ Sections or Division prepared by entities other than the Architect, and not noted above.

- PROJECT MANUAL COVER

DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS

000101 PROJECT TITLE PAGE
000110 TABLE OF CONTENTS OF THE PROJECT MANUAL
000110 HVAC SPECIFICATIONS TABLE OF CONTENTS ***1**
000110.02 TABLE OF CONTENTS OF THE ELECTRICAL SPECIFICATIONS AND THE ELECTRONIC SAFETY AND SECURITY SPECIFICATIONS ***2**
000115 LIST OF DRAWINGS
007200 UNIFORM GENERAL CONDITIONS **+**

DIVISION 01 – GENERAL REQUIREMENTS **+** except as noted

011100 SUMMARY OF WORK
012100 ALLOWANCES
012200 UNIT PRICES
012300 ALTERNATES
012500 SUBSTITUTION PROCEDURES
012500.13 SUBSTITUTION REQUEST FORM
012600 CONTRACT MODIFICATION PROCEDURES
012900 PAYMENT PROCEDURES
013100 PROJECT MANAGEMENT AND COORDINATION
013200 CONSTRUCTION PROGRESS DOCUMENTATION
013233 PHOTOGRAPHIC DOCUMENTATION
013300 SUBMITTAL PROCEDURES
013516 ALTERATION PROJECT PROCEDURES
014000 QUALITY REQUIREMENTS
014000.10 SUPPLEMENTAL QUALITY REQUIREMENTS (by Architect)
014100 UNT SYSTEM REGULATORY REQUIREMENTS
014200 REFERENCES
015000 TEMPORARY FACILITIES AND CONTROLS
015300 MOLD PREVENTION MEASURES
015720 INDOOR AIR QUALITY DURING CONSTRUCTION
016000 PRODUCT REQUIREMENTS

017300 EXECUTION
017419 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL
017700 CLOSEOUT PROCEDURES
017823 OPERATION AND MAINTENANCE DATA
017839 PROJECT RECORD DOCUMENTS
017900 DEMONSTRATION AND TRAINING
019113 GENERAL COMMISSIONING REQUIREMENTS

DIVISION 02 – EXISTING CONDITIONS

024119 SELECTIVE DEMOLITION

DIVISIONS 03 - 04

NO SECTIONS

DIVISION 05 – METALS

055800 FORMED METAL FABRICATIONS
055813 COLUMN COVERS

DIVISION 06 – WOOD, PLASTICS, AND COMPOSITES

061000 ROUGH CARPENTRY
064023 INTERIOR ARCHITECTURAL WOODWORK

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

079200 JOINT SEALANTS
079513.13 INTERIOR EXPANSION JOINT COVER ASSEMBLIES

DIVISION 08 – OPENINGS

081113 HOLLOW METAL DOORS AND FRAMES
081416 FLUSH WOOD DOORS
081816.16 MULTIPANEL SLIDING ALUMINUM-FRAMED GLASS DOORS
083113 ACCESS DOORS AND FRAMES
087100 DOOR HARDWARE +
088000 GLAZING

DIVISION 09 – FINISHES

092216 NON-STRUCTURAL METAL FRAMING
092900 GYPSUM BOARD
095000 ACOUSTICAL METAL CEILINGS
095113 ACOUSTICAL PANEL CEILINGS
096513 RESILIENT BASE AND ACCESSORIES
096513.33 METAL FLOORING ACCESSORIES
096519.24 LUXURY VINYL TILE
096816 CARPET
097200 WALLCOVERINGS
099000 PAINTING (PROFESSIONAL LINE PRODUCTS)

DIVISION 10 - SPECIALTIES

102113.16 PLASTIC-LAMINATE-CLAD TOILET COMPARTMENTS
102215 FIXED GLASS PANEL PARTITIONS
102800 TOILET BATH LAUNDRY ACCESSORIES
104413 FIRE PROTECTION CABINETS
104416 FIRE EXTINGUISHERS

DIVISION 11 – EQUIPMENT

NO SECTIONS

DIVISION 12 – FURNISHINGS

123216 MANUFACTURED PLASTIC LAMINATE FACED CASEWORK
123623.13 PLASTIC LAMINATE CLAD COUNTERTOPS
123661.19 QUARTZ AGGLOMERATE COUNTERTOPS

DIVISIONS 13 - 21

NO SECTIONS

DIVISION 20 – COMMON MECHANICAL ***1**

20 00 10 GENERAL REQUIREMENTS FOR MECHANICAL, PLUMBING, & FIRE PROTECTION SYSTEMS
23 05 00 COMMON WORK RESULTS (for HVAC)
20 05 16 EXPANSION FITTINGS AND LOOPS FOR PIPING
20 05 19 METERS AND GAGES

DIVISION 23 – HEATING, VENTILATING, AND AIR CONDITIONING (HVAC) ***1**

23 05 23 GENERAL-DUTY VALVES FOR PIPING
23 05 29 HANGERS AND SUPPORTS
23 05 53 MECHANICAL IDENTIFICATION
23 05 93 TESTING, ADJUSTING, AND BALANCING
23 07 00 MECHANICAL INSULATION
23 09 00 INSTRUMENTATION AND CONTROL FOR HVAC
23 21 13 HYDRONIC PIPING
23 21 16 HYDRONIC PIPING SPECIALTIES
23 31 13 METAL DUCTS
23 33 00 AIR DUCT ACCESSORIES
23 36 00 AIR TERMINAL UNITS
23 37 13 DIFFUSERS, REGISTERS, AND GRILLES

DIVISIONS 24 – 25

NO SECTIONS

DIVISION 26 – ELECTRICAL ***2**

26 00 10 SUPPLEMENTAL REQUIREMENTS FOR ELECTRICAL
26 05 00 COMMON WORK RESULTS FOR ELECTRICAL
26 05 19 LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES
26 05 26 GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

26 05 29 HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS
26 05 33 RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS
26 05 53 IDENTIFICATION FOR ELECTRICAL SYSTEMS
26 09 43 DIGITAL LIGHTING CONTROLS
26 22 00 LOW VOLTAGE TRANSFORMER
26 24 16 PANELBOARDS
26 27 26 WIRING DEVICES
26 28 13 FUSES
26 28 16 ENCLOSED SWITCHES AND CIRCUIT BREAKERS
26 43 13 SURGE PROTECTION DEVICES
26 51 00 INTERIOR LIGHTING

DIVISION 27

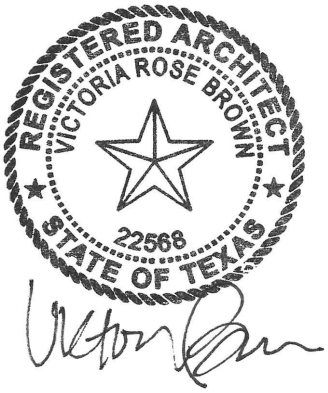
NO SECTIONS

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY ***2**

28 31 11 DIGITAL, ADDRESSABLE FIRE-ALARM SYSTEM

DIVISIONS 29 - 49

NO SECTIONS



END OF SECTION 000110

DIVISION 23 – MECHANICAL

20 00 10	GENERAL MECHANICAL INSTRUCTIONS
20 05 00	COMMON WORK RESULTS FOR MECHANICAL
20 05 16	EXPANSION FITTINGS AND LOOPS FOR PIPING
20 05 19	METERS AND GAGES
20 05 23	GENERAL DUTY VALVES FOR PIPING
20 05 29	HANGERS AND SUPPORTS
20 05 53	MECHANICAL IDENTIFICATION
20 05 93	TESTING ADJUSTING AND BALANCING
20 07 00	MECHANICAL INSULATION

02.03.2022

DIVISION 23 – MECHANICAL

23 09 00	INSTRUMENTATION AND CONTROL FOR HVAC
23 21 13	HYDRONIC PIPING
23 21 16	HYDRONIC PIPING SPECIALTIES
23 31 13	METAL DUCTS
23 33 00	AIR DUCT ACCESSORIES
23 36 00	AIR TERMINAL UNITS
23 37 13	DIFFUSERS, REGISTERS, AND GRILLES

SECTION 00 01 10.02 – TABLE OF CONTENTS OF THE ELECTRICAL SPECIFICATIONS AND ELECTRONIC SAFETY AND SECURITY SPECIFICATIONS

DIVISION 26 – ELECTRICAL

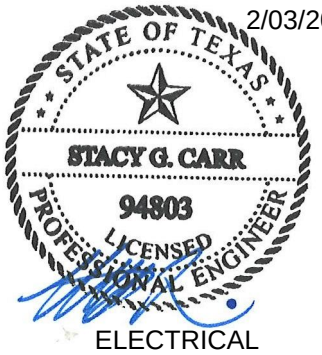
26 00 10 GENERAL REQUIREMENTS FOR ELECTRICAL SYSTEMS
26 05 00 COMMON WORK RESULTS FOR ELECTRICAL
26 05 19 LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES
26 05 26 GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS
26 05 29 HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS
26 05 33 RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS
26 05 53 IDENTIFICATION FOR ELECTRICAL SYSTEMS
26 09 43 DIGITAL LIGHTING CONTROLS
26 22 00 LOW VOLTAGE TRANSFORMER
26 24 16 PANELBOARDS
26 27 26 WIRING DEVICES
26 28 13 FUSES
26 28 16 ENCLOSED SWITCHES AND CIRCUIT BREAKERS
26 43 13 SURGE PROTECTION DEVICES
26 51 00 INTERIOR LIGHTING

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

28 31 11 DIGITAL, ADDRESSABLE FIRE-ALARM SYSTEM

END OF SECTION 00 01 10.02

2/03/2023



ELECTRICAL

SECTION 000115

LIST OF DRAWINGS

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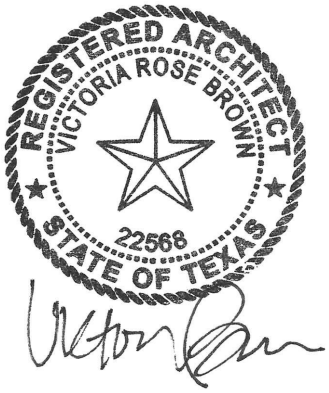
● Issue for Construction – this issue, unless otherwise indicated
● ● Issue for Construction – Demolition Package and this issue for Construction

VOLUME 1 of 1

GENERAL

G001 PROJECT COVER SHEET ● ●
G003 SCOPE OF WORK PLANS ● ●
G101 CODE REVIEW ● ●
ARCHITECTURAL DEMOLITION
AD101 LEVEL 1 DEMOLITION PLAN ● ●
AD102 LEVEL 2 DEMOLITION PLAN ● ●
AD111 LEVEL 1 DEMOLITION PLAN PHASE 2 ●
AD112 LEVEL 2 DEMOLITION PLAN PHASE 2 ●
AD113 LEVEL 3 DEMOLITION PLAN PHASE 2 ●
AD601 LEVEL 1 CEILING DEMOLITION PLAN ● ●
AD602 LEVEL 2 CEILING DEMOLITION PLAN ● ●
AD611 LEVEL 1 CEILING DEMOLITION PLAN PHASE 2 ●
AD612 LEVEL 2 CEILING DEMOLITION PLAN PHASE 2 ●



ARCHITECTURAL

A001 ABBV., MATERIAL LEGEND AND SYMBOLS ● ●
A002 TYPICAL MOUNTING HEIGHTS AND TOILET LAYOUT ●
A003 INTERIOR PARTITION TYPES ●
A006 WALL SPANS INTERIOR AND WALL TO DECK DETAILS ●
A101 LEVEL 1 FLOOR PLAN ●
A102 LEVEL 2 FLOOR PLAN ●
A103 LEVEL 3 FLOOR PLAN ●
A401 ENLARGED PLANS & DETAILS ●
A501 DOOR SCHEDULE, INFO, AND FRAME TYPES ●
A502 FRAME ELEVATIONS ●
A511 HJS DETAILS ●
A601 LEVEL 1 CEILING PLAN ●
A602 LEVEL 2 CEILING PLAN ●
A651 CEILING DETAILS ●
A701 FINISH PLAN LEVEL 1 ●
A702 FINISH PLAN LEVEL 2 ●
A731 ENLARGED PLANS AND ELEVATIONS ●
A751 CASEWORK DETAILS ●
A801 FINISH SCHEDULES ●
A804 TRANSITION DETAILS ●
A821 INTERIOR ELEVATIONS ●
A901 LEVEL 1 FURNITURE PLAN ●

A902 LEVEL 2 FURNITURE PLAN ●

FIRE PROTECTION

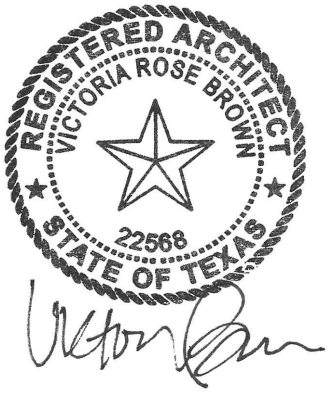
FP100 FIRE PROTECTION PLANS - OVERALL ●

ELECTRICAL

E001 ELECTRICAL LEGENDS, ABBREVIATIONS AND SYMBOLS ●
E002 ELECTRICAL COMCHECK ●
ED201 LEVEL 1 - ELECTRICAL PLAN DEMOLITION - PHASE 2 ●
ED202 LEVEL 2 - ELECTRICAL PLAN DEMOLITION - PHASE 2 ●
ED001 ELECTRICAL LEGENDS, ABBREVIATIONS AND SYMBOLS ● (Issue for Construction in Demolition Package only)
ED101 LEVEL 1 - ELECTRICAL PLAN DEMOLITION - PHASE 1 ● (Issue for Construction in Demolition Package only)
ED102 LEVEL 2 - ELECTRICAL PLAN DEMOLITION - PHASE 1 ● (Issue for Construction in Demolition Package only)
E111 LEVEL 1 - LIGHTING PLAN ●
E121 LEVEL 2 - LIGHTING PLAN ●
E211 LEVEL 1 - POWER PLAN ●
E221 LEVEL 2 - POWER PLAN ●
E401 ELECTRICAL ONE LINE DIAGRAM ●
E411 PANEL SCHEDULES ●
E501 ELECTRICAL DETAILS ●
E601 LIGHTING FIXTURE SCHEDULE AND DETAILS ●

MECHANICAL

M001 MECHANICAL LEGEND, SYMBOLS, AND ABBREVIATIONS ●
MD101 MECHANICAL DEMOLITION PLAN - FIRST FLOOR ●
MD102 MECHANICAL DEMOLITION PLAN - SECOND FLOOR ●
M101 MECHANICAL PLAN - FIRST FLOOR ●
M102 MECHANICAL PLAN - SECOND FLOOR ●
M103 MECHANICAL PLAN - THIRD FLOOR ●
M501 MECHANICAL SCHEDULES AND DETAILS ●
M502 MECHANICAL DETAILS ●



END OF SECTION 000115

UNIFORM GENERAL CONDITIONS
FOR CONSTRUCTION AND DESIGN CONTRACTS
2022

TABLE OF CONTENTS

ARTICLE 1. DEFINITIONS 1

ARTICLE 2. WAGE RATES AND OTHER LAWS GOVERNING CONSTRUCTION 6

2.1 Environmental Regulations 6
2.2 Wage Rates 7
2.2.1 Notification to Workers 7
2.2.2 Penalty for Violation 8
2.2.3 Complaints of Violations. 8
2.3 Licensing of Trades 9
2.4 Royalties, Patents, and Copyrights 9
2.5 State Sales and Use Taxes 9
2.6 Antiquities 9
2.7 Franchise Tax Status 10

ARTICLE 3. GENERAL RESPONSIBILITIES OF OWNER 10

3.1 Preconstruction Conference 10
3.2 Owner's Construction Manager (OCM) 10
3.2.1 Point of Contact 10
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
3.3.3 Other Information 10
3.4 Availability of Lands 10
3.5 Limitation on Owner's Duties. 11
3.5.1 No Control 11
3.5.2 No Contravention of Design Professional 11

ARTICLE 4. GENERAL RESPONSIBILITIES OF DESIGN PROFESSIONAL 11

4.1 Role of Design Professional 11
4.2 Site Visits 11
4.3 Inspections 11
4.4 Clarifications and Interpretations 11
4.5 Limitations on Design Professional Authority 12

ARTICLE 5. GENERAL RESPONSIBILITIES OF CONTRACTOR 12

5.1 Contractor's General Responsibilities 12
5.2 Project Administration 12
5.2.1 Contractor's Management Personnel 13
5.2.2 Labor 13
5.2.3 Services, Materials, and Equipment 13
5.2.4 No Substitutions without Approval 13
5.3 Owner Equipment or Material 13
5.4 Non-Compliant Work 13
5.5 Subcontractors 13
5.5.1 Contract Documents 14

5.5.2 Scheduling 14
5.6 Continuing the Work 14
5.7 Cleaning 14
5.8 Acts and Omissions of Contractor, its Subcontractors, and Employees 14
5.9 Ancillary Areas 14
5.10 Off-Site Storage 15
5.11 Separate Contracts 15
5.11.1 Continuation of Contract 15
5.11.2 Cooperation 16
5.11.3 Reimbursement 16

ARTICLE 6. HISTORICALLY UNDERUTILIZED BUSINESS (HUB) SUBCONTRACTING PLAN 16

6.1 General Description 16
6.1.1 Good Faith Effort 16
6.2 Compliance with Approved HUB Subcontracting Plan 16
6.3 Failure to Demonstrate Good-Faith Effort 17

ARTICLE 7. BONDS 17

7.1 Construction Bonds 17
7.2 Bond Requirements 17
7.2.1 Performance Bonds 17
7.2.2 Payment Bonds 18
7.2.3 When Bonds Are Due 18
7.2.4 Power of Attorney 18
7.3 Bond Indemnification 18
7.3.1 Furnishing Bond Information 18
7.3.2 Claims on Payment Bonds 18
7.4 Payment of Claims when Payment Bond is Not Required 18
7.5 Sureties 18
7.6 Bond Costs 19

ARTICLE 8. INDEMNITY AND INSURANCE 19

8.1 Indemnification of Owner 19
8.1.1 No Third-Party Beneficiaries 19
8.1.2 Notice 19
8.2 Insurance Requirements 20
8.2.1 Period of Coverage 20
8.2.2 Certificates 20
8.2.3 Failure to Provide Certificates 20
8.2.4 Contractor's Liability 20
8.2.5 Insurance Limits 20
8.2.6 Insurers 20
8.3 Insurance Coverage Required 20
8.3.1 Workers' Compensation Insurance 20
8.3.2 Commercial General Liability Insurance 21
8.3.3 Asbestos Abatement Liability Insurance 21
8.3.4 Comprehensive Automobile Liability Insurance 22
8.3.5 All-Risk Builder's Risk Insurance 22
8.3.6 "Umbrella" Liability Insurance 22
8.4 Policy Requirements. Policies must include the following clauses, as applicable 23

8.5 Subcontractor Insurance Coverage 23

ARTICLE 9 CONSTRUCTION DOCUMENTS, COORDINATION DOCUMENTS, AND RECORD DOCUMENTS 24

9.1 Drawings and Specifications 24
9.1.1 Copies Furnished 24
9.1.2 Ownership of Drawings and Specifications. 24
9.2 Interrelation of Documents 24
9.3 Resolution of Conflicts in Documents 24
9.4 Contractor's Duty to Review Contract Documents 25
9.5 Discrepancies and Omissions in Drawings and Specifications 25
9.5.1 Design-Build Firm 25
9.5.2 Construction Manager-at-Risk Examination and Reporting 25
9.5.3 Other Limitations 25
9.6 No Warranty or Representation by Owner 25
9.7 Requirements for Record Documents. 25
9.7.1 Contractor shall: 25
9.7.2 Design Professional shall: 26

ARTICLE 10. CONSTRUCTION SAFETY 27

10.1 General 27
10.1.1 Site Visits 27
10.2 Notices 27
10.2.1 Utilities and Adjacent Properties 27
10.2.2 Safety Data Sheets 27
10.3 Emergencies 27
10.3.1 On Call Response 27
10.3.2 Notice 28
10.3.3 Owner Remedy 28
10.4 Injuries 28
10.4.1 Documentation 28
10.4.2 Incident Report 28
10.5 Environmental Safety 28
10.5.1 Subcontractors 28
10.5.2 Owner 28
10.6 Trenching Plan 29
10.6.1 OSHA Regulations 29
10.6.2 Texas State Law 29
10.6.3 Contractor Responsibility 29
10.7 Crane Safety 30
10.8 Unmanned Aircraft System (UAS) Usage 30
10.9 Fire Protection Procedures 30
10.10 Smoke and Tobacco Free Campus 30

ARTICLE 11. QUALITY CONTROL 31

11.1 Materials & Workmanship 31
11.2 Testing 31
11.2.1 Owner 31
11.2.2 Contractor 31
11.2.3 Standards 31
11.2.4 Non-Compliance (Test Results) 31

11.2.5 Notice of Testing 32
11.2.6 Test Samples 32
11.2.7 Covering Up Work 32
11.3 Submittals 32
11.3.1 Contractor's Submittals 32
11.3.2 Review of Submittals 33
11.3.3 Correction and Resubmission 33
11.3.4 Limits on Shop Drawing Review 34
11.3.5 No Substitutions without Approval 34
11.3.6 Unauthorized Substitutions at Contractor's Risk 35
11.4 Field Mock-up 35
11.4.1 Minimum 35
11.4.2 No Incorporation Unless Approved 35
11.4.3 Schedule 35
11.5 Inspection During Construction 35
11.5.1 Corrected Work 35
11.5.2 Owner's Self Help 35
11.5.3 Notice 36

ARTICLE 12. CONSTRUCTION SCHEDULES 36

12.1 Contract Time 36
12.2 Notice to Proceed 36
12.3 Work Progress Schedule 36
12.3.1 Work Progress Schedule Updates 36
12.3.2 Use of Work Progress Schedules 37
12.4 Ownership of Float 38
12.5 Completion of Work 38
12.5.1 Owner's Self Help 38
12.5.2 Requirement to Regain Schedule 38
12.5.3 Recovery Schedule 38
12.5.4 Owner's Notice Not Acceleration 38
12.6 Modification of the Contract Time 38
12.6.1 Extension Request 39
12.6.2 Weather Days 39
12.6.3 Excusable Delay 39
12.7 No Damages for Weather Days 40
12.8 Costs for Excusable Delay 40
12.9 No Damages for Other Delay 40
12.10 Concurrent Delay 40
12.11 Time Extension Requests for Changes to the Work or Excusable Delay 40
12.11.1 Content of Request 41
12.11.2 No Release 41
12.11.3 Longest Path Analysis 41
12.11.4 Owner Response 41
12.12 Failure to Complete Work in the Contract Time 41
12.13 Liquidated Damages 42
12.13.1 Reasonable Estimate 42
12.13.2 Offset 42
12.13.3 No Waiver 42

ARTICLE 13. PAYMENTS 42
13.1 Job Order Contracts 42
13.2 Schedule of Values 43
13.2.1 Requirements 43
13.3 Progress Payments 43
13.3.1 Preliminary Pay Worksheet 43
13.3.2 Contractor's Application for Payment 44
13.3.3 Certification by Design Professional 45
13.4 Owner's Duty to Pay 45
13.4.1 Stored Materials 45
13.4.2 Retainage 45
13.4.3 Price Reduction to Cover Loss 45
13.4.4 Title 46
13.4.6 No Release 46
13.4.7 Documentation 46
13.5 Time for Payment by Contractor 47
ARTICLE 14. CHANGES 47
14.1 Change Orders 47
14.1.1 Owner Ordered Changes 47
14.1.2 Corrections 47
14.2 Lump Sum Change Order Request 48
14.2.1 Self-Performed Labor 48
14.2.2 Overhead and Profit 48
14.2.3 Labor Burden 48
14.2.4 Material 49
14.2.5 Equipment 49
14.2.6 Maximum Markup Percentage Allowable on Self-Performed Work 49
14.2.7 Maximum Markup Percentages Allowable on Work Performed by Subcontractors 49
14.2.8 GMP Limitation 50
14.2.9 No Markup on Bonds and Liability Insurance Costs 50
14.2.10 Direct and Indirect Costs Covered by Markup Percentages 50
14.2.11 Deduct Change Orders and Net Deduct Changes 50
14.2.12 Contingency 50
14.3 Unit Price Change Order Requests 50
14.3 Cost Plus Change Order Requests 51
14.4 Job Order Unit Prices 51
14.5 Claims for Additional Costs. 51
14.5.0 Claim with no Requested Change 51
14.5.1 Miscellaneous Claims 51
14.5.2 Failure to Notify 51
14.6 Minor Changes 52
14.7 Concealed Site Conditions 52
14.8 Extension of Time 52
14.9 Administration of Change Order Requests 52
14.9.1 Procedures. 52
14.9.2 Routine Changes 52
14.9.3 Documentation 53
14.9.4 Emergencies 53
14.9.5 Coordination with Schedule of Values 53

14.10 Construction Change Directive (CCD) ... 53
14.11 Audit of Changes ... 53

ARTICLE 15. PROJECT COMPLETION AND ACCEPTANCE ... 53

15.1 Closing Inspections ... 53
15.1.1 Purpose of Inspection ... 53
15.1.2 Annotation ... 54
15.1.3 Substantial Completion Inspection ... 54
15.1.4 Final Inspection ... 55
15.1.5 Additional Inspections. ... 55
15.1.6 Phased Completion ... 56
15.2 Owner's Right of Occupancy ... 56
15.3 Acceptance and Payment. ... 56
15.3.1 Request for Final Payment ... 56
15.3.2 Final Payment Documentation ... 56
15.3.3 Design Professional Approval ... 56
15.3.4 Offsets and Deductions ... 57
15.3.5 Final Payment Due ... 57
15.3.6 Effect of Final Payment ... 57
15.3.7 Waiver of Claims ... 57
15.3.8 Effect on Warranty ... 57

ARTICLE 16. WARRANTY AND GUARANTEE ... 57

16.1 Contractor's General Warranty and Guarantee ... 57
16.1.1 Warranty Period ... 58
16.1.2 Limits on Warranty ... 58
16.1.3 Events Not Affecting Warranty ... 58
16.2 Separate Warranties ... 59
16.2.1 Assumption ... 59
16.2.2 Assignment ... 59
16.3 Correction of Defect ... 59
16.4 Certification of No Asbestos Containing Materials or Work ... 59
16.5 Compliance with Acts ... 59

ARTICLE 17. SUSPENSION AND TERMINATION ... 60

17.1 Suspension of Work for Cause ... 60
17.1.1 Cease Work ... 60
17.1.2 Investigation ... 60
17.1.3 Outcome ... 60
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 ... 60
17.3.2 No Waiver ... 61
17.3.3 Notice ... 61
17.3.4 Cure ... 61
17.3.5 Failure to Cure ... 61
17.3.6 Conversion to Termination for Convenience ... 62
17.4 Termination for Convenience of Owner ... 62
17.4.1 Notice ... 62
17.4.2 Contractor Action ... 62

17.4.3 Contractor Remedy 63
17.5 Termination by Contractor 63
17.6 Settlement on Termination 63
ARTICLE 18. DISPUTE RESOLUTION 63
18.1 Contracts Less Than $250,000 63
18.2 Contracts $250,000 or Greater 63
18.2.1 Mediation 63
18.3 Owner Retained Rights 65
18.4 No Waiver 65
18.5 No Attorney's Fees 65
18.6 Interest 65
ARTICLE 19. MISCELLANEOUS 65
19.1 Right to Audit 65
19.2 Records and Inspection 65
19.2.1 Deliverables 66
19.2.2 Plans and Specifications 66
19.2.3 Ethics Expectations 66
19.2.4 Change Order Pricing 66
19.2.5 Invoice Accuracy 66
19.2.6 Claims. 66
19.3 Audit of Subcontractors 66
19.4 Overpricing or Overcharges. 66
19.5 Documentation Requirements 66
19.6 Supplementary or Special Conditions 67
19.6.1 Supplementary Conditions 67
19.6.2 Special Conditions 68
19.7 Federally Funded Projects 68
19.8 Internet-based Project Management Systems 68
19.8.1 Accessibility and Administration. 68
19.8.2 Training 68
19.9 Computation of Time 68
19.10 Survival of Obligations 68
19.11 No Waiver of Performance 68
19.12 Governing Law and Venue 68
19.13 Captions and Catch Lines 69
19.14 Independent Contractor Status 69
19.15 No Third-Party Beneficiaries 69
19.16 Child Support Obligor 69
19.17 Buy America Requirements for Iron and Steel Used in Construction 69
19.18 No Assignment 69
19.19 Severability 69
19.20 Parties Bound 69
19.21 Public Information 69
19.22 Business Ethics Expectations 70
19.22.1 Contractor 70
19.22.2 Reasonable Actions 70
19.22.3 Gifts and Other Considerations 70

19.22.4 Subcontractor 70
19.22.5 Other Jobs 70
19.22.6 Owner Notification 70
19.22.7 Subcontractors Contracts 70
19.22.8 Interviews and Audits 70
19.23 Entire Agreement 71

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 Environmental Regulations. 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 Wage Rates. 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 Notification to Workers. 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 Penalty for Violation. 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 Complaints of Violations.

2.2.3.1 Owner's Determination of Good Cause. 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 No Extension of Time. 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 Cooperation with Owner's Investigation. 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 Notification to Owner. 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 Licensing of Trades. 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 Royalties, Patents, and Copyrights. 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 State Sales and Use Taxes. 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 Antiquities. 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 Franchise Tax Status. 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 Preconstruction Conference. 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 Owner's Construction Manager (OCM). 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 Point of Contact. 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 Directives. All directives on behalf of Owner will be conveyed to Contractor and Design Professional by OCM in writing.

3.3 Owner Supplied Materials and Information.

3.3.1 Surveys. 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 Drawings and Specifications. 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 Other Information. Owner will provide information, equipment, or services under Owner's control to Contractor with reasonable promptness.

3.4 Availability of Lands. 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 Limitation on Owner's Duties.

3.5.1 No Control. 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 No Contravention of Design Professional. 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 Role of Design Professional. 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 Site Visits. 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 Inspections. 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 Clarifications and Interpretations. 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 Limitations on Design Professional Authority. 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 Contractor's General Responsibilities. 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 Site Visit. 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 Project Administration. 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 Contractor's Management Personnel. 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 Labor. 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 Services, Materials, and Equipment. 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 No Substitutions without Approval. 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 Owner Equipment or Material. 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 Non-Compliant Work. 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 Subcontractors. 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 Contract Documents. 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 Scheduling. 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 terms and conditions of the Contract, including, without limitation, any provisions 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 Continuing the Work. 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 Cleaning. 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 Acts and Omissions of Contractor, its Subcontractors, and Employees. 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 Ancillary Areas. 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 Off-Site Storage. 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 Separate Contracts. 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 Continuation of Contract. 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 Cooperation. 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 Reimbursement. 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.
HISTORICALLY UNDERUTILIZED BUSINESS (HUB) SUBCONTRACTING PLAN

6.1 General Description. 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 Good Faith Effort.

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 Compliance with Approved HUB Subcontracting Plan. 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 Failure to Demonstrate Good-Faith Effort. 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.
BONDS

7.1 Construction Bonds. 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 Bond Requirements. 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 Performance Bonds. 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 Payment Bonds. 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 When Bonds Are Due. Payment and performance bonds are due before Contractor commences any Work.

7.2.4 Power of Attorney. 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 Bond Indemnification. 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 Furnishing Bond Information. 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 Claims on Payment Bonds. 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 Payment of Claims when Payment Bond is Not Required. 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 Sureties. 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), https://fiscal.treasury.gov/surety-bonds/list-certified-companies.html, 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 Bond Costs. 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 **No Third-Party Beneficiaries. 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 **Notice. 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 Insurance Requirements. 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 Period of Coverage. 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 Certificates. 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 Failure to Provide Certificates. 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 Contractor's Liability. 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 Insurance Limits. 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 Insurers. 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 Workers' Compensation Insurance. 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 Commercial General Liability Insurance. 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 Asbestos Abatement Liability Insurance. 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 Comprehensive Automobile Liability Insurance. 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 All-Risk Builder's Risk Insurance. 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 "Umbrella" Liability Insurance. 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 Policy Requirements. Policies must include the following clauses, as applicable:

- This insurance shall not be suspended, voided, canceled, materially changed, or non-renewed 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 Subcontractor Insurance Coverage**. WITHOUT LIMITING ANY OF THE OTHER 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 Copies Furnished. 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 Ownership of Drawings and Specifications. 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 Interrelation of Documents. 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 Resolution of Conflicts in Documents. 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 Contractor's Duty to Review Contract Documents. 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 Discrepancies and Omissions in Drawings and Specifications. 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 Design-Build Firm. 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 Construction Manager-at-Risk Examination and Reporting. 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 Other Limitations. 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 No Warranty or Representation by Owner. 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 Requirements for Record Documents.

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 General. 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 Site Visits. 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 Notices. Contractor shall provide notices as follows:

10.2.1 Utilities and Adjacent Properties. 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 Safety Data Sheets. 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 Emergencies. 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 On Call Response. 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 To OCM and Design Professional: Give OCM and Design Professional prompt notice of all such events.

10.3.2.2 Changes or Variations to Work: 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 Owner Remedy. 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 Injuries. 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 Documentation. 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 Incident Report. 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 Environmental Safety. 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 Subcontractors. Contractor shall bind all Subcontractors to the same duty.

10.5.2 Owner. 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 Trenching Plan. 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 OSHA Regulations: 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 Texas State Law: 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 Contractor Responsibility: 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 Unmanned Aircraft System (UAS) Usage. 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 Fire Protection Procedures. 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 Smoke and Tobacco Free Campus. 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 Materials & Workmanship. 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 Testing.

11.2.1 Owner. 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 Contractor. 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 Standards. 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 Non-Compliance (Test Results). 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 Notice of Testing. 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 Test Samples. 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 Covering Up Work. 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 Submittals.

11.3.1 Contractor's Submittals. 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 re-submittal 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 withhold a reasonable sum of money that would otherwise be due 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 Review of Submittals. 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 Correction and Resubmission. 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 Limits on Shop Drawing Review. 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 No Substitutions without Approval. 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 Unauthorized Substitutions at Contractor's Risk. 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 Field Mock-up. Mock-ups shall be constructed prior to commencement of a specified scope of work to confirm acceptable workmanship.

11.4.1 Minimum. 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 No Incorporation Unless Approved. 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 Schedule. 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 Inspection During Construction. 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 Corrected Work. Should corrections of the Work be required for approval, Contractor shall not cover up corrected Work until Owner indicates approval.

11.5.2 Owner's Self Help. 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 Notice. 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 Contract Time. **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 Notice to Proceed. 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 Work Progress Schedule. 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 Work Progress Schedule Updates.

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 Use of Work Progress Schedules. 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 Ownership of Float. 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 Completion of Work. 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 Owner's Self Help. 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 Requirement to Regain Schedule. 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 Recovery Schedule. 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 Owner's Notice Not Acceleration. 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 Modification of the Contract Time. Delays and extensions of Contract Time are valid only if properly noticed and documented by Change Order.

12.6.1 Extension Request. 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 Weather Days. "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 Excusable Delay. 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 No Damages for Weather Days. 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 Costs for Excusable Delay. 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 regardless of the extent or frequency of Owner's exercise of such rights or remedies.

12.10 Concurrent Delay. 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 Time Extension Requests for Changes to the Work or Excusable Delay. 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 Content of Request. 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 No Release. 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 Owner Response. 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 Failure to Complete Work in the Contract Time. **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 Liquidated Damages. 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	To	Per Day
	< $ 1,000,000	$ 250
$ 1,000,000	< $ 25,000,000	$ 1,000
$ 25,000,000	< $ 50,000,000	$ 2,500
$ 50,000,000	< $ 75,000,000	$ 5,000
$ 75,000,000	< $ 100,000,000	$ 7,500
> $ 100,000,000		$ 10,000

12.13.1 Reasonable Estimate. 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 Offset. 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 No Waiver. 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.
PAYMENTS

13.1 Job Order Contracts. 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 Schedule of Values (utilized in Construction-Manager-at-Risk and General Construction Agreement). 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 Requirements.

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 Progress Payments. 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 Preliminary Pay Worksheet. 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 Contractor's Application for Payment. 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 Certification by Design Professional. 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 Owner's Duty to Pay. 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 Stored Materials. 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 Retainage. 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 Price Reduction to Cover Loss. 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 Title.

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 Contracts with No Payment Bond. 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 No Release. 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 Time for Payment by Contractor: 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 Change Orders. 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 Owner Ordered Changes. 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 Corrections. 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 Lump Sum Change Order Request. 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 Self-Performed Labor. 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 Overhead and Profit. 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 Labor Burden. 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 Non-Reimbursable Labor Burden. 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 Material. 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 Equipment. 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 Maximum Markup Percentage Allowable on Self-Performed Work. 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 Maximum Markup Percentages Allowable on Work Performed by Subcontractors. 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 GMP Limitation. 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 No Markup on Bonds and Liability Insurance Costs. 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 Deduct Change Orders and Net Deduct Changes. 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 Contingency. 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 Unit Price Change Order Requests. 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 Job Order Unit Prices. 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 Claims for Additional Costs.

14.5.1 Claim with no Requested Change. 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 Miscellaneous Claims. 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 Failure to Notify. 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 Minor Changes. 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 Concealed Site Conditions. 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 before they are disturbed. Upon such notice, or upon its own observation 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 Extension of Time. 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 Administration of Change Order Requests. 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 Routine Changes. 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 Documentation. 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 Emergencies. 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 Coordination with Schedule of Values. 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 Construction Change Directive (CCD). 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 Audit of Changes. 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 Closing Inspections.

15.1.1 Purpose of Inspection. 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 Annotation. 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 Substantial Completion Inspection. 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 Final Inspection. 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 Phased Completion. 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 completed receives a Substantial Completion certificate. Final Completion of the Work as a whole is the date on which the last element or part of the Work completed receives a Final Completion certificate.

15.2 Owner's Right of Occupancy. 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 Request for Final Payment. 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 Final Payment Documentation. 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 may not subsequently submit a claim on behalf of Subcontractor or vendor unless Contractor's affidavit notes that claim as an exception.

15.3.3 Design Professional Approval. 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 Offsets and Deductions. 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 Final Payment Due. 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 Effect of Final Payment. 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 Waiver of Claims. 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 Effect on Warranty. 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 Contractor's General Warranty and Guarantee. 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 Warranty Period. 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 Limits on Warranty. 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 Events Not Affecting Warranty. 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 Separate Warranties. 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 Assumption. 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 Assignment. 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 Correction of Defects. 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 Certification of No Asbestos Containing Materials or Work. 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 Compliance with Acts. 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 Suspension of Work for Cause. 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 Cease Work. 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 Investigation. 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 Outcome. 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 Time. 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 Suspension of Work for Owner's Convenience. 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 Termination by Owner for Cause.

17.3.1 Cause. 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 No Waiver. 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 Notice. 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 Cure. 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 Failure to Cure. 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 Conversion to Termination for Convenience. 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 Termination for Convenience of Owner. 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 Notice. 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 Contractor Action. 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 Contractor Remedy. 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 Termination by Contractor. 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 Settlement on Termination. 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 Contracts Less Than $250,000. 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 Contracts $250,000 or Greater. 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 Mediation. 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 Owner Retained Rights. 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 No Waiver. 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 No Attorney's Fees. 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 Interest. 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 Records and Inspection. 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 Change Order Pricing: Compliance with contract provisions regarding the pricing of Change Orders

19.2.5 Invoice Accuracy: Accuracy of Contractor representations regarding the pricing of invoices

19.2.6 Claims: Accuracy of Contractor representations related to claims submitted by the Contractor or any of his payees.

19.3 Audit of Subcontractor: 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 Overpricing or Overcharges: 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 Documentation Requirements: 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	.pdf
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.)	.pdf and Excel
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.)	.pdf

19.6 Supplementary or Special Conditions. 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 Supplementary Conditions. 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 Special Conditions. 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 Federally Funded Projects. 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 Internet-based Project Management Systems. 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 Training. When used, Owner shall provide training to the Project team members.

19.9 Computation of Time. 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 Survival of Obligations. 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 No Waiver of Performance. 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 Governing Law and Venue. 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 Captions and Catch Lines. 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 Independent Contractor Status. 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 No Third-Party Beneficiaries. 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 Child Support Obligor. 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 Buy America Requirements for Iron and Steel Used in Construction. 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 No Assignment. 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 Severability. 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 Parties Bound. 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 Public Information. 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 Contractor: 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 Reasonable Action: 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 Gifts and Other Considerations: 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 Subcontractors: 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 Other Jobs: 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 Owner Notification: 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 Subcontractor Contracts: 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 Interviews and Audits: 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 Entire Agreement. 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 011000

SUMMARY OF WORK

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:
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: Eagle Student Service Center, University of North Texas System
C. Project Location: 1147 Union Circle, Denton, TX 76201
1. Owner's Construction Manager – NA
2. Owner's Designated Representative – Thanh Kim Nguyen
D. Architect: Stantec Architecture Inc., 6080 Tennyson Pkwy, Plano, TX 75024
E. Construction Manager-at-Risk Name:
1. Construction Manager-at-Risk for this Project is Project's constructor. In Divisions 01 through 49 Sections, the terms "Construction Manager" and "Contractor" are synonymous.
F. Design Builder's Name:
1. Design-Builder has been engaged for this Project to provide architectural and engineering services and to serve as Project's constructor. In Divisions 01 through 49 Sections, the terms "Design-Builder" and "Contractor" are synonymous.
G. 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. Interior renovation of the existing Eagle Student Service Center (built in 1985) on UNT Denton Campus. The work will take place in Three Phases.
B. Type of Contract
1. Project will be constructed under a Competitive Sealed Proposal (CSP) Construction Agreement contract.

1.5 PHASED CONSTRUCTION
A. The Work shall be conducted in 1 phase, with each phase substantially complete as indicated:
1. Phase 1: Buildback of First floor Registrar and Second floor Financial Aid : Substantial completion by July 21, 2023.
2. Phase 2: Demolition and buildback of Second floor ISSC (former Registrar) including smoke barrier on Third floor: Substantial completion by October 6, 2023.
3. Phase 3: First floor Student Accounting, First and Second floor corridors / lobbies, and First and Second floor public restrooms : Substantial completion by 1/5/2024
B. 2. Before commencing Work of each phase, submit an updated copy of the Contractor's construction schedule showing the sequence, commencement and completion dates [and move-out and -in dates of Owner's personnel] 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 [work in areas] [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.

1.8 COORDINATION WITH OCCUPANTS

A. Full Owner Occupancy: Owner will occupy site and [existing] [adjacent] building(s) during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day 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.

B. [Partial Owner Occupancy: Owner will occupy the premises during entire construction period, with the exception of 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 authorities having jurisdiction.
2. Provide not less than three (3) day notice to Owner 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 normal business working hours of 6 a.m. to 7 p.m., Monday through Friday, except as otherwise indicated.

1. Hours for Utility Shutdowns: Coordinated with Owner, with not less than two (2) weeks written notice of intended shutdown.
2. Hours for core drilling and other noisy activities: to be communicated and coordinated through owner prior to work.

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.
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)

END OF SECTION

SECTION **012100**

ALLOWANCES

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 administrative and procedural requirements governing allowances.
  - 1. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when direction will be provided to the Contractor. If necessary, additional requirements will be issued by Change Order.
- B. Types of allowances include the following:
  - 1. Lump sum allowances
  - 2. Unit cost allowances
  - 3. Quantity allowances

1.3 SELECTION AND PURCHASE
- A. At the earliest practical date after award of the Contract, advise Design Professional and Owner of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.
- B. At Design Professional's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.
- C. Purchase products and systems selected by Design Professional from the designated supplier.

1.4 SUBMITTALS
- A. Submit proposals for purchase of products or systems included in allowances.
- B. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.
- C. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.
- D. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.5 COORDINATION
- A. Coordinate allowance items with other portions of the Work. Furnish templates as required to coordinate installation.

1.6 LUMP SUM, UNIT COST AND QUANTITY ALLOWANCES
- A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Design Professional under allowance and shall include freight, and delivery to Project site.
- B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials [ordered by Owner] [selected by Architect] under allowance shall be included as part of the Contract Sum and not part of the allowance.
- C. Unused Materials: Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.
  - 1. If requested by Design Professional, retain and prepare unused material for storage by Owner. Deliver unused material to Owner's storage space as directed.

1.7 ADJUSTMENT OF ALLOWANCES
- A. Allowance Adjustment: Should Owner determine that an adjustment is needed in an allowance amount; a Change Order will be prepared based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.
  - 1. Include installation costs in purchase amount only where indicated as part of the allowance.

2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other margins claimed.
3. Submit substantiation of a change in scope of work, if any, claimed in Change Orders related to unit cost allowances.
4. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.

B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit.
1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in the Contract Documents.
2. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

PART 2 - PRODUCTS (Not **Used**)

PART 3 - EXECUTION

3.1 EXAMINATION
A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION
A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.3 SCHEDULE OF ALLOWANCES
A. Allowance No. : Lump Sum Unit Cost Quantity Contingency Testing and Inspecting Allowance: Include the sum of [Insert dollar or quantity amount of allowance] : Include [Insert allowance description] as specified in Division [Insert Division number] Section " [Insert Section title] " and as shown on Drawings.
1. This allowance includes material cost, receiving, handling, and installation, and Contractor overhead and profit .
2. Coordinate quantity allowance adjustment with corresponding unit price requirements of Division 01 Section "Unit Prices."

END OF SECTION

SECTION **012200**

UNIT PRICES

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 administrative and procedural requirements for unit prices.

1.3 DEFINITIONS
A. Unit price is an amount incorporated in 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, cost for delivery, installation, insurance, overhead, and profit.
B. Measurement and Payment: Refer to 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 schedule contain requirements for materials described under each unit price.

PART 2 - PRODUCTS (Not **Used**)

PART 3 - EXECUTION

3.1 SCHEDULE OF UNIT PRICES

A. Item No. 1: Additional Acoustical Ceiling Grid:

1. Description: Provide additional new acoustical panel ceiling suspension systems (grid) if existing grid products / materials are not suitable for reinstallation in accordance with Division 9 Section "Acoustical Panel Ceilings."
   1. Unit of Measurement: Linear foot.
   2. Quantity Allowance: Coordinate unit price with allowance adjustment requirements of Division 01 Section 012100, “Allowances".

END OF SECTION

SECTION **012300**

ALTERNATES

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 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. A1: New Carpet: Provide new carpet in lieu of new LVT at second floor Main Corridor, as indicated on the drawings and specified herein.

B. Alternate No. E1: Lighting and Controls: All work to demolish existing lighting and controls and replace with new lighting and controls, as indicated on the drawings and specified herein.

C. Alternate No. E2: Abandonment of Equipment Above Ceiling: All work to demolish existing already abandoned equipment, conduits, and other devices above ceilings where ceilings are to be demolished to accomplish the new work, as indicated on the drawings and specified herein.

D. Alternate No. M1: Existing VAV Box Replacement: All work to replace existing VAV Boxes indicated to be relocated and reused, as indicated on the drawings and specified herein. Existing controllers at existing VAV Boxes shall be reused with new VAV Boxes.

E. Alternate No. M2: New VAV Boxes: All work to replace all existing VAV Boxes within the scope of the work area, as indicated on the drawings and specified herein. Existing controllers at existing VAV Boxes shall be reused with new VAV Boxes.

END OF SECTION

SECTION 012500

SUBSTITUTION 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 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.
l. 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:

a. 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)

END OF SECTION

SECTION 012500.13

SUBSTITUTION REQUEST FORM

PROJECT: _____ **(After Contract Award)**

TO: _____

_____

NO. _____ DATE: _____

Contractor hereby requests acceptance of the following product or system as a substitution in accordance with provisions of Division 01 Section 012500 "Substitution Procedures":

1. SPECIFIED PRODUCT OR SYSTEM

Substitution request for: _____

Specification Section No.: _____ Article/ Paragraph: _____

2. REASON FOR SUBSTITUTION REQUEST

SPECIFIED PRODUCT

- ☐ Is no longer available
- ☐ Is unable to meet project schedule
- ☐ Is unsuitable for the designated application
- ☐ Cannot interface with adjacent materials
- ☐ Is not compatible with adjacent materials
- ☐ Cannot provide the specified warranty
- ☐ Cannot be constructed as indicated
- ☐ Cannot be obtained due to one or more of the following:
  - ☐ Strike
  - ☐ Lockout
  - ☐ Bankruptcy of manufacturer or supplier
  - ☐ Similar occurrence (explain below)

PROPOSED PRODUCT

- ☐ Will reduce construction time
- ☐ Will result in cost savings of $ _____ to Project
- ☐ Is for supplier's convenience
- ☐ Is for subcontractor's convenience
- ☐ Other: _____ _____

3. SUPPORTING DATA

- ☐ Drawings, specifications, product data, performance data, test data, and any other necessary information to facilitate review of the Substitution Request are attached.
- ☐ Sample is attached
- ☐ Sample will be sent if requested

4. QUALITY COMPARISON

Provide all necessary side-by-side comparative data as required to facilitate review of Substitution Request:

	SPECIFIED PRODUCT	PROPOSED PRODUCT
Manufacturer:	_____	

Name / Brand: _____

Catalog No.: _____

Vendor: _____

Variations: _____

(Add Additional Sheets If Necessary)

Local Distributor or Supplier: _____

Maintenance Service Available: ☐ Yes ☐ No

Spare Parts Source: _____

Warranty: ☐ Yes ☐ No _____ Years

5. PREVIOUS INSTALLATIONS

Identification of at least three (3) similar projects on which proposed substitution was used:

PROJECT #1

Project: _____

Address: _____

_____

Architect: _____

Owner: _____

Contractor: _____

Date Installed: _____

PROJECT #2

Project: _____

Address: _____

_____

Architect: _____

Owner: _____

Contractor: _____

Date Installed: _____

PROJECT #3

Project: _____

Address: _____

_____

Architect: _____

Owner: _____

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:_____ By: _____ _____

Note: Unresponsive or incomplete 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

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 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 Chang 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)

END OF SECTION

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 2019, 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
- Division 33 - Utilities
- Division 34 - Transportation
- Division 35 - Waterway and Marine Construction
- Division 40 - Process Integration
- Division 41 - Material Processing and Handling Equipment
- Division 42 - Process Heating, Cooling, and Drying Equipment
- Division 43 - Process Gas and Liquid Handling, Purification and Storage Equipment
- Division 44 - Pollution and Waste Control Equipment
- Division 45 - Industry-Specific Manufacturing Equipment
- Division 46 - Water and Wastewater Equipment
- Division 48 - Electrical Power Generation

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 39, 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
   l. 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. 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.
5. 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
   l. 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)

END OF SECTION

SECTION 013100

PROJECT MANAGEMENT AND COORDINATION

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 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 1¼ -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
8. 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.
3. File Submittal Format: Submit or post coordination drawing files using Portable Data File (PDF) format.

4. 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 PDF format.
    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.
2. 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
   l. 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
   l. 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
   y. 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 10 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
   l. 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.
      Review schedule for next period.
   b. Review present and future needs of each entity present, including the following:
      Interface requirements
      Sequence of operations
      Status of submittals
      Deliveries
      Off-site fabrication
      Access
      Site utilization
      Temporary facilities and controls
      Progress cleaning
      Quality and work standards
      Status of correction of deficient items
      Field observations
      Status of RFIs
      Status of proposal requests
      Pending changes
      Status of Change Orders
      Pending claims and disputes
      Documentation of information for payment requests
      Recommendations of construction feasibility
      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.
   1. 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:
         Interface requirements
         Sequence of operations
         Status of submittals
         Deliveries
         Off-site fabrication
         Access
         Site utilization
         Temporary facilities and controls
         Work hours
         Hazards and risks
         Progress cleaning
         Quality and work standards
         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)

END OF SECTION

SECTION 013200

CONSTRUCTION PROGRESS DOCUMENTATION

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 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.

1.1 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.

1.2 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.

B. Event: The starting or ending point of an activity.
C. 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.
D. 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
   l. 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:
   1. 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.

END OF SECTION

EFFECTIVE DATE
18 March 2013
01 June 2020

SECTION 013233

PHOTOGRAPHIC DOCUMENTATION

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 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
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
A. 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.
3. 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.

E. Time-lapse Sequence Construction Photographs: Take photographs as indicated, to show status of construction and progress since last photographs were taken.
   1. Frequency: Take photographs weekly, with timing each month adjusted to coincide with the cutoff date associated with each Application for Payment.
   2. Vantage Points: Following suggestions by Architect and Contractor, photographer to select vantage points. During each of the following construction phases, take not less than two of the required shots from same vantage point each time to create a time-lapse sequence as follows:
      a. Commencement of the Work, through completion of subgrade construction
      b. Above-grade structural framing
      c. Exterior building enclosure
      d. Interior Work, through date of Substantial Completion

END OF SECTION

SECTION 013300

SUBMITTAL 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 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.
   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 PDF format.
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.
1. 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.
4. 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
   b. Date
   c. Name of Design Professional
   d. Name of Contractor
   e. Name of subcontractor
   f. Name of supplier
   g. Name of manufacturer
   h. Submittal number or other unique identifier, including revision identifier
      1) 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
   l. 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
   l. 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:
   a. 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. Reviewed
   2. Revise and Resubmit
   3. Rejected
   4. Furnish As Corrected
   5. No Action Taken
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.

END OF SECTION

SECTION 013516

ALTERATION PROJECT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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.

END OF SECTION

SECTION 014000

QUALITY REQUIREMENTS

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 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 49 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. 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.

D. Source Quality Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.

E. Field Quality Control Testing: Tests and inspections that are performed onsite for installation of the Work and for completed Work.

F. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

G. 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.

H. 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 exterior 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. 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.
Requirements of authorities having jurisdiction shall supersede requirements for specialists.

F. 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.

G. 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.

H. 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.

I. 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, and laboratory 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. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
   f. 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.

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.

END OF SECTION

UNT SYSTEM REGULATORY REQUIREMENTS

SECTION 014100

PART 1 GENERAL

1.1 SUMMARY

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,
      1) Including Municipal fire code amendments of the city[1] where the building is being constructed, pertaining only to the following, shall be used in the project design and construction:
         i) water supply for fire suppression;
         ii) fire hydrant number and locations;
         iii) fire department access to the building;
         iv) KNOX® key access boxes – contact UNT System Fire Marshal for specifics;
         v) fire department connections (FDC & its location);
         vi) fire sprinkler and standpipe systems;
         vii) fire detection & alarm systems;
         viii) elevator stretcher requirements*;
         ix) communication coverage;
         x) other emergency equipment requirements.
   e. 2018 edition International Fuel Gas Code
   f. 2018 edition International Energy Conservation Code
3. *Design & Construction Guidelines – The University of North Texas*
   a. (access the UNT Facilities Resources webpage at http://facilities.unt.edu/resources. "Under Projects & Renovations", click on the "Design Guidelines – UNT" hyperlink)
   b. For design guidelines specific to UNT Discovery Park – access the UNT facilities Resources webpage at http://facilities.unt.edu/resources. "Under Projects & Renovations", click on the "Design Guidelines – RP Appendix" hyperlink.
   c. Questions regarding the *Design & Construction Guidelines – The University of North Texas* are to be emailed to: Peter.Palacios@unt.edu
4. Elevator and Escalator Construction
   a. *Elevators, Escalators and Related Equipment, Administrative Rules of the Texas Department of Licensing and Regulation, 16 Texas Administrative Code, Chapter 74, §74.100 (Effective February 15, 2016).*
   b. *2018 edition International Building Code (IBC), Chapter 30.
5. Accessibility Standards

[1] Respectively: City of Denton, TX; City of Ft. Worth, TX.; City of Dallas, TX; City of Frisco, TX

2012 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).

6. Energy Conservation Design Standards for New Construction and Major Renovation[2] Projects:
   a. 2015 edition International Energy Conservation Code (IECC);
   b. Low-Rise Residential Buildings[3] -- use Residential Section of 2015 edition IECC.
7. Water Conservation Standards

   "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

END OF SECTION

[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. 34 Tex. Admin. Code §19.33.*

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 Residential Building: Residential 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).

SECTION 014200

REFERENCES

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 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.

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:

1. A/E: Architect/Engineer
2. AHJ: Authority Having Jurisdiction
3. BOR: Board of Regents
4. CCD: Construction Change Directive
5. CCL: Construction Cost Limitation
6. CMAR: Construction Manager at Risk
7. CSP: Competitive Sealed Proposal
8. DD: Design Development
9. FPE: Fire Protection Engineer
10. GCs: General Conditions
11. GMP: Guaranteed Maximum Price
12. GSF: Gross Square Feet
13. HSP: HUB Subcontractor Plan

14. HUB: Historically Underutilized Business
15. LA: Landscape Architect
16. LEED: Leadership in Energy and Environmental Design
17. LDs: Liquidated Damages
18. NASF: Net Assignable Square Feet
19. NTP: Notice to Proceed
20. OAC: Owner/Architect/Contractor
21. OCM: Owner's Construction Manager
22. ODR: Owner's Designated Representative
23. PAR: Progress Assessment Report
24. PE: Professional Engineer
25. PM: Project Manager
26. RID: Registered Interior Designer
27. R&R: Repair and Rehabilitation
28. SD: Schematic Design
29. SDs: Schematic Design Drawings
30. UGC/SGC: Uniform General Conditions/Supplemental General Conditions

END OF SECTION

SECTION 015000

TEMPORARY FACILITIES AND CONTROLS

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 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.

E. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

F. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required 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.

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:

Locations of dust-control partitions at each phase of the work
HVAC system isolation schematic drawing
Location of proposed air filtration system discharge
Other dust-control measures
Waste management plan
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 2⅜ -inch OD line posts and 2⅞-inch OD corner and pull posts, with 1⅝-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 2⅜-inch OD line posts and 2⅞-inch OD corner and pull posts, with 1⅝-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:

Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.

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.

Drinking water and private toilet.

Coffee machine and supplies.

Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F.

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.

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.

Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.

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.
Locate facilities to limit site disturbance as specified in Division 01 Section 011000, "Summary."

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.
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.
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.
Prior to commencing work, isolate the HVAC system in area where work is to be performed in accordance with approved coordination drawings.
Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
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.
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.
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.
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.
Install electric power service overhead, unless otherwise indicated.
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.
Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

L. Telephone:

1. Post a list of important telephone numbers.
   Police and fire departments
   Ambulance service
   Contractor's home office
   Architect's office
   Engineers' offices
   Owner's office
   Principal subcontractors' field and home offices

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:
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.
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.
Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
Prepare subgrade and install sub-base and base for temporary roads and paved areas according to Division 31 Section [Insert Section number], "Earth Moving".
Recondition base after temporary use, including removing contaminated material, re-grading, proof rolling, compacting, and testing.

C. Traffic Controls: Comply with requirements of authorities having jurisdiction.
Protect existing site improvements to remain including curbs, pavement, and utilities.
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.
Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties nor endanger permanent Work or temporary facilities.
Remove snow and ice as required to minimize accumulations.

F. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
Identification Signs: Provide Project identification signs as indicated on Drawings.
Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
Provide temporary, directional signs for construction personnel and visitors.
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.
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.
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.

Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.

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.

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.

Construct dustproof partitions with gypsum wallboard with joints taped on occupied side, and fire-retardant plywood on construction operations side.

Construct dustproof partitions with two layers of 6-mil polyethylene sheet on each side. Cover floor with two layers of 6-mil polyethylene sheet, extending sheets 18 inches up the sidewalls. Overlap and tape full length of joints. Cover floor with fire-retardant treated plywood.

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.

Where fire-resistance-rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.

Insulate partitions to control noise transmission to occupied areas.

Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.

Protect air-handling equipment.

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.

Prohibit smoking in construction areas.

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.

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. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:

Protect porous materials from water damage.

Protect stored and installed material from flowing or standing water.

Keep porous and organic materials from coming into prolonged contact with concrete.

Remove standing water from decks.

Keep deck openings covered or dammed.

C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
Keep interior spaces reasonably clean and protected from water damage.
Periodically collect and remove waste containing cellulose or other organic matter.
Discard or replace water-damaged material.
Do not install material that is wet.
Discard, replace or clean stored or installed material that begins to grow mold.
Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.

D. 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:
Control moisture and humidity inside building by maintaining effective dry-in conditions.
Use permanent HVAC system to control humidity.
Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
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.
Remove materials that can not be completely restored to their manufactured moisture level within forty-eight (48) hours.

E. 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.
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.
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."

END OF SECTION

SECTION 015300

MOLD PREVENTION MEASURES

PART 1 - 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. Window and storefront testing
3. Moisture contents of materials
4. 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. Remove water found within building during construction immediately.
1. Energize lift stations and sump pumps as early in Project as possible. Use temporary pumps if necessary to get water out of building and drain lines.
C. 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.
4. Provide temporary outside air ventilation as building becomes enclosed.
D. Maintain clean project site, free from hazards, garbage, and debris.
E. Eating, drinking, and smoking are not permitted within building.
F. Slope perimeter grades, both temporary and final grades, away from building structure.
G. Verify that condensate pans drain properly beginning with initial installation.
H. Flash roof penetrations immediately. Do not allow water to penetrate to floor below.
I. Seal window openings prior to window installation with plastic to prevent moisture entry.
J. Sprayed-on Fireproofing: Keep air moving throughout building when using sprayed-on fireproofing.
K. Cover stored and installed ductwork and installed duct openings with plastic to prevent dust, debris, and moisture from entering ductwork. Repair damaged plastic barrier.
L. Do not operate air handling equipment below 60° F supply air temperature until building is 100 percent enclosed.
M. Monitor humidity and temperature for conformance to installation requirements defined by material and equipment manufacturers.
N. Check moisture content of gypsum board prior to applying finishes. Record findings.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 INSTALLATION

A. Roof Drains: Connect roof drains to risers and storm drainage lines as soon as possible.

B. Floor Drains: Connect floor drains as soon as possible. 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.

C. Wall Assemblies:

1. Install exterior wall insulation, vapor retarder, and gypsum board only after building is enclosed.
2. Keep bottom of installed gypsum board off floor ½ -inch.

D. Cavity Conditions: Clean and inspect cavity conditions prior to covering, sealing, or restricting access. Vacuum-clean cavity spaces prior to covering or enclosing.

E. Sprayed-On Fireproofing: Remove sprayed-on fireproofing overspray immediately.

F. Plumbing: Pressure test plumbing piping identified as insulated on Project prior to installation of insulation.

G. Roof Mounted Equipment: Inspect rooftop units and other roof-mounted equipment for signs of rain leaks immediately after first rain. Water test with hose immediately after installation. Seal leaks immediately.

H. Windows and Storefront: Water test windows to manufacturer's and Project Manual's specifications. Record findings and forward to Architect.

I. Sealants: Inspect exterior sealants for cracks, damage, or deterioration. Record findings and forward to Architect.

J. 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.

END OF SECTION

SECTION 015720

INDOOR AIR QUALITY PLAN DURING CONSTRUCTION

PART 1 - 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.

l. 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.

l. HEPA vacuum all concrete floors before installation of floor covering materials.

m. 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. Exhaust fans may be installed on each floor to remove dust and contaminants.

c. The air handler shall supply conditioned air to the floors. Floors with heavy dust or chemical operations shall be exhausted to the outside.

d. 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.

e. Return air dampers and openings shall be covered with filter media during operations that may contaminate the system.

f. During activities producing airborne particulates in occupied buildings undergoing renovation, or projects whose airspace is connected to occupied buildings, 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.

END OF SECTION

SECTION 016000

PRODUCT REQUIREMENTS

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 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)

END OF SECTION

SECTION 017300

EXECUTION

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 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 INFORMATIONAL SUBMITTALS

A. Qualification Data: For land surveyor

B. Certificates: Submit certificate signed by land surveyor certifying that location and elevation of improvements comply with requirements.

C. Certified Surveys: Submit two (2) paper copies that are certified, sealed and signed by a Texas registered professional land surveyor. Also submit one copy of the survey in CAD format using surface coordinates and one copy of the survey in CAD format using grid coordinates. Coordinate with Owner for the reference coordinate system and CAD guidelines.

D. Final Property Survey: Submit one (1) digital copy that is certified, sealed and signed by a Texas registered professional land surveyor showing the Work performed. Also submit one copy of the survey in CAD format using surface coordinates and one copy of the survey in CAD format using grid coordinates. Coordinate with Owner for the reference coordinate system and CAD guidelines.

1.5 QUALITY ASSURANCE

A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

B. 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. Exterior curtain-wall construction
   d. Equipment supports
   e. Piping, ductwork, vessels, and equipment
   f. 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.

C. 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.

D. Manufacturer's Installation Instructions: Obtain and maintain onsite manufacturer's written recommendations and instructions for installation of products and equipment.

1.6 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.
   1. For projects requiring compliance with sustainable design and construction practices and procedures, utilize products for patching that comply with requirements of Division 01 Section 018114, "Sustainable Design Requirements".

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. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning site work, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work. Surveyor will perform a Locative Survey (Category 3) according to the standards set by the Texas Society of Professional Surveyors Manual of Practice.
   1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water service piping; underground electrical services, and other utilities.
   2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
   3. Collect and depict all utility infrastructure according to the Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data published by the American Society of Civil Engineers, publication number CI/ASCE 38-02. All utility data must have a quality level clearly associated, either via a geospatial database, CAD layering, plan symbols, and/or plan labels per the guidelines. Design Professional or Engineer will work with Owner to explain and detail costs and benefits so as to achieve the highest quality levels of subsurface utility engineering applicable to the Project and Work.

B. 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.
   1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
   2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
   3. Inform installers of lines and levels to which they must comply.
   4. Check the location, level, and plumb of every major element as the Work progresses.
   5. Notify Design Professional when deviations from required lines and levels exceed allowable tolerances.
   6. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

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. Level foundations and piers from two or more locations.

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.

1. 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. Temporary Support: Provide temporary support of work to be cut.

C. 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.

D. 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".

E. 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.

F. 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.

G. 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.
2. 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.

H. 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.

END OF SECTION

SECTION 017419

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

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 administrative and procedural requirements for the following:
  1. Salvaging non-hazardous demolition and construction waste
  2. Recycling non-hazardous demolition and construction waste
  3. Disposing of non-hazardous demolition and construction waste

1.3 DEFINITIONS
- A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.
- C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
- D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.4 PERFORMANCE REQUIREMENTS
- A. General: Achieve end-of-Project rates for salvage/recycling a minimum of seventy-five percent (75%) by weight of total non-hazardous solid waste generated by the Work. Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials, including the following:
  1. Demolition Waste:
     - a. Concrete
     - b. Concrete reinforcing steel
     - c. Brick
     - d. Concrete masonry units
     - e. Doors and frames
     - f. Door hardware
     - g. Metal studs
     - h. Gypsum board
     - i. Acoustical tile and panels
     - j. Carpet
     - k. Carpet pad
     - l. Plumbing fixtures
     - m. Piping
     - n. Mechanical equipment
     - o. Refrigerants
     - p. Electrical conduit
     - q. Copper wiring
     - r. Lighting fixtures
     - s. Switchgear and panelboards
     - t. Transformers
  2. Construction Waste:
     - a. Site-clearing waste
     - b. Masonry and CMU
     - c. Lumber
     - d. Wood sheet materials
     - e. Wood trim
     - f. Metals

g. Carpet and pad
h. Gypsum board
i. Piping
j. Electrical conduit
k. Packaging: Regardless of salvage/recycle goal indicated in paragraph above, salvage or recycle one-hundred percent (100%) of the following uncontaminated packaging materials:
   1) Paper
   2) Cardboard
   3) Boxes
   4) Plastic sheet and film
   5) Polystyrene packaging
   6) Wood crates
   7) Plastic pails

1.5 ACTION SUBMITTALS

A. Waste Management Plan: Submit plan within thirty (30) days of date established for commencement of the Work.

1.6 INFORMATIONAL SUBMITTALS

A. Waste Reduction Progress Reports: Concurrent with LEED Submittal. Include the following information:
   1. Material category
   2. Generation point of waste
   3. Total quantity of waste in tons
   4. Quantity of waste salvaged, both estimated and actual in tons
   5. Quantity of waste recycled, both estimated and actual in tons
   6. Total quantity of waste recovered (salvaged plus recycled) in tons
   7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste
B. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.
C. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
D. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
E. LEED Submittal: LEED letter template for Credit MRc5, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
F. Qualification Data: For waste management coordinator refrigerant recovery technician.
G. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.7 QUALITY ASSURANCE

A. Waste Management Coordinator Qualifications: Experienced firm, with a record of successful waste management coordination of Projects with similar requirements.
B. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.
C. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.
D. Waste Management 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 waste management including, but not limited to, the following:
   1. Review and discuss waste management plan including responsibilities of waste management coordinator.
   2. Review requirements for documenting quantities of each type of waste and its disposition.
   3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
   4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
   5. Review waste management requirements for each trade.

1.8 WASTE MANAGEMENT PLAN

A. General: Develop a waste management plan according to ASTM E 1609 and requirements of this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Distinguish between demolition and construction waste. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.

B. Waste Identification: Indicate anticipated types and quantities of demolition, site clearing, and construction waste generated by the Work. Use attached form or comparable generated by Contractor. Include estimated quantities and assumptions for estimates.

C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.

1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.

D. Cost/Revenue Analysis: Indicate total cost of waste disposal as if there was no waste management plan and net additional cost or net savings resulting from implementing waste management plan.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

1. Comply with Division 01 Section 015000, “Temporary Facilities and Controls" for operation, termination, and removal requirements.

B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan.

C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.

1. Distribute waste management plan to everyone concerned within three days of submittal return.
2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.

D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
2. Comply with Division 01 Section 015000, “Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.2 SALVAGING DEMOLITION WASTE

A. Salvaged Items for Reuse in the Work: Salvage items for reuse and handle as follows:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until installation.
4. Protect items from damage during transport and storage.
5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.

B. Salvaged Items for Sale and Donation: NOT Permitted on Project site.

C. Salvaged Items for Owner's Use: Salvage items for Owner's use and handle as follows:

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.

D. Doors and Hardware: Brace open end of door frames. Except for removing door closers, leave door hardware attached to doors.

E. Plumbing Fixtures: Separate by type and size.

F. Lighting Fixtures: Separate lamps by type and protect from breakage.

3.3 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

A. General: Recycle paper and beverage containers used by on-site workers.

B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Contractor.

C. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.

D. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.

1. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
   a. Inspect containers and bins for contamination and remove contaminated materials if found.
2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
4. Store components off the ground and protect from the weather.
5. Remove recyclable waste off Owner's property and transport to recycling receiver or processor.

3.4 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of 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 waste materials.

C. Disposal: Transport waste materials off Owner's property and legally dispose of them.

END OF SECTION

SECTION 017700

CLOSEOUT 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 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
      b. ~~Three (3) paper copies of product schedule or list, unless otherwise indicated. Architect will return two (2) copies~~.

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.
   ~~1. Bind warranties and bonds in heavy duty, three-ring, vinyl-covered, loose leaf binders, thickness as necessary to accommodate contents, and sized to receive 8½ by 11-inch paper.~~
   ~~2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.~~
   ~~3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES", Project name, and name of Contractor.~~
   ~~4. Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide table of contents at beginning of document.~~

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:
   a. 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.
   l. 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".

END OF SECTION

SECTION 017823

OPERATION AND MAINTENANCE DATA

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 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:
  - a. PDF electronic file. Assemble each manual into a composite electronically-indexed file. Submit on digital media acceptable to Design Professional.
    - a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically-linked operation and maintenance directory.
    - b. Enable inserted reviewer comments on draft submittals.
  - b. 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.
  1. 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.
      b. 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 white 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
8. Chemical release or spill

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
6. Limiting conditions
7. Performance curves
8. Engineering data and tests
9. Complete nomenclature and number of replacement parts

C. 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.

END OF SECTION

SECTION 017839

PROJECT RECORD DOCUMENTS

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 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.
1. 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
e. Cross-reference record prints to corresponding archive photographic documentation

2. 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
   l. 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.
1. 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.

END OF SECTION

SECTION 017900

DEMONSTRATION AND TRAINING

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 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 49 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

2.1 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.

B. 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
   b. Performance and design criteria if Contractor is delegated design responsibility
   c. Operating standards
   d. Regulatory requirements
   e. Equipment function
   f. Operating characteristics
   g. Limiting conditions
   h. Performance curves
2. Documentation: Review the following items in detail:
   a. Emergency manuals
   b. Operations manuals
   c. Maintenance manuals
   d. Project record documents
   e. Identification systems
   f. Warranties and bonds
   g. Maintenance service agreements and similar continuing commitments
3. Emergencies: Include the following, as applicable:
   a. Instructions on meaning of warnings, trouble indications, and error messages
   b. Instructions on stopping
   c. Shutdown instructions for each type of emergency
   d. Operating instructions for conditions outside of normal operating limits
   e. Sequences for electric or electronic systems
   f. Special operating instructions and procedures
4. Operations: Include the following, as applicable:
   a. Startup procedures
   b. Equipment or system break-in procedures
   c. Routine and normal operating instructions
   d. Regulation and control procedures
   e. Control sequences
   f. Safety procedures
   g. Instructions on stopping
   h. Normal shutdown instructions
   i. Operating procedures for emergencies
   j. Operating procedures for system, subsystem, or equipment failure
   k. Seasonal and weekend operating instructions
   l. Required sequences for electric or electronic systems
   m. Special operating instructions and procedures
5. Adjustments: Include the following:
   a. Alignments
   b. Checking adjustments
   c. Noise and vibration adjustments
   d. Economy and efficiency adjustments
6. Troubleshooting: Include the following:
   a. Diagnostic instructions
   b. Test and inspection procedures
7. Maintenance: Include the following:
   a. Inspection procedures
   b. Types of cleaning agents to be used and methods of cleaning
   c. List of cleaning agents and methods of cleaning detrimental to product
   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.

END OF SECTION

EFFECTIVE DATE
01 June 2020

SECTION 019113

GENERAL COMMISSIONING REQUIREMENTS

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.
- 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)

END OF SECTION

SECTION 024119

SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 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, the removal and safe storage, of existing items to be reused or recycled.

B. Related Requirements are not limited to the following:

1. Section 01 10 00 "Summary of Work" for restrictions on use of the premises, Owner-occupancy requirements, and phasing requirements.

C. Removal work specified elsewhere:

1. Cutting nonstructural concrete floors and masonry walls for piping, ducts, and conduits is included with the work of the respective mechanical and electrical specification sections in Divisions 22, 23, and 26.
2. Cutting holes in roof deck for installation of new rooftop mechanical equipment is specified in Division 23.

D. Related work specified elsewhere:

1. Remodeling construction work and patching are included within the respective Sections of specifications, including removal of materials for reuse and incorporation into remodeling or new construction.
2. Relocation of pipes, conduits, ducts, and other mechanical and electrical work is specified in other Divisions.

1.2 DEFINITIONS

A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.

B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and either deliver to Owner ready for reuse or store for installation in project, whichever is required or otherwise indicated.

C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.

D. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.

E. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

1.3 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.

1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.4 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. Schedule of Selective Demolition Activities: Indicate the following:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's building manager's and on-site operations are uninterrupted.
2. Interruption of utility services. Indicate how long utility services will be interrupted.
3. Coordination for shutoff, capping, and continuation of utility services.
4. Use of elevator and stairs.
5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

C. Predemolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, which might be misconstrued as damage caused by demolition operations. Comply with Section 01 32 33 "Photographic Documentation." Submit before Work begins.

D. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

E. Warranties: Documentation indicating that existing warranties are still in effect after completion of selective demolition.

F. Shoring Submittal: Include structural analysis data and drawings signed, dated and sealed by the qualified professional engineer responsible for their preparation. The Engineer shall be licensed in the state where the Work resides. The submittal to the Architect/Engineer is for their “records”.

1.5 CLOSEOUT SUBMITTALS

A. Inventory: Submit a list of items that have been removed and salvaged.

1.6 QUALITY ASSURANCE

A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

1.7 FIELD CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

1. Hazardous materials will be removed by Owner before start of the Work.
2. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

E. Storage or sale of removed items or materials on-site is not permitted.

F. 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.

1.8 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials and using approved contractors so as not to void existing warranties. Notify warrantor before proceeding.

B. Notify warrantor on completion of selective demolition, and obtain documentation verifying that existing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.

1.9 COORDINATION

A. Arrange selective demolition schedule so as not to interfere with Owner's 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 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. Do not proceed with Selective Demolition Work where shoring is required, until engineering analysis, drawings and reports have been completed and submitted to Architect/Engineer.

C. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.

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.

1. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

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 utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
2. Arrange to shut off utilities with utility companies.
3. 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.
4. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings 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 and leave in place.
    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 and leave in place.

3.3 PROTECTION

A. Temporary Protection: 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 Section 015000 "Temporary Facilities and Controls."

B. Temporary Shoring: Design, 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.
2. Responsibility for all aspects of shoring, in concept and in execution, shall reside with the Contractor doing the Work.

C. Remove temporary barricades and protections where hazards no longer exist.

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. 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 portable fire-suppression devices during flame-cutting operations.
5. Maintain fire watch during and for at least one hour after flame-cutting operations.
6. Maintain adequate ventilation when using cutting torches.
7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
9. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
10. Dispose of demolished items and materials promptly. Comply with requirements in Section 01 74 19 "Construction Waste Management."

B. 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.

C. Work in Historic Areas: Selective demolition may be performed only in areas of Project that are not designated as historic.

D. 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 or indicated on Drawings.
5. Protect items from damage during transport and storage.

E. 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.

F. 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 small sections. Using power-driven saw, cut concrete to a depth of at least 3/4 inch (19 mm) at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.

B. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, and then remove concrete between saw cuts.

C. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.

D. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, and then break up and remove.

E. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings." Do not use methods requiring solvent-based adhesive strippers.

F. Roofing: Remove no more existing roofing than what can be covered in one day by new roofing and so that building interior remains watertight and weathertight.

1. Remove existing roof membrane, flashings, copings, and roof accessories.
2. Remove existing roofing system down to substrate.

3.6 SALVAGED MATERIALS

A. Salvaged Items: Owner maintains first right of salvage. When directed by Architect or Owner, carefully remove indicated items, clean, store, and turn over to Owner and obtain receipt.

3.7 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction, and recycle or dispose of them according to Section 01 74 19 "Construction Waste Management."

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.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
4. Comply with requirements specified in Section 01 74 19 "Construction Waste Management."
5. If hazardous materials are encountered during demolition operations, comply with applicable regulations, laws, and ordinances concerning removal, handling, and protection against exposure or environmental pollution.

B. Burning: Do not burn demolished materials.

3.8 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.

B. Repair demolition performed in excess of that required. Return elements of construction and surfaces to remain to condition existing prior to start operations. Repair adjacent construction or surfaces soiled or damaged by Selective Demolition Work.

END OF SECTION 02 41 19

SECTION 055800

FORMED METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Closures and trim for wall penetrations.

1.3 PERFORMANCE REQUIREMENTS

A. Corrosion Control: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.4 SUBMITTALS

A. Product Data: For the following:

1. Sound-deadening insulation.
2. Insulation adhesive.
3. Gaskets.
4. Nonstructural anchors.
5. Paint products.

B. Shop Drawings: Detail fabrication and installation of the following formed-metal fabrications. Include plans, elevations, sections, and details of components and their connections. Show anchorage and accessory items.

1. Closures and trim.

C. Samples for Verification: For each type of exposed finish required, prepared on 6 inch (150 mm) square samples of metal of same thickness and material indicated for the Work. If finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: A firm experienced in producing formed-metal fabrications 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.

B. Source Limitations: Obtain formed-metal fabrications through one source from a single manufacturer.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver formed-metal fabrications wrapped in protective coverings and strapped together in suitable packs or in heavy-duty cartons. Remove protective coverings before they stain or bond to finished surfaces.

B. Store products on elevated platforms in a dry location.

1.7 PROJECT CONDITIONS

A. Field Measurements: Where formed-metal fabrications 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. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating formed-metal fabrications without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 SHEET METAL

A. General: Provide sheet metal without pitting, seam marks, roller marks, stains, discolorations, or other imperfections where exposed to view on finished units.

B. Galvanized Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating, either commercial quality or lock-forming quality, stretcher-leveled standard of flatness.

C. Electrolytic Zinc-Coated Steel Sheet: ASTM A 591/A 591M, Class C coating, commercial quality, stretcher-leveled standard of flatness.

D. Uncoated, Cold-Rolled Steel Sheet: ASTM A 366/A 366M, matte finish, stretcher-leveled standard of flatness. Electrolytic zinc-coated steel sheet complying with ASTM A 591/A 591M, Class C coating, commercial quality, stretcher-leveled standard of flatness, may be substituted at fabricator's option.

2.2 MISCELLANEOUS MATERIALS

A. Sound-Deadening Insulation: Unfaced, mineral-fiber blanket insulation complying with ASTM C 665, Type I, and passing ASTM E 136 test.

B. Insulation Adhesive: Duct thermal-insulation adhesive complying with ASTM C 916, Type I or Type III.

C. Flexible Cellular Neoprene Gaskets: ASTM D 1056, Type 1, Class A, grade as recommended by gasket manufacturer to obtain airtight seal for application indicated.

D. Joint Sealants for Concealed Joints: One-part, nonsag, solvent-release-curing, polymerized butyl sealant complying with ASTM C 1085 and formulated with minimum of 75 percent solids.

E. Filler Metal and Electrodes: Provide type and alloy of filler metal and electrodes as recommended by producer of metal to be welded or brazed and as necessary for strength, corrosion resistance, and compatibility in fabricated items.

F. Fasteners: Use fasteners fabricated from same basic metal and alloy as fastened metal, unless otherwise indicated. Do not use metals that are corrosive or incompatible with materials joined.

1. Provide concealed fasteners for interconnecting formed-metal fabrications and for attaching them to other work, unless exposed fasteners are unavoidable or are the standard fastening method.
2. Provide Phillips flat-head machine screws for exposed fasteners, unless otherwise indicated.

G. Nonstructural Anchors: For applications not indicated to comply with design loads, provide anchors of type, size, and material necessary for type of load and installation indicated, as recommended by the

manufacturer from options listed below, unless otherwise indicated. Use nonferrous-metal or hot-dip galvanized anchors for exterior installations and elsewhere as needed for corrosion resistance.

1. Powder-actuated fasteners.
2. Metal expansion sleeve anchors.
3. Metal impact expansion anchors.

2.3 PAINT

A. Shop Primers: Provide primers that comply with Division 9 Section "Painting."

B. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.

C. Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint 12, except containing no asbestos fibers, or cold-applied asphalt emulsion complying with ASTM D 1187.

2.4 FABRICATION, GENERAL

A. Shop Assembly: Preassemble formed-metal fabrications in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

B. Coordinate dimensions and attachment methods of formed-metal fabrications with those of adjoining construction to produce integrated assemblies with closely fitting joints and with edges and surfaces aligned, unless otherwise indicated.

C. Form metal to profiles indicated, in maximum lengths to minimize joints. Produce flat, flush surfaces without cracking or grain separation at bends. Fold back exposed edges of unsupported sheet metal to form a 1/2 inch (12 mm) wide hem on the concealed side, or ease edges to a radius of approximately 1/32 inch (1 mm) and support with concealed stiffeners.

D. Increase metal thickness or reinforce with concealed stiffeners, backing materials, or both, as needed to provide surface flatness specified for stretcher-leveled sheet metal and sufficient strength for indicated use.

1. Support joints with concealed stiffeners as needed to hold exposed faces of adjoining sheets in flush alignment.

E. Build in straps, plates, and brackets as needed to support and anchor fabricated items to adjoining construction. Reinforce formed-metal units as needed to attach and support other construction.

F. Provide support framing, mounting and attachment clips, splice sleeves, fasteners, and accessories needed to install formed-metal fabrications.

G. Where welding or brazing is indicated, weld or braze joints and seams continuously. Grind, fill, and dress to produce smooth, flush, exposed surfaces in which joints are not visible after finishing is completed.

2.5 CLOSURES AND TRIM

A. Form closures and trim from metal of type and thickness indicated below. Fabricate to fit tightly to adjoining construction.

1. Metal for Interior Installations: Steel sheet, 0.0428 inch (1.09 mm).
2. Metal for Exterior Installations: Galvanized steel sheet, 0.052 inch (1.32 mm), with weathertight joints at exterior installations.
3. Closures and trim may be fabricated from prefinished metal sheet in lieu of finishing after fabrication provided unfinished edges are concealed from view and not exposed to weather.

B. Conceal fasteners where possible; otherwise, locate where they will be as inconspicuous as possible. Size fasteners to support closures and trim, with fasteners spaced to prevent buckling or waviness in finished surfaces.

C. Drill and tap holes needed for securing closures and trim to other surfaces.

D. Incorporate gaskets where indicated or needed for concealed, continuous seal at abutting surfaces.

E. Miter or cope trim members at corners and reinforce with bent metal splice plates to form tight joints.

2.6 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Comply with SSPC-PA 1, "Paint Application Specification No. 1," for steel sheet finishes.

C. Apply organic and anodic finishes to formed metal after fabrication, unless otherwise indicated.

2.7 GALVANIZED STEEL SHEET FINISHES

A. Surface Preparation: Clean surfaces with nonpetroleum solvent so surfaces are free of oil and other contaminants. After cleaning, apply a conversion coating suited to the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas, and apply galvanizing repair paint to comply with ASTM A 780.

B. Baked-Enamel Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-enamel finish consisting of prime coat and thermosetting topcoat, with a minimum dry film thickness of 1 mil (0.025 mm) for topcoat. Comply with paint manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils (0.05 mm).

1. Color and Gloss: As indicated by manufacturer's designations.

2.8 STEEL SHEET FINISHES

A. Surface Preparation: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning," to remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or SSPC-SP 8, "Pickling."

B. Pretreatment: Immediately after cleaning, apply a conversion coating of type suited to organic coating applied over it.

C. Factory Priming for Field-Painted Finish: Immediately after cleaning and pretreating, apply shop primer.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Locate and place formed-metal fabrications level, plumb, and in alignment with adjacent construction.

B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where needed to protect metal surfaces and to make a weathertight connection.

C. Form tight joints with exposed connections accurately fitted together. Provide reveals and openings for sealants and joint fillers as indicated.

D. Install concealed gaskets, joint fillers, insulation, and flashings, as the Work progresses, to make exterior formed-metal fabrications weatherproof.

E. Install concealed gaskets, joint fillers, and insulation, as the Work progresses, to make interior formed-metal fabrications soundproof or lightproof as applicable to the type of fabrication indicated.

F. Corrosion Protection: Coat concealed surfaces of aluminum, zinc-coated, and nonferrous metals that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint.

3.2 ADJUSTING

A. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit or provide new units.

3.3 PROTECTION

A. Protect finishes of formed-metal fabrications from damage during construction period. Remove temporary protective coverings at time of Substantial Completion.

END OF SECTION 055800

SECTION 055813

COLUMN COVERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes interior Metal Composite Material (MCM) column covers.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product, including finishing materials.

B. Shop Drawings: Show fabrication and installation details for column covers.

C. Samples for Initial Selection: Provide samples where a finish has not been indicated. For products involving selection of color, texture, or design, including mechanical finishes.

D. Samples for Verification: Where a finish has been indicated, provide samples. For each type of exposed finish required, prepared on 6-inch- (150-mm-) square Samples of MCM of same thickness and material indicated for the Work.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator, organic-coating applicator, anodic finisher, and powder-coating applicator as applicable to the product being supplied.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For finishes to include in maintenance manuals.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: A firm experienced in producing column covers similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

B. Organic-Coating Applicator Qualifications: A firm experienced in successfully applying organic coatings of type indicated to metals of types indicated and that employs competent control personnel to conduct continuing, effective quality-control program to ensure compliance with requirements.

C. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.

1. Build mockups of typical column covers.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion if allowed by and coordinated with the Architect in the field.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver column covers wrapped in protective coverings and strapped together in suitable packs or in heavy-duty cartons. Remove protective coverings before they stain or bond to finished surfaces.

1.7 WARRANTY

A. Provide manufacturer's warranty against defects in material and workmanship for a period of one year after date of Substantial Completion.

B. Finish warranty: Warrant fluoropolymer coating to remain free, under normal atmospheric conditions, from peeling, checking, cracking, chalking in excess of numerical rating of 8 when measured in accord with ASTM D4214, of fading in excess of 5 N.B.S. Units during warranty period. Warranty period shall be 20 years after date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SNAP-TOGETHER COLUMN COVERS

A. Manufacturer: Subject to compliance with requirements, provide the named product, or a comparable product by other manufacturer.

1. Basis-of-Design: PAC-1000F, Flush joint Column Cover with High-Performance Organic Finish, AAMA 2605 finish, by Pac Clad

B. Form column covers to shapes indicated from metal of type and minimum thickness indicated below. Return vertical edges and bend to form hook that engages continuous mounting clips.

1. Aluminum MCM Sheet: Formed with 0.020-inch- (0.50-mm-) thick, coil-coated aluminum sheet facings, 0.157 inch (4 mm) thick minimum. Provide thicker cover if recommended by manufacturer.

a. Core: Manufacturer's Standard.
b. Finish: High-performance organic coating.

2. Column covers shall be fabricated from prefinished metal sheet.
3. Increase metal thickness or reinforce with concealed stiffeners, backing materials, or both, as needed to provide flat surfaces where indicated.
4. Support joints with concealed stiffeners as needed to hold exposed faces of adjoining sheets in flush alignment.
5. Form returns at vertical joints to provide flush joints.
6. Fabricate column covers without horizontal joints.
7. Fabricate ceiling ring to match column covers.
8. Apply manufacturer's recommended sound-deadening insulation and, or mastic to backs of column covers.

C. Metal Composite Material: Provide factory-formed and -assembled, metal composite material sheets fabricated from two metal facings that are bonded to a solid, extruded thermoplastic core; formed into profile for installation method indicated. Include attachment assembly components, panel stiffeners, and accessories required for weathertight system.

1. Manufacturers: Subject to compliance with requirements, provide the named product, or a comparable product by one of the following:

a. 3A Composites (Alucobond) 800-626-3365 www.alucobondusa.com
b. Alcoa Architectural Products 478-374-4746 www.alcoa.com/aap/north_america
c. Alcotex Inc. 877-252-6839 www.alcotex.com
d. Citadel Architectural Products, Inc. 800-446-8828 www.citadelap.com
e. Laminators, Incorporated 877-663-4277 www.laminatorsinc.com
f. Mitsubishi Plastics Composites America, Inc. 800-422-7270 www.alpolic-usa.com

2.2 MISCELLANEOUS MATERIALS

A. Fasteners: Fabricated from same basic metal and alloy as fastened metal unless otherwise indicated. Do not use metals that are incompatible with materials joined.

1. Provide concealed fasteners for interconnecting column covers and for attaching them to other work unless otherwise indicated.

B. Sound-Deadening Materials:

1. Insulation: Unfaced, mineral-fiber blanket insulation complying with ASTM C 665, Type I, and passing ASTM E 136 test.
2. Mastic: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

C. Backing Materials: Provided or recommended by column cover manufacturer.

2.3 PAINTS AND COATINGS

A. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

2.4 FABRICATION, GENERAL

A. Coordinate dimensions and attachment methods of column covers with those of adjoining construction to produce integrated assemblies with closely fitting joints and with edges and surfaces aligned unless otherwise indicated.

B. Form metal to profiles indicated, in maximum lengths to minimize joints. Produce flat, flush surfaces without cracking or grain separation at bends.

2.5 GENERAL FINISH REQUIREMENTS

A. Apply organic and anodic finishes to formed metal after fabrication unless otherwise indicated.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.6 ALUMINUM FINISHES

A. High-Performance Organic Finish: Two-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

1. Color and Gloss: Match Architect's sample, or if not indicated, as selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of column covers.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Locate and place column covers plumb and in alignment with adjacent construction. Perform cutting, drilling, and fitting required to install column covers.

1. Do not cut or abrade finishes that cannot be completely restored in the field. Return items with such finishes to the shop for required alterations, followed by complete refinishing, or provide new units as required.

B. Use concealed anchorages where possible.

C. Form tight joints with exposed connections accurately fitted together. Provide reveals and openings for sealants and joint fillers as indicated.

D. Corrosion Protection: Apply bituminous paint or other permanent separation materials on concealed surfaces where metals would otherwise be in direct contact with substrate materials that are incompatible or could result in corrosion or deterioration of either material or finish.

3.3 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean abraded areas of shop paint and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Apply by brush or spray to provide a minimum 2.0-mil (0.05-mm) dry film thickness.

B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit or provide new units.

3.4 PROTECTION

A. Protect finishes from damage during construction period. Remove temporary protective coverings at time of Substantial Completion.

END OF SECTION 055813

SECTION 061000

ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wood blocking, cants, wall backing and nailers.
2. Plywood backing panels.

B. Related Requirements:

1. Section 092216 “Non-Structural Metal Framing” for typical locations where wood blocking is required in steel frame construction.

1.2 DEFINITIONS

A. Dimension Lumber: Lumber of 2 inches nominal (38 mm actual) size or greater but less than 5 inches nominal (114 mm actual) size in least dimension.

B. Boards or Strips: Lumber of less than 2 inches nominal (38 mm actual) size in least dimension. Plywood is laminated “board” lumber.

C. Exposed Framing: Framing not concealed by other construction.

D. OSB: Oriented strand board.

E. ALSC: American Lumber Standard Committee

F. ICC-ES: International Code Council Evaluation Service

G. AWPA: American Wood Protection Association

H. NLGA: National Lumber Grades Authority

I. SPIB: Southern Pine Inspection Bureau

J. WCLIB: West Coast Lumber Inspection Bureau

K. NELMA: Northeastern Lumber Manufacturers Association

L. AF&PA: American Forest & Paper Association

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.

SECTION 064023

INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

MILLWORK HARDWARE SCHEDULE:

PART	MANUFACTURER	MODEL NO.	FINISH	DESCRIPTION
PULLS	HAFELE	111.95.102	MATTE NICKEL	5" TAG HARDWARE MODERN COLLECTION 128 CTC
HINGES	BLUM	875M558	NICKEL	CLIP 125j SERIES, FULL OVERLAY
CATCH	IVES	1V2BR	CHROME	ELBOW CATCH
LOCK	HAFELE	232.14.401	BRUSHED CHROME	CABINET DOOR LOCK, KEYED ALIKE
LOCK	HAFELE	232.14.351	BRUSHED CHROME	CABINET DRAWER LOCK, KEYED ALIKE, 1 3/8" CYLINDER
LATCH	FERUM	FE944BN	CHROME	ROLLER TOUCH LATCH
SHELF SUPPORT	HAFELE	282.4.712	NICKEL PLATED	5MM STEEL SHELF SUPPORT, ANTI-SLIP
DRAWER SLIDE	ACCURIDE	3832 (20")	CLEAR ZINC	FULL EXTENSION DRAWER SLIDE 100 LBS. CAPACITY
GROMMET	DOUG MOCKETT	EDP SERIES	PECAN (93P)	2 1/2" DIA. HOLE

1.2 SUMMARY

A. This Section includes the following:

1. Wood / Plastic Laminate cabinets.
2. Wood benches.
3. Shop finishing interior woodwork.

B. Related Sections include the following:

1. Division 6 Section "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing woodwork and concealed within other construction before woodwork installation.
2. Division 8 Section "Flush Wood Doors."
3. Division 12 Sections for countertops.

C. This Section does not include premanufactured casework. Refer to Division 12 Sections for premanufactured casework requirements. The Casework required to meet the Division 12 specification is distinguished from the custom millwork, specified in this section, by model number designations which correspond to predetermined cabinet designs. Refer to the plans for casework model numbers, if any. The cabinets specified in, and controlled by, this specification section are not designated by Manufacturer's model numbers, although they may be designated by the Architectural Woodwork Institute (AWI) cabinet unit design numbers. The Casework Manufacturers listed in the specification body, may bid the cabinets required in this section, subject to compliance with the indicated requirements.

D. The Casework Manufacturers listed in the specification body, may also bid the items required in this section other than the cabinets, subject to compliance with the indicated requirements.

1.3 DEFINITIONS

A. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips for installing woodwork items, unless concealed within other construction before woodwork installation.

B. Balanced Construction: To achieve balanced construction panels should be absolutely symmetrical from the centerline, i.e., use materials on either side, which contract or expand, or are moisture permeable, at the same rate.

C. For the purposes of this specification and project:

1. Thermoset Decorative Overlay (TDO): Melamine – this product is **not allowed on the project**.
2. High-Pressure Decorative Laminate (HPDL): Plastic Laminate other than Melamine.
3. CLS: Thin Plastic Laminate used exclusively for cabinet liner or other “hidden from view” applications, unless otherwise indicated. **Not allowed at exposed to view locations**.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated, including cabinet hardware and accessories, and finishing materials and processes.

B. Product Data: For plywood, high-pressure decorative laminate, cabinet hardware and accessories, and finishing materials and processes.

C. Shop Drawings: Comply with AWS Section 1 – Submittals, and, in addition, the following:

1. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
2. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers, and other items installed in architectural woodwork.
3. Show shelf to cabinet joint details of bottom, intermediate, and top fixed shelves.
4. For casework, comply with Section 10 of the American Woodwork Institute - Architectural Woodwork Standards (AWS) – or the latest published AWI standard superseding the AWS unless indicated otherwise in this specification.

D. Samples for Verification: Comply with AWS Section 1 – Submittals, and, in addition, the following:

1. Lumber with or for transparent finish: 3 individual samples, each 12 by 12 inches (305 by 305 mm), for each species and cut, finished on 1 side and 1 edge.
2. Plastic-laminate-clad panel products: 8 by 10 inches (200 by 250 mm), for each type, color, pattern, and surface finish, with separate samples of unfaced panel product used for core.
3. Corner pieces as follows:

   a. Cabinet front frame joints between stiles and rail, as well as exposed end pieces, 18 inches (450 mm) high by 18 inches (450 mm) wide by 6 inches (150 mm) deep.
   b. Miter joints for standing trim.

E. Product Certificates: Signed by manufacturers of woodwork certifying that products furnished comply with requirements.

F. Woodwork Quality Standard Compliance Letter: Before the end of the project, provide a notarized letter from an executive of the casework manufacturing company who is authorized to represent the manufacturer regarding the quality of their product, signed by the executive and notarized, certifying that the woodwork manufacturer's products for the job have been built in compliance with the specifications and the AWI Architectural Woodwork Standard (AWS), or in lieu of the AWS, in compliance with the AWI’s latest published casework standard superseding the AWS, in the quality grade indicated in this specification for requirements not covered by this specification. Compliance with this specification and the AWS, or AWI’s superseding standard, where this specification does not cover an aspect of casework design, is required for the job. Submit an unsigned sample letter with the initial shop drawing submittal for the Architect’s review.

G. Qualification Data: For firms and persons specified in "Quality Assurance" Article 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.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed architectural woodwork similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

B. Fabricator Qualifications: A firm experienced in producing architectural woodwork similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Source Limitations: Engage a qualified woodworking firm to assume undivided responsibility for production and installation of interior architectural woodwork.

D. Quality Standard: Unless otherwise indicated, comply with Architectural Woodwork Institute (AWI), Architectural Woodwork Manufacturers Association of Canada, Woodwork Institute “Architectural Woodwork Standards” (AWS) for grades of interior architectural woodwork, construction, finishes, and other requirements. Comply with the requirements of the AWS latest edition, or the latest AWI standard superseding the AWS, if published.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver woodwork until painting and similar operations that could damage woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Field Measurements: Where woodwork is 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 woodwork by field measurements before being enclosed and indicate measurements on Shop Drawings.
2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.8 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.

B. Hardware Coordination: Distribute copies of approved hardware schedule specified in Division 8 Section "Door Hardware" to fabricator of architectural woodwork; coordinate Shop Drawings and fabrication with hardware requirements.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Provide materials that comply with requirements of the AWS quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.

B. Wood Products: Comply with the following: All plywood shall be 7-ply minimum veneer core plywood.

1. Softwood Plywood: DOC PS 1, 7-ply, minimum Veneer Core.
2. Hardwood Plywood and Face Veneers: HPVA HP-1, 7-ply, minimum Veneer Core.
3. Solid wood planks (**WD-1**) for Benches: Basis-of-Design – 5 inch Planks machined from solid lumber (species: Texas Post Oak) in thickness indicated, by Woodwright 214-630-8811 https://woodwright.net/

C. General Cabinet Construction Requirements:

1. Cabinet bases shall be of dimensional lumber.
2. Frames, side panels and structural parts of the cabinets shall be of plywood and/or dimension lumber.
3. Doors, shelves and drawer fronts may have their substrate of plywood or dimension lumber. All fixed shelves shall be full shelf thickness "stop dado" joined to their supports. The full depth of the stop dado joint shall, begin no more than 1-1/2 inch (38 mm) from the face of the shelf and, end at the back of the shelf. The joint shall be continuous.
4. File drawers shall be designed and constructed so that the hanging folder rail position (height above the bottom of the drawer) is justified as low as possible in the drawer to allow filing insert bottoms (hanging file folders) to sit as close as possible to the bottom of the drawer. Allow at least 1.25 inch of air space above the rail height for folder tabs to clear the cabinet construction above the file drawer without touching the cabinet.

D. Clear Tempered Float Glass for Doors: ASTM C 1048, Kind FT, Condition A, Type I, Class 1, Quality q3; manufactured by horizontal (roller hearth) process, with exposed edges seamed before tempering, 6 mm thick, unless otherwise indicated.

E. Clear Tempered Float Glass for Shelves: ASTM C 1048, Kind FT, Condition A, Type I, Class 1, Quality q3; with exposed edges seamed before tempering, 6 mm thick, unless otherwise indicated.

F. High-Pressure Decorative Laminate (Plastic Laminate): NEMA LD 3, grades as indicated, or if not indicated, as required by woodwork quality standard. Use at exteriors of cabinets and at interiors of cabinets where necessary to achieve balanced panel construction.

1. Manufacturer: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the Work include, but are not limited to, the following:

a. Formica Corporation 800-367-6422 www.formica.com
b. Lamin-Art, Inc. 800-323-7624 www.laminart.com
c. Pionite Decorative Surfaces 800-746-6483 www.pionite.com
d. Wilsonart International, Inc., a Division of Illinois Tool Works Inc. 800-433-3222 www.wilsonart.com

G. Formaldehyde Emission Levels: Adhesive materials and products used in the manufacture of wood products, including but not limited to particle board shall be urea-formaldehyde free. Only no-added Formaldehyde panel products and cabinet materials / products shall be used in the woodwork.

2.2 CABINET HARDWARE AND ACCESSORIES

A. General: The hardware indicated establishes a "Basis of Design" for appearance and performance, except where labeled with "**UNT**". Comparable products by other manufacturers may be allowed where the design is, solely in the opinion of the Architect, equal to, or better than the "Basis of Design". Where "**UNT**" is indicated, only use the product indicated. Caution, and attention to understanding the "Basis of Design", should be exercised where substitutions away from use of the "Basis of Design" are planned. Unless otherwise indicated, provide manufacturer's standard satin-finish, commercial-quality, heavy-duty hardware.

B. Hardware Standard: Comply with BHMA A156.9 for items indicated by referencing BHMA numbers or items referenced to this standard.

C. Cabinet Hardware:

1. Shelf Standards (**UNT**): 233 Series, nickel-plated, Knape & Vogt Manufacturing Company 800-253-1561 www.knapeandvogt.com Provide near back and front of shelves – two vertical columns at each side of shelf. Other AWS accepted methods of adjustable shelf support will not be allowed.
2. Patch Hinges (at glass doors): Knuckle pin type double wrap around design (0.088 inch steel) - Finish to match cabinet pulls.

   a. Three knuckle, nickel-plated cast zinc, institutional grade hinge. ANSI-BHMA standard A156.9, Grade 1.

      1) Basis-of-Design: Aximat 300 Thin Panel Hinge or Aximat Glass Door Hinge, Hafele America Company 888-437-7477 www.hafele.com/us
      2) Provide the number of hinges per door leaf that is recommended by the hinge manufacturer for the given height of the door, except at doors 6'-0" and over in height, provide at least 3 hinges unless more are recommended by the manufacturer. Doors need no catches with the use of these hinges.

3. Casework Hinges (other than at glass doors):

   a. Frameless Concealed Hinges (**UNT**): Blum, Inc., Type B71T555, 120 degrees of opening, self-closing, nickel-plated steel. Provide two hinges for doors less than 48 inches (1220 mm) high, and provide three hinges for doors more than 48 inches (1220 mm) high.

4. Cabinet Pulls: #4483 1/2 Wire Pulls, aluminum with satin finish, Stanley Security Solutions, Inc. 317-849-2250 www.stanleysecuritysolutions.com
5. Drawer Slides for Light and Medium Duty Drawers: Full extension all ball bearing 100 lbs. load rated with lever disconnect and positive outstop preventing inadvertent drawer removal.

   a. 3832, Accuride International Inc. 562-903-0200 www.accuride.com

6. Drawer Slide for File Drawer and Wide Heavy Duty Drawers: Full extension all ball bearing 150 lbs. load rated with rail mount, hold-in detent, progressive movement and positive outstop preventing inadvertent drawer removal.

   a. 4032, Accuride International Inc. 562-903-0200 www.accuride.com
   b. 8500 Heavy-Duty Lateral File Slide, Knape & Vogt Manufacturing Company 800-253-1561 www.knapeandvogt.com

7. Label Holders: 701 Drawer Label Holder, 2-5/8 inch W by 1-7/16 inch H to hold 2 inch x 1 inch card, anochrome finish, Knape & Vogt Manufacturing Company 800-253-1561 www.knapeandvogt.com
8. Locks: Surface mounting, cylinder length as required for application intended, supply with standard accessories and two keys. Comply with ANSI-BHMA standards; Doors – E07121, Drawers – E07041. Cycle testing - ANSI-BHMA standard A156.1, Grade 1. Include spacers, adapters, fasteners, strikes. All locks shall engage to metal strikes. Brass keys shall be metallic plated.

   a. Subject to compliance with requirements, Manufacturers offering products which may be incorporated in the Work include, but are not limited to, the following. Comparable products by other manufacturers may be allowed where the design is, solely in the opinion of the Architect, equal to, or better than the "Basis of Design".

      1) #6810 Million Lock, Sugatsune America, Inc. 800-562-5267 www.sugatsune.com
      2) C8178, pin tumbler, CompX National, Division of CompX Security Products 864-297-6655 www.compxnet.com
      3) Comparable products by Olympus Locks, Inc
      4) Comparable products by Northeast Lock Corporation

9. Grommets: XG Flip-Top Series, 3 inch (76 mm), color as selected by Architect from manufacturer's full range of standard colors, Doug Mockett & Company, Inc. 800-523-1269 www.mockett.com

D. Accessory Materials:

1. Hang Rods: 770-5 Heavy Duty Round Tubing, 1 5/16 inch (33 mm) O.D., satin chrome finish steel; 768 Adjustable Center Hangers; 766 Flange, Knape & Vogt Manufacturing Company 800-253-1561 www.knapeandvogt.com
2. Shelf Brackets and Standards: 180 Series Regular-Duty Brackets; 80 Series Regular-Duty Standards; size as required for shelves, Knape and Vogt Manufacturing Company 800-253-1561 www.knapevogt.com
3. Mop Racks: Grip All, Model #WM-936, as manufactured by Walton-March, Inc., as distributed by Craine Chemical Co. 214-358-3301.
4. Pegboard: 1/4" thick, tempered hardboard, S1S; size as indicated on Drawings.
5. Single Prong Coat Hooks: 572 Coat and Hat Hook, aluminum, Ives Hinges (Allegion), (877) 860-0174 www.iveshinges.com/
6. Double Prong Coat Hooks: 580 Ceiling Hook, cast aluminum, Ives Hinges (Allegion), (877) 860-0174 www.iveshinges.com/
7. Hook and Shelf Brackets: Model #4800, Solar Hardware Corp. 601-785-4711.
8. L-Shelf Brackets: 204 Series Reinforced L-Bracket, Knape & Vogy Manufacturing Company 800-253-1561 www.knapeandvogt.com
9. Keyboard Tray: CBERGO-TRAY 200, all ball bearing, 3/4 extension slides with angled keyboard and foam palm rest, Accuride International Inc. 562-903-0200 www.accuride.com
10. Flipper Door Slides: 123/1234 vertical cabinet doors up to 30 inch (762mm) tall that retract into cabinet, Accuride International Inc. 562-903-0200 www.accurdie.com

E. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

2.3 INSTALLATION 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 nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

2.4 FABRICATION, GENERAL

A. Interior Woodwork Grade: AWS Grade: Custom, unless otherwise indicated.

B. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.

C. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:

1. Corners of Cabinets and Edges of Solid-Wood (Lumber) Members 3/4 Inch (19 mm) Thick or Less: 1/16 inch (1.5 mm).
2. Edges of Rails and Similar Members More Than 3/4 Inch (19 mm) Thick: 1/8 inch (3 mm).

D. Fixed Shelves: Fixed shelves shall be fastened to cabinet bodies with full-shelf thickness “Stop Dado” joints. The dado shall stop no farther than 1-1/2 inch (38 mm) from the edge of the vertical support. The dado shall not begin closer than 1 inch (25 mm) from the edge of the vertical support. The depth which the dado cut shall extend into the vertical shelf support shall be no more than half of the thickness of the vertical support. The joint shall be glued for its entire length and all the surfaces of the joint shall be fully glued with no fraction of the joint’s “shelf to support” surfaces void of glue.

E. Supported Shelves Up To 32 inch (813 mm) Span: Adjustable and fixed shelves with end supports only, and end-to-end spans shorter than or equal to 32 inches (813 mm), shall be 3/4 inch (19 mm) minimum thick.

Fixed shelves of end-to-end lengths shorter than or equal to 32 inches (813 mm), with support along at least one of their long edges, shall also be 3/4 inch (19 mm) minimum thick.

F. Supported Shelves, 32 inch (813 mm) to 42 inch (1,067 mm) Span: Adjustable and fixed shelves with end supports only, and end-to-end spans between 32 inches (813 mm) and 42 inches (1,067 mm), shall be 1 inch (25 mm) minimum thick. Fixed shelves of end-to-end lengths between 32 inches (813 mm) and 42 inches (1,067 mm), with support along at least one of their long edges, shall also be 1 inch (25 mm) minimum thick.

G. Adjustable Supports: Provide one of the following.

1. Recessed Standards (**UNT**): Adjustable shelves shall be supported by recessed standards. The face of the standard shall be in-line and flush with the face of the panel into which it is installed. Other AWS accepted methods of adjustable shelf support will not be allowed, including the “surface mounted standards” method and the “multiple holes” method. Adjustable shelves shall be made adjustable by the use of metal shelf supports. Provide the KV - #233 System.
2. Multiple Hole Supports (**UNT**): Adjustable shelves shall be supported by the “Multiple Holes” (with pegs) method with two columns of holes to allow two supports at each end of a shelf. The front and back shelf supports shall be the Basis-of-Design indicated below. Other AWS accepted methods of adjustable shelf support will not be allowed, including the “surface mounted standards” method and the “recessed standards” method. The front and back supports for the adjustable shelves shall be plastic shelf supports.

   a. Basis-of-Design: Dual Peg Locking Tongue Support, Clear, 5mm x 3/4 inch (19 mm) or 1 inch (25 mm), Model # 3220CL, Bainbridge Manufacturing, Inc. 800-255-4702 www.bainbridgemfg.com

H. Complete fabrication, including assembly, finishing, 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.

I. Shop cut openings, to maximum extent possible, to receive hardware, appliances, plumbing fixtures, 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.

1. Seal edges of openings in countertops with a coat of varnish.

J. Install glass to comply with applicable requirements in Division 8 Section "Glazing" and in GANA's "Glazing Manual." For glass in wood frames, secure glass with removable stops.

2.5 PLASTIC-LAMINATE CABINETS

A. Quality Standard: Comply with AWS Section 10 – Casework.

B. AWS Grade: Custom.

C. Provide laminate covered panels of balanced construction for all work provided and controlled under this specification section. Panels with one surface finished and the other not finished, will not be allowed. Panels with both sides of panels finished, but not of balanced construction, will not be allowed. Adjacent panels or panels of more than one panel thickness must be glued together, or each substrate panel must have both surfaces covered with laminate before being located in final plan configuration.

D. AWS Type of Cabinet Construction: Reveal overlay.

E. Panel Product for Exposed Surfaces: 7-ply, minimum, Hardwood Veneer Core plywood.

F. Laminate Cladding for Exposed Surfaces (Exteriors of cabinets with and without doors and drawers, interiors of cabinet compartments without doors): High-pressure decorative laminate complying with the following requirements:

1. Horizontal Surfaces Other Than Tops: HGS.

2. Postformed Surfaces: HGP.
3. Vertical Surfaces: VGS.
4. Edges: HGS, except provide 1mm thick Rigid PVC extrusions, through color, matching the laminate in color, pattern and texture, at shelves only.
5. Thermoset Decorative Overlay (Melamine) will not be allowed, and HPDL - Grade CLS, will not be allowed at exposed surfaces.

G. Materials for Semiexposed Surfaces:

1. For semiexposed backs of panels (visible from the inside of the cabinet) with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate:

a. Grade VGS where cabinets are freestanding (with the back is not against a wall), or where cabinet backs are against a low wall and the back is partially visible.
b. Grade CLS where cabinet back are against walls.

H. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:

1. Match color, pattern, and finish as indicated by laminate manufacturer's designations for these characteristics.

2.6 SHOP FINISHING

A. Quality Standard: Comply with AWS, unless otherwise indicated.

1. Grade: Provide finishes of same grades as items to be finished.

B. General: Shop finish transparent finished interior architectural woodwork at fabrication shop as specified in this Section. Refer to Division 9 Section "Painting" for finishing opaque finished architectural woodwork.

C. Preparations for Finishing: Comply with referenced quality standard 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 woodwork. Apply two coats to back of paneling and to end-grain surfaces. Concealed surfaces of plastic-laminate-clad woodwork do not require backpriming when surfaced with plastic laminate, backing paper, or thermoset decorative overlay.

D. Transparent Finish: Comply with requirements indicated below for grade, finish system, staining, and sheen, with sheen measured on 60-degree gloss meter per ASTM D 523:

1. AWS Finish System 5: Conversion varnish.
2. Staining: Match approved sample for color.
3. Wash Coat for Stained Finish at Closed-Grain Wood: Apply a vinyl wash coat before staining and finishing to woodwork made from closed-grain wood, or to any woodwork made from wood with a combination of end-grain wood and any other grain.
4. Open Finish for Open-Grain Woods: Do not apply filler to open-grain woods.
5. Sheen: Satin, 30-50 gloss units.

PART 3 - EXECUTION

3.1 PREPARATION

A. Condition woodwork to average prevailing humidity conditions in installation areas before installation.

B. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packaging and shipping restraints.

3.2 INSTALLATION

A. Quality Standard: Install woodwork to comply with AWS for the items specified in Part 2 of this Section for type of woodwork involved.

B. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm).

C. Scribe and cut woodwork to fit adjoining work, and refinish cut surfaces and repair damaged finish at cuts.

D. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.

E. Cabinets: Install without distortion so doors and drawers fit openings properly 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.

1. Install cabinets with no more than 1/8 inch in 96 inch (3 mm in 2400 mm) sag, bow, or other variation from a straight line.
2. Maintain veneer sequence matching of cabinets with transparent finish.
3. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches (400 mm) o.c. with No. 10 wafer-head screws sized for 1 inch (25 mm) penetration into wood framing, blocking, or hanging strips and No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish.
4. Locks: If casework elevations indicate “LOCKS: ooo” (ooo = YES, NO, dash (-) or is blank), provide the following:

   a. “LOCKS: YES” – provide all the drawers and doors shown in the elevation with locks.
   b. “LOCKS: YES” with one or more of the drawers and doors shown with a lock – again, provide all the drawers and doors shown in the elevation with locks.
   c. “LOCKS: NO” – provide all the drawers and doors shown in the elevation without locks.
   d. ”LOCKS: NO” with one or more of the drawers and doors shown with a lock – again, provide all the drawers and doors shown in the elevation with without locks, except each drawer and / or door shown with a lock, shall receive a lock.
   e. “LOCKS: *blank or dash (-)*” – provide all the drawers and doors shown in the elevation without locks.
   f. ”LOCKS: *blank or dash (-)*” with one or more of the drawers and doors shown with a lock – again, provide all the drawers and doors shown in the elevation with without locks, except each drawer and / or door shown with a lock, shall receive a lock.
   g. If something other than the 6 conditions indicated are found, inquire with the Architect, on how to proceed.
   h. A small circle shall be the symbol for a lock, unless otherwise indicated, and the symbol (circle or other indicated symbol) shall supersede the omission of locks caused by the “LOCKS: NO” or “LOCKS: *blank or dash (-)*” designations for the casework elevation.
   i. Each drawer and door shall receive its own lock, unless otherwise indicated – provide a locking system capable of locking more than one drawer at a time from a single lock, where indicated.

5. Key cabinet (millwork) locks alike within each room and differently from room to room.

   a. Provide 4 master keys which can operate all cabinet (millwork) locks throughout the areas receiving new cabinets (millwork).

3.3 ADJUSTING AND CLEANING

A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

B. Clean, lubricate, and adjust hardware.

C. Clean woodwork on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 064023

SECTION 079200

JOINT SEALANTS

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. Silicone joint sealants.
2. Urethane joint sealants.
3. Latex joint sealants.
4. Acoustical sealants.
5. Fire resistive joint sealants.

B. Related Sections:

1. Division 08 Section "Glazing" for glazing sealants.
2. Division 09 Section "Gypsum Board" for sealing perimeter joints.

1.3 SUBMITTALS

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. 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 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.

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. 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.

C. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

A. Silicone, S, NS, 100/50, NT: Single-component, nonsag, plus 100 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 100/50, Use NT.

1. Products: Subject to compliance with requirements, provide the following or approved:

a. DOW Dowsil 790.

2.3 EPOXY JOINT SEALANTS

A. Two-Component, Semi-rigid, Joint Sealant: ACI 302, for Use T.

1. Products: Subject to compliance with requirements, provide the following or approved substitute:

a. Euclid Chemical Company; Euco 700.

2.4 URETHANE JOINT SEALANTS

A. Single-Component, Pourable, Traffic-Grade, Urethane Joint Sealant: ASTM C 920, Type S, Grade P, Class 25, for Use T, M, A, O and I (Class 2).

1. Products: Subject to compliance with requirements, provide one of the following or approved substitute:

a. Tremco Incorporated; Vulkem 45SSL.

B. Urethane, M, NS, 50, T, NT: Single-component, nonsag, plus 100 percent and minus 50 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Uses T and NT, M, A, O, I.

1. Products: Subject to compliance with requirements, provide the following:

a. Tremco Incorporated; Dymeric 100.

2.5 LATEX JOINT SEALANTS

A. Latex Joint Sealant: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

1. Products: Subject to compliance with requirements, provide one of the following or approved substitute:

a. May National Associates, Inc.; Bondaflex Sil-A 700.
b. Pecora Corporation; AC-20+.
c. Tremco Incorporated; Tremflex 834.

2.6 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), 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.

2.7 ACOUSTICAL JOINT SEALANTS

A. Acoustical Sealant for Fire-Rated Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex acoustical sealant complying with ASTM C834.

1. Basis of Design Products: Subject to compliance with requirements, provide Pecora AC-20 FTR sealant. Other manufacturers that may offer products include the following manufacturers:

a. Accumetric LLC
b. Everkem Diversified Products, Inc.
c. Franklin International.
d. GE Construction Sealants; Momentive Performance Materials Inc.
e. Grabber Construction Products; Acoustical Sealant GSC.
f. Hilti, Inc.
g. OSI Sealants; Henkel Corporation.
h. Pecora Corporation.
i. Serious Energy Inc.
j. Tremco Incorporated.
k. USG Corporation.

B. Acoustical Sealant for Concealed Joints: Manufacturer's standard nonsag, nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber acoustical sealant.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Pecora Corporation; BA-98.
b. Serious Energy Inc.; Quiet Seal 350.

2.8 FIRE-RESISTANT JOINT SEALERS:

A. General: Provide manufacturer's standard fire-stopping sealant, with accessory materials, having fire-resistance ratings indicated as established by testing identical assemblies per ASTM E 814 by

Underwriters Laboratory, Inc. Systen #49 and #319, or other testing and inspecting agency acceptable to authorities having jurisdiction.

B. Foamed-In-Place Fire-Stopping Sealant: Two-part, foamed-in-place, silicone sealant formulated for use in a through-penetration fire-stop system for filling openings around cables, conduit, pipes and similar penetrations through walls and floors.

C. One-Part Fire-Stopping Sealant: One part elastomeric sealant formulated for use in a through-penetration fire-stop system for sealing openings around cables, conduit, pipes and similar penetrations through walls and floors.

D. Accessories: Provide the following fire-stopping accessories as manufactured by 3M Brand Fire Protection Products or approved substitute, and as in compliance with details on drawings:

1. 3M Fire Barrier RC-1 restricting collar.
2. 3M Fire Barrier FS-195 Wrap/Strip.

E. Accessories: Provide the following fire-stopping accessories as manufactured by Wiremold Wire and Cable Management Systems or approved substitute, and as in compliance with details on drawings:

1. FlameStopper FS Series Thru-Wall Fitting for Fire Walls, cable penetrations; Wiremold.

F. Available Products: Subject to compliance with requirements, products which may be incorporated in the Work include, but are not limited to, the following:

1. Foamed-In-Place Fire-Stopping Sealant:

a. Dow Corning Fire Stop Foam"; Dow Corning Corp.
b. "Pensil 851"; General Electric Co.

2. One-Part Fire-Stopping Sealant:

a. "Dow Corning Fire Stop Sealant"; Dow Corning Corp.
b. "3M Fire Barrier Caulk CP-25WB"; Electrical Products Div./3M.
c. "3M Fire Barrier Caulk CP-25S/L"; Electrical Products Div./3M.
d. "3M Fire Barrier Caulk CP-25N/S"; Electrical Products Div./3M.
e. "RTV 7403"; General Electric Co.
f. "Fyresil"; Tremco
g. "Fyreshield"; Tremco

2.9 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

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. Masonry.
    c. Unglazed surfaces of ceramic tile.

3. 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. Glass.
    c. Porcelain enamel.
    d. 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. 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.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. 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.

F. 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.
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.

G. Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping, taking care not to pull or stretch material, and to comply with sealant manufacturer's directions for installation methods, materials, and tools which produce seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures where expansion of sealant requires acceleration to produce seal, apply heat to sealant in conformance with sealant manufacturer's recommendations.

H. Installation of Fire-Stopping Sealant: Install sealant, including forming, packing, and other accessory materials to fill openings around mechanical and electrical services penetrating floors and walls to provide fire-stops with fire resistance ratings indicated for floor or wall assembly in which penetration occurs. Comply with installation requirements established by testing and inspecting agency.

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.

1. Joint Locations:

a. Isolation and contraction joints in cast-in-place concrete slabs.
b. Other joints as indicated.

2. Urethane Joint Sealant: Single component, pourable, traffic grade.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

B. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Locations:

a. Construction joints in cast-in-place concrete.
b. Control and expansion joints in unit masonry.
c. Joints between different materials listed above.
d. Perimeter joints between materials listed above and frames of doors, windows and louvers.
e. Control and expansion joints in ceilings and other overhead surfaces.
f. Other joints as indicated on Drawings.

2. Joint Sealant: Urethane, M, NS, 50, T, NT.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

C. Joint-Sealant Application: Interior joints in horizontal foot traffic and soft-wheeled surfaces.

1. Joint Locations:

a. Isolation joints in cast-in-place concrete slabs.
b. Control and expansion joints in exposed cast-in-place concrete floors.
c. Construction joints in resilient floors on cast-in-place concrete slabs.
d. Perimeter slab to wall expansion joint.
e. Other joints as indicated.

2. Urethane Joint Sealant: Single component, pourable, traffic grade.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

D. Joint-Sealant Application: Interior joints in horizontal hard-wheeled traffic surfaces.

1. Joint Locations:

a. Control and expansion joints in exposed cast-in-place concrete floors.
b. Other joints as indicated.

2. Epoxy Joint Sealant: Two-component, semi-rigid, traffic grade.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

E. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Locations:

a. Control and expansion joints on exposed interior surfaces of exterior walls.
b. Perimeter joints of exterior openings where indicated.
c. Vertical joints on exposed surfaces of interior unit masonry, concrete, walls, and partitions.
d. Perimeter joints between interior wall surfaces and frames of interior doors, windows, and elevator entrances.
e. Other joints as indicated.

2. Joint Sealant: Latex.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of standard and special colors.

F. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Sealant Location:

   a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
   b. Other joints as indicated.

2. Joint Sealant: Single component, nonsag, mildew resistant, acid curing.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION 079200

SECTION 079513.13

INTERIOR EXPANSION JOINT COVER ASSEMBLIES

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 interior expansion joint cover 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 expansion joint cover assemblies.

B. Shop Drawings: For each expansion joint cover assembly.

1. Include 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 each expansion joint cover assembly and for each color and texture specified, full width by 6 inches long in size.

D. 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.

E. Samples for Verification: For each type of expansion joint cover assembly, full width by 6 inches long in size.

F. 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.
7. Fire-resistance ratings.

1.4 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each fire-resistance-rated expansion joint cover assembly, for tests performed by a qualified testing agency.

1.5 QUALITY ASSURANCE

A. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for materials and execution.

1. Build mockup of typical expansion joint cover assembly as shown on Drawings.
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.

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 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Expansion joint cover assemblies shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

B. Fire-Resistance Ratings: Provide expansion joint cover assemblies with fire barriers identical to those of systems tested for fire resistance according to UL 2079 or ASTM E 1966 by a qualified testing agency, acceptable to the authority having jurisdiction.

1. Hose Stream Test: Wall-to-wall and wall-to-ceiling assemblies shall be subjected to hose stream testing.

C. Expansion Joint Design Criteria:

1. Type of Movement: Thermal.

a. Nominal Joint Width: As indicated on Drawings.
b. Minimum Joint Width: As indicated on Drawings.
c. Maximum Joint Width: As indicated on Drawings.

2. Type of Movement: Expansion and contraction.

a. Joint Movement: As indicated on Drawings.

2.3 FLOOR EXPANSION JOINT COVERS

A. Floor Joint Cover.

1. Manufacturers: Provide products comparable to the Basis-of-Design products indicated, by one of the following Manufacturers.

   a. Architectural Art Manufacturing, Division of Pittcon Industries 800-835-0028 www.archart.com
   b. Balco Inc 800-767-0082 www.balcousa.com
   c. Construction Specialties, Inc. 972-988-9400 www.c-sgroup.com
   d. InPro Corporation 800-437-2698 www.inprocorp.com
   e. MM Systems Corporation 866-506-6929 www.mmsystemscorp.com

2. Application: Floor to floor and floor to wall.

   a. Floor to Floor Joints.

      1) Basis-of-Design Product: Construction Specialties, Inc.; "ALR" Series.

   b. Floor to Wall Joints:

      2) Basis-of-Design Product: Construction Specialties, Inc.; "ALRW" Series.

3. Installation: Integrated for floor to floor and integrated and surface mounted for floor to wall.
4. Load Capacity:

   a. Uniform Load: 50 lb/sq. ft.
   b. Concentrated Load: 300 lb.
   c. Maximum Deflection: 0.0625 inch.

5. Fire-Resistance Rating: Not less than that indicated on the Drawings for the adjacent, surrounding construction into which the joint is placed.
6. Cover-Plate Design: Plain.
7. Exposed Metal:

   a. Aluminum: Mill for floor pieces and Clear anodic, Class II for aluminum above the floor level.

2.4 WALL EXPANSION JOINT COVERS

A. Metal-Plate Wall Joint Cover: Metal cover plate fixed on one side of joint gap and free to slide on other.

1. Manufacturers: Provide products comparable to the Basis-of-Design products indicated, by one of the following Manufacturers.

   a. Architectural Art Manufacturing, Division of Pittcon Industries 800-835-0028 www.archart.com
   b. Balco Inc 800-767-0082 www.balcousa.com
   c. Construction Specialties, Inc. 972-988-9400 www.c-sgroup.com
   d. InPro Corporation 800-437-2698 www.inprocorp.com
   e. MM Systems Corporation 866-506-6929 www.mmsystemscorp.com

2. Application: Wall to wall.

   a. Wall-to-Wall Joints:

      1) Basis-of-Design Product: Construction Specialties, Inc.; "AFW" Series.

3. Fire-Resistance Rating: Not less than that indicated on the Drawings for the adjacent, surrounding construction into which the joint is placed.
4. Exposed Metal:

a. Aluminum: Clear anodic, Class II.

2.5 CEILING / SOFFIT EXPANSION JOINT COVERS

A. Ceiling Joint Cover: Assembly consisting of center plate that slides over gasket in metal frames fixed to sides of joint gaps.

1. Manufacturers: Provide products comparable to the Basis-of-Design products indicated, by one of the following Manufacturers.

   a. Architectural Art Manufacturing, Division of Pittcon Industries 800-835-0028 www.archart.com
   b. Balco Inc 800-767-0082 www.balcousa.com
   c. Construction Specialties, Inc. 972-988-9400 www.c-sgroup.com
   d. InPro Corporation 800-437-2698 www.inprocorp.com
   e. MM Systems Corporation 866-506-6929 www.mmsystemscorp.com

2. Application: Ceiling to ceiling and Wall to ceiling / soffit.

   a. Ceiling-to-Ceiling Joints:

      1) Basis-of-Design Product: Construction Specialties, Inc.; “FCF” Series.

   a. Wall-to-Ceiling / Soffit Joints:

      1) Basis-of-Design Product: Construction Specialties, Inc.; “FCSC” Series.

3. Fire-Resistance Rating: Not less than that indicated on the Drawings for the adjacent, surrounding construction into which the joint is placed.
4. Exposed Metal:

   a. Aluminum: Clear anodic, Class II.

2.6 MATERIALS

A. Aluminum: ASTM B 221 (ASTM B 221M), Alloy 6063-T5 for extrusions; ASTM B 209 (ASTM B 209M), 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. Stainless Steel: ASTM A 240/A 240M or ASTM A 666, Type 304 for plates, sheet, and strips.

C. Brass: ASTM B 36/B 36M, UNS Alloy C26000 for half hard sheet and coil.

D. Bronze: ASTM B 455, Alloy C38500 for extrusions; Alloy C23000 red brass for plates.

E. Elastomeric Seals: Manufacturer's standard preformed elastomeric membranes or extrusions to be installed in metal frames.

F. Fire Barriers: Any material or material combination, when fire tested after cycling, designated to resist the passage of flame and hot gases through a movement joint and to comply with performance criteria for required fire-resistance rating.

G. Moisture Barrier: Manufacturer's standard, flexible elastomeric material.

H. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.7 ALUMINUM FINISHES

A. Mill finish.

B. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

2.8 ACCESSORIES

A. Moisture Barriers: Manufacturer's standard continuous, waterproof membrane within joint and attached to substrate on sides of joint.

1. Provide at expansion control systems that traverse wet areas, such as shower rooms, or rooms that are frequently mopped down, such as commercial kitchens, and provide where indicated on Drawings.

B. Manufacturer's standard attachment devices, dry areas of the building. Provide stainless steel attachment devices at expansion control systems that traverse wet areas, such as shower rooms, or rooms that are frequently mopped down, such as commercial kitchens. 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 (75 mm) from each end and not more than 24 inches (600 mm) 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.

F. Fire-Resistance-Rated Assemblies: Coordinate installation of expansion joint cover assembly materials and associated work so complete assemblies comply with performance requirements.

1. Fire Barriers: Install fire barriers to provide continuous, uninterrupted fire resistance throughout length of joint, including transitions and field splices.

G. Moisture Barrier Drainage: If indicated, provide drainage fittings and connect to drains.

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.

END OF SECTION 079513.13

SECTION 081113

HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Interior standard steel door and window frames.

1.2 COORDINATION

A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

B. Coordinate requirements for installation of door hardware, electrified door hardware, and access control and security systems.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, core descriptions, fire-resistance ratings, and finishes.

B. Shop Drawings: Include the following:

1. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
2. Locations of reinforcement and preparations for hardware.
3. Details of each different wall opening condition.
4. Details of electrical raceway and preparation for electrified hardware, access control systems, and security systems.
5. Details of anchorages, joints, field splices, and connections.
6. Details of accessories.
7. Details of moldings, removable stops, and glazing.

C. Product Schedule: For hollow-metal doors and frames, prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final door hardware schedule.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality control reports.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow-metal doors and frames palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use 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 hollow-metal doors and frames vertically under cover at Project site with head up. Place on minimum 4-inch- (102-mm-) high wood blocking. Provide minimum 1/4-inch (6-mm) space between each stacked door to permit air circulation.

PART 2 - PRODUCTS

2.1 INTERIOR STANDARD STEEL DOORS AND FRAMES

A. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Extra-Heavy-Duty Doors and Frames: ANSI/SDI A250.8, Level 3; ANSI/SDI A250.4, Level A.

1. Frames:

a. Materials: Uncoated steel sheet, minimum thickness of 0.053 inch (1.3 mm).
b. Sidelite Frames: Fabricated from same thickness material as adjacent door frame.
c. Construction: Full profile welded.

2. Exposed Finish: Prime.

2.2 BORROWED LITES

A. Fabricate of uncoated steel sheet, minimum thickness of 0.053 inch (1.3 mm).

B. Construction: Full profile welded.

C. Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as metal as frames.

D. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.

2.3 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B.

C. Inserts, Bolts, and Fasteners: Hot-dip galvanized in accordance with ASTM A153/A153M.

D. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.

E. Mineral-Fiber Insulation: ASTM C665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E136 for combustion characteristics.

F. Glazing: Comply with requirements in Section 088000 “Glazing.”

2.4 FABRICATION

A. Hollow-Metal Frames: Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as frames.

1. Sidelite Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by welding.
2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
3. Jamb Anchors: Provide number and spacing of anchors as follows or at rated frames, as required to construct the rated assembly:

   a. Masonry Type: Locate anchors not more than 16 inches (406 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c., to match coursing, and as follows:

      1) Two anchors per jamb up to 60 inches (1524 mm) high.
      2) Three anchors per jamb from 60 to 90 inches (1524 to 2286 mm) high.
      3) Four anchors per jamb from 90 to 120 inches (2286 to 3048 mm) high.
      4) Four anchors per jamb plus one additional anchor per jamb for each 24 inches (610 mm) or fraction thereof above 120 inches (3048 mm) high.

   b. Stud-Wall Type: Locate anchors not more than 18 inches (457 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c. and as follows:

      1) Three anchors per jamb up to 60 inches (1524 mm) high.
      2) Four anchors per jamb from 60 to 90 inches (1524 to 2286 mm) high.
      3) Five anchors per jamb from 90 to 96 inches (2286 to 2438 mm) high.
      4) Five anchors per jamb plus one additional anchor per jamb for each 24 inches (610 mm) or fraction thereof above 96 inches (2438 mm) high.

   c. Compression Type: Not less than two anchors in each frame.
   d. Postinstalled Expansion Type: Locate anchors not more than 6 inches (152 mm) from top and bottom of frame. Space anchors not more than 26 inches (660 mm) o.c.

4. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.

   a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
   b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

B. Hardware Preparation: Factory prepare hollow-metal doors and frames to receive templated mortised hardware, and electrical wiring; include cutouts, reinforcement, mortising, drilling, and tapping in accordance with ANSI/SDI A250.6, the Door Hardware Schedule, and templates.

1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

2. Comply with BHMA A156.115 for preparing hollow-metal doors and frames for hardware.

C. Glazed Lites: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with mitered hairline joints.

1. Provide stops and moldings flush with face of door, and with beveled stops unless otherwise indicated.
2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames. Provide loose stops and moldings on inside of hollow-metal doors and frames.
4. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.
5. Provide stops for installation with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches (230 mm) o.c. and not more than 2 inches (51 mm) o.c. from each corner.

2.5 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

PART 3 - EXECUTION

3.1 PREPARATION

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. Touch up factory-applied finishes where spreaders are removed.

B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.2 INSTALLATION

A. Install hollow-metal doors and frames plumb, rigid, properly aligned, and securely fastened in place. Comply with approved Shop Drawings and with manufacturer's written instructions.

B. Hollow-Metal Frames: Comply with ANSI/SDI A250.11.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces without damage to completed Work.

a. Where frames are fabricated in sections, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces. Touch-up finishes.
b. Install frames with removable stops located on secure side of opening.

2. Floor Anchors: Secure with postinstalled expansion anchors.
3. Solidly pack mineral-fiber insulation inside frames.
4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout or mortar.

5. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
6. Installation Tolerances: Adjust hollow-metal frames to the following tolerances:

    a. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
    b. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
    c. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
    d. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs at floor.

C. Glazing: Comply with installation requirements in Section 088000 "Glazing" and with hollow-metal manufacturer's written instructions.

3.3 REPAIR

A. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

END OF SECTION 081113

SECTION 081416

FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Five-ply flush wood veneer-faced doors for transparent finish.
2. Factory finishing flush wood doors.
3. Factory fitting flush wood doors to frames and factory machining for hardware.

B. Related Sections include the following:

1. Division 8 Section "Glazing" for glass view panels in flush wood doors.

1.3 SUBMITTALS

A. Product Data: For each type of door. Include details of core and edge construction, louvers, and trim for openings. Include factory-finishing specifications.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.

1. Indicate requirements for veneer matching.
2. Indicate doors to be factory finished and finish requirements.
3. Indicate fire ratings for fire doors.

C. Samples for Verification:

1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain flush wood doors through one source from a single manufacturer.

B. Quality Standard: Comply with NWWDA I.S.1-A, "Architectural Wood Flush Doors."

C. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.

1. Test Pressure: Test at atmospheric pressure.

2. Temperature-Rise Rating: At exit enclosures, provide doors that have a temperature-rise rating of 450° F (250° C) maximum in 30 minutes of fire exposure.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of referenced standard and manufacturer's written instructions.

B. Package doors individually in cardboard cartons and wrap bundles of doors in plastic sheeting.

C. Mark each door on top and bottom rail with opening number used on Shop Drawings.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until building is enclosed, wet work is complete, and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature between 60 and 90° F (16 and 32° C) and relative humidity between 25 and 55 percent during the remainder of the construction period.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form, signed by manufacturer, Installer, and Contractor, in which manufacturer agrees to repair or replace doors that are defective in materials or workmanship, have warped (bow, cup, or twist) more than 1/4 inch (6.4 mm) in a 42-by-84-inch section, or show telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.

1. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
2. Warranty shall be in effect during the following period of time from date of Substantial Completion:

a. Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Flush Wood Doors:

a. Algoma Hardwoods Inc.; a Masonite company
b. Eggers Industries; Architectural Door Division.
c. Graham Wood Doors.; an Assa Abloy Group company
d. Marshfield Doors; a Masonite company.
e. Mohawk Flush Doors, Inc.; a Masonite company
f. VT Industries Inc.

2.2 DOOR CONSTRUCTION, GENERAL

A. Adhesives: Do not use adhesives containing urea formaldehyde.

B. Doors for Transparent Finish:

1. Grade: Premium, with Grade A faces.
2. Species and Cut: Match species of existing doors on Project site.
3. Match between Veneer Leaves: Match existing doors on Project site.
4. Assembly of Veneer Leaves on Door Faces: Match existing doors on Project site.
5. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.
6. Room Match: Provide door faces of compatible color and grain within each separate room or area of building.
7. Stiles: Same species as faces.

2.3 SOLID-CORE DOORS

A. Particleboard Cores: Comply with the following requirements:

1. Particleboard: ANSI A208.1, Grade LD-2.

a. Use particleboard made with binder containing no urea-formaldehyde resin.

2. Provide doors with either glued-block or structural composite lumber cores instead of particleboard cores at locations where exit devices are indicated.

B. Interior Veneer-Faced Doors:

1. Core: Particleboard or Either glued block or structural composite lumber per 2.3.A.2 above.
2. Construction: Five plies with stiles and rails bonded to core, and then entire unit abrasive planed before veneering.

C. Fire-Rated Doors:

1. Construction: Construction and core specified above for type of face indicated or manufacturer's standard mineral-core construction as needed to provide fire rating indicated.
2. Blocking: For mineral-core doors, provide composite blocking with improved screw-holding capability approved for use in doors of fire ratings indicated as needed to eliminate through-bolting hardware.
3. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile matching face veneer, and laminated backing at hinge stiles for improved screw-holding capability and split resistance.
4. Pairs: Provide fire-rated pairs with fire-retardant stiles matching face veneer that are labeled and listed for kinds of applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals.

2.4 LIGHT FRAMES

A. Wood Beads for Light Openings in Wood Doors:

1. Wood Species: Same species as door faces.
2. Profile: Flush rectangular beads.
3. At 20-minute, fire-rated, wood-core doors, provide wood beads and metal glazing clips approved for such use.

2.5 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated, with the following uniform clearances and bevels, unless otherwise indicated:

1. Comply with clearance requirements of referenced quality standard for fitting. Comply with requirements in NFPA 80 for fire-rated doors.

B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.

1. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before factory machining.
2. Metal Astragals: Premachine astragals and formed-steel edges for hardware for pairs of fire-rated doors.

C. Openings: Cut and trim openings through doors to comply with applicable requirements of referenced standards for kind(s) of door(s) required.

1. Light Openings: Trim openings with moldings of material and profile indicated.

2.6 FACTORY FINISHING

A. General: Comply with AWI's "Architectural Woodwork Standards" for factory finishing.

B. Finish doors at factory.

C. Transparent Finish:

1. Grade: Premium.
2. Finish: AWI System 3.
3. Finish doors to match existing doors on Project site.
4. Effect: Filled finish.
5. Sheen: Satin.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and installed door frames before hanging doors.

1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
2. Reject doors with defects.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Manufacturer's Written Instructions: Install doors to comply with manufacturer's written instructions, referenced quality standard, and as indicated.

1. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.

B. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

C. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

D. Hang all doors so they remain fully and totally closed without latching.

3.3 ADJUSTING

A. Operation: Re-hang or replace doors that do not swing or operate freely.

B. Finished Doors: Replace doors that are damaged or do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 081416

SECTION 081816.16

MULTIPANEL SLIDING ALUMINUM-FRAMED GLASS DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior multipanel sliding aluminum-framed glass doors.

B. Related Requirements:

1. Section 087100 "Door Hardware" for hardware not specified in this Section.

1.2 ACTION SUBMITTALS

A. Product Data:

1. Multipanel sliding aluminum-framed glass doors.

B. Product Data Submittals: For each product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for multipanel sliding aluminum-framed glass doors.

C. Shop Drawings:

1. Include plans, elevations, sections, and installation details.
2. Indicate dimensions, configuration of panels, and stacking layout.

D. Samples: For each multipanel sliding aluminum-framed glass door and for each color specified, 12-inch-long (300-mm-long) section with factory-applied color finish.

E. Product Schedule: For multipanel sliding aluminum-framed glass doors. Use same designations indicated on Drawings.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For each multipanel sliding aluminum-framed glass door, for tests performed by manufacturer and witnessed by a qualified testing agency or by a qualified testing agency; and for each class and performance grade indicated, tested at AAMA gateway size.

C. Field quality-control reports.

D. Sample Warranty: For manufacturer's special warranty.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For multipanel sliding aluminum-framed glass doors to include in maintenance manuals. Include finishes, weather stripping, operable panels, and operating hardware.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: A manufacturer capable of fabricating multipanel sliding aluminum-framed glass doors that meet or exceed performance requirements indicated and of documenting this performance by inclusion in lists and by labels, test reports, and calculations.

B. Installer Qualifications: An installer acceptable to multipanel sliding aluminum-framed glass door manufacturer for installation of units required for this Project.

1.6 WARRANTY

A. Manufacturer's Special Warranty: Manufacturer agrees to repair or replace multipanel sliding aluminum-framed glass doors that fail(s) in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Failure to meet performance requirements.
b. Structural failures, including excess deflection.
c. Faulty operation of movable panels and hardware.
d. Deterioration of metals, metal finishes, and other materials.

2. Warranty Period:

a. Multipanel Sliding Aluminum-Framed Glass Doors: Five year(s) from date of Substantial Completion.

B. Special Finish Warranty, Anodized Finishes: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of anodized finishes within specified warranty period.

1. Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Delta E units when tested in accordance with ASTM D2244.
b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
c. Cracking, peeling, or chipping.

2. Warranty Period: Five years minimum from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Product Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 for minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.

1. Product Certification: AAMA certified with label attached to each door.

B. Thermal Movements: Provide multipanel sliding aluminum-framed glass doors, including anchorage, that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

C. Sound Transmission Class (STC): Rated for not less than 28 STC when tested for laboratory sound transmission loss in accordance with ASTM E90 and determined by ASTM E413.

2.2 MULTIPANEL SLIDING ALUMINUM-FRAMED GLASS DOORS

A. Basis-of-Design: Kawneer 1010 Aluminum Sliding Mall Panel Storefront.

B. Manufacturers: Subject to compliance with requirements, provide the named product, or a comparable product by one of the following:

1. Arcadia Incorporated 713-398-3227 www.arcadiainc.com/
2. Arch Aluminum & Glass Co., Inc. www.arch.amarlite.com
3. Boyd Aluminum Manufacturing Company 800-737-2800 https://boydaluminum.com/
4. CMI Architectural Products, Inc. 800-334-1533 www.cmiarch.com
5. Columbia Commercial Building Products 800-668-1645 www.ccbpwin.com
6. Coral Industries Inc. 800-772-7737 http://coralind.com/
7. EFCO, a Pella Company 800-221-4169 www.efcocorp.com
8. Kawneer North America 972-438-1212 www.kawneer.com
9. Manko Window Systems, Inc. 800-642-1488 www.mankowindows.com
10. Oldcastle BuildingEnvelope 866-653-2278 www.oldcastlebe.com
11. Regal Mfg. Co., Division of Arcorp, Inc. 503-230-0444
12. Trulite Glass & Aluminum Solutions, LLC. 800-432-8132 www.trulite.com
13. Tubelite Inc. 800-866-2227 www.tubeliteinc.com
14. Vistawall Architectural Products. www.vistawall.com/
15. Waltek & Company, Ltd. 513-577-7980 www.waltekltd.com
16. YKK AP America Inc. 800-955-9551 www.ykkap.com

C. Multipanel Sliding Aluminum-Framed Glass Doors: Provide extruded-aluminum-framed, multipanel sliding glass doors, designed for interior use, complete with glazing, threshold, flashings, support, and anchorage devices.

1. Stack Storage Configuration: Panels open from center to both sides and are stored within opening unless otherwise indicated on the Drawings.

D. Frames and Door Panels: Fabricate from aluminum extrusions complying with AAMA/WDMA/CSA 101/I.S.2/A440 and indicated requirements. Provide factory-assembled door panels that are reglazable without dismantling panel framing and factory-assembled or field-assembled frames.

2.3 GLAZING

A. Glass and Glazing: Manufacturer's standard glazing system that produces weathertight seal.

1. Glass: ASTM C1036, Type 1, q3; Category II safety glass complying with testing requirements in 16 CFR 1201.
2. Safety Glazing Labeling: Permanently mark safety glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction or the manufacturer. Label

must indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

3. Tint: Clear.

2.4 HARDWARE

A. Provide manufacturer's standard hardware, fabricated from a corrosion-resistant material compatible with door panels and other components, and complying with AAMA 907. Provide hardware designed to smoothly operate, tightly close, and securely lock multipanel sliding aluminum-framed glass doors. Size hardware to accommodate panel weights and dimensions. Provide full-perimeter weatherstripping for each interior door panel, unless it is recommended by the door manufacturer that the full-perimeter weatherstripping specifically be removed at interior locations, and the removal of the weatherstripping will not impede or degrade the interior door's function, including acoustical performance.

B. Bottom-Supported Panel System: Provide panel support system designed for size, weight, and performance requirements of multipanel sliding aluminum-framed glass doors indicated, capable of being adjusted for smooth operation and clearances without needing to remove panels from tracks.

1. Bottom Carriers: Provide carrier system designed to roll on track within threshold, with overhead wheeled guide that engages upper track. Provide carriers with sealed ball bearings.
2. Lock: Provide manufacturer's standard multipoint locking device on primary door panel, lockable from the inside. Provide exterior cylinder lock on primary panel. Provide manufacturer's standard lock mechanism on each secondary door panel operable from the inside. Adjust locking devices to allow unobstructed movement of the panel across adjacent panel in the direction indicated.

   a. Trim Design: As selected from manufacturer's full range.
   b. Trim Finish: As selected from manufacturer's full range of finishes.
   c. Cylinders: As specified in Section 087100 "Door Hardware."

3. Threshold Configuration: Extruded-aluminum multitrack threshold with low profile, compliant with United States Access Board's "Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines" or recessed flush profile.

   a. Aluminum Finish: To match panel.

2.5 ACCESSORIES

A. Trim: Provide interior and exterior casings, jamb extensions, and other components in material and finish to match door frames.

B. Fasteners: Noncorrosive and compatible with door members, trim, hardware, anchors, and other components.

1. Exposed Fasteners: Do not use exposed fasteners to the greatest extent possible. For application of hardware, use fasteners that match finish hardware being fastened.

C. Anchors, Clips, and Accessories: Provide anchors, clips, and accessories of aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron for multipanel sliding aluminum-framed glass doors, complying with ASTM B456 or ASTM B633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.

2.6 FABRICATION

A. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation.

B. Factory-Glazed Fabrication: Glaze sliding aluminum-framed glass doors in the factory.

2.7 GENERAL FINISH REQUIREMENTS

A. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. 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.

2.8 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of Work.

B. Verify rough opening dimensions, levelness of threshold substrate, and operational clearances.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing multipanel sliding aluminum-framed glass doors, hardware, accessories, and other components.

B. Install multipanel sliding aluminum-framed glass doors level, plumb, square, true to line; without distortion, warp, or rack of frames and panels, and without impeding thermal movement; anchored securely in place to structural support; and in proper relation to other adjacent construction.

C. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

3.3 ADJUSTING

A. Adjust hardware for proper alignment, smooth operation, and proper latching without unnecessary force or excessive clearance.

B. Adjust hardware and operable panels to function smoothly, and lubricate as recommended by manufacturer.

3.4 CLEANING

A. Clean exposed surfaces immediately after installation. Avoid damaging protective coatings and finishes. Remove nonpermanent labels, excess sealants, glazing materials, dirt, and other substances.

B. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

3.5 PROTECTION

A. Protect multipanel sliding aluminum-framed glass door surfaces from contact with contaminating substances resulting from construction operations. Remove contaminants immediately in accordance with manufacturer's written instructions.

B. Refinish or replace sliding aluminum-framed glass doors with damaged finishes.

END OF SECTION 081816.16

SECTION 083113

ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes fire resistive rated and non-rated access doors and panels with frames for walls and ceilings.

1. Provide for access to controls, valves, traps, dampers, cleanouts, and similar items requiring operation behind inaccessible finished surfaces.
2. Coordinate exact locations with the various trades to assure proper placement of access doors and panels.

1.2 REFERENCES

A. ASTM International: ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.

B. Intertek Testing Services (Warnock Hersey Listed): WH - Certification Listings.

C. National Fire Protection Association: NFPA 80 - Standard for Fire Doors, Fire Windows.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, fire ratings for doors in rated assemblies, material descriptions, dimensions of individual components and profiles, and finishes.

B. Samples: For each type of access door and frame and for each finish specified, complete assembly minimum 6 by 6 inches (150 by 150 mm) in size.

C. Product Schedule: For access doors and frames.

1.4 QUALITY ASSURANCE

A. Single Source Responsibility: Obtain access doors for entire project from one source from a single manufacturer.

B. Size Variations: Obtain Architect's acceptance of manufacturer's standard size units, which may vary slightly from sizes indicated.

C. Coordination: Furnish inserts and anchoring devices that must be built into other work for installation of access doors. Coordinate delivery with other work to avoid delay

1.5 PROJECT CONDITIONS

A. Verification: Obtain specific locations and sizes for required access doors from trades requiring access to concealed equipment, and indicate on submittal schedule.

B. Special-Size Access doors: Use where required or requested, indicate on schedule.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Rated Access Doors and Frames: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, according to NFPA 252 or UL 10B. At acoustically rated assemblies, provide acoustical rated doors and frames with STC ratings equal to or better than the STC rating of the assembly.

2.2 MANUFACTURERS

1. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the Work include, but are not limited to, the following:

   a. Babcock-Davis, Inc. 888-412-3726 www.babcockdavis.com
   b. Bar-Co, Alfab, Inc. 334-347-9516 www.alfabinc.com
   c. Cesco Products 888-422-3726 www.cescoproducts.com
   d. J.L. Industries, Inc. 800-554-6077 www.jlindustries.com
   e. Karp Associates, Inc. 800-888-4212 www.karpinc.com
   f. Milcor, Commercial Products Group of Hart & Cooley, Inc. 800-624-8642 www.commercialproductsgroup.com
   g. Nystrom, Inc. 800-547-2635 www.nystrom.com
   h. The Williams Brothers Corporation 416-299-7767 www.williams-brothers.com

2.3 ACCESS DOORS AND FRAMES

A. Flush Access Doors with Concealed Flanges:

1. Description: Face of door flush with frame; with concealed flange and concealed hinge.
2. Locations: Wall and ceiling.
3. Door Size: As indicated.
4. Uncoated Steel Sheet for Door: Nominal 0.060 inch (1.52 mm), 16 gage, factory primed unless indicated to be finished.
5. Frame Material: Same material and thickness as door.
6. Latch and Lock: Cam latch, screwdriver operated.
7. At acoustically rated walls, provide acoustical rated doors and frames with STC ratings equal to or better than the STC rating of the wall.

2.4 MATERIALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A 879/A 879M, with cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.

C. Frame Anchors: Same material as door face.

D. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

2.5 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.

D. Latch and Lock Hardware:

1. Quantity: Furnish number of latches and locks required to hold doors tightly closed.

2.6 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 Primed: Apply manufacturer's standard, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.
2. Factory Finished (if indicated): Apply manufacturer's standard baked-enamel or powder-coat finish immediately after cleaning and pretreating, with minimum dry-film thickness of 1 mil (0.025 mm) 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.

C. Coordinate installation with work of other trades.

3.2 INSTALLATION

A. Comply with manufacturer's written instructions for installing access doors and frames.

B. Set frames accurately in position and securely attach to supports with face panels plumb or level in relation to adjacent finish surfaces.

3.3 ADJUSTING

A. Adjust doors and hardware, after installation, for proper operation.

B. Remove and replace panels or frames that are warped, bowed, or otherwise damaged.

END OF SECTION 083113

SECTION 087100

DOOR HARDWARE

PART 1 - GENERAL

1.1 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.
2. Division 06 Section "Rough Carpentry"
3. 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:
   a. "Metal Doors and Frames"
   b. "Flush Wood Doors"
   c. "Stile and Rail Wood Doors"
   d. "Interior Aluminum Doors and Frames"
   e. "Aluminum-Framed Entrances and Storefronts"
   f. "Stainless Steel Doors and Frames"
   g. "Special Function Doors"
   h. "Entrances"
6. Division 26 "Electrical" sections for connections to electrical power system and for low-voltage wiring.
7. Division 28 "Electronic Safety and Security" sections for coordination with other components of electronic access control system and fire alarm system.

1.2 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
3. Keying Systems and Nomenclature

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

1.3 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 Hardware 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.

1.4 QUALITY ASSURANCE

A. Qualifications and Responsibilities:

1. 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.

1.5 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 door hardware 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.

1.6 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.

1.7 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) Best 9K Series Locks: 10 years
      2) Exit Devices
         a) Von Duprin: 3 years
      3) Closers
         a) LCN 4000 Series: 30 years
         b) LCN 1460 Series: 30 years
   b. Electrical Warranty
      1) Locks
         a) Best 9K Series Electromechanical Locks: 3 years
      2) Exit Devices
         a) Von Duprin: 1 year

1.8 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

2.1 `MANUFACTURERS

A. The Owner requires use of certain products for their unique characteristics and project suitability to ensure continuity of existing and future performance and maintenance standards. After investigating available product offerings, the Awarding Authority has elected to prepare proprietary specifications. These products are specified with the notation: "No Substitute."

   1. Where "No Substitute" is noted, submittals and substitution requests for other products will not be considered.

B. 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.

C. 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.

D. 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.

2.2 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.

2.3 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. 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.

2.4 CONTINUOUS HINGES

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

2. Acceptable Manufacturers:
   a. Select
   b. Roton

B. Requirements:

1. Provide aluminum geared continuous hinges conforming to ANSI/BHMA A156.26, Grade 1.
2. Provide aluminum geared continuous hinges, where specified in the hardware sets, fabricated from 6063-T6 aluminum.
3. Provide split nylon bearings at each hinge knuckle for quiet, smooth, self-lubricating operation.
4. Provide hinges capable of supporting door weights up to 450 pounds, and successfully tested for 1,500,000 cycles.
5. On fire-rated doors, provide aluminum geared continuous hinges classified for use on rated doors by testing agency acceptable to authority having jurisdiction.
6. Provide aluminum geared continuous hinges with electrified option scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware.
7. Provide hinges 1 inch (25 mm) shorter in length than nominal height of door, unless otherwise noted or door details require shorter length and with symmetrical hole pattern.

2.5 ELECTRIC POWER TRANSFER

A. Manufacturers:

1. Scheduled Manufacturer and Product:
   a. Von Duprin EPT-10

2. Acceptable Manufacturers and Products:
   a. Securitron CEPT-10
   b. Security Door Controls PTM

B. Requirements:

1. Provide power transfer with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware.
2. Locate electric power transfer per manufacturer's template and UL requirements, unless interference with operation of door or other hardware items.

2.6 FLUSH BOLTS

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

2. Acceptable Manufacturers:
   a. Burns
   b. Trimco

B. Requirements:

1. Provide automatic, constant latching, and manual flush bolts with forged bronze or stainless-steel face plates, extruded brass levers, and with wrought brass guides and strikes. Provide 12 inch (305 mm) steel or brass rods at doors up to 90 inches (2286 mm) in height. For doors over 90 inches (2286 mm) in height increase top rods by 6 inches (152 mm) for each additional 6 inches (152 mm) of door height. Provide dust-proof strikes at each bottom flush bolt.

2.7 COORDINATORS

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

2. Acceptable Manufacturers:
   a. Burns
   b. Trimco

B. Requirements:

1. Where pairs of doors are equipped with automatic flush bolts, an astragal, or other hardware that requires synchronized closing of the doors, provide bar-type coordinating device, surface applied to underside of stop at frame head.
2. Provide filler bar of correct length for unit to span entire width of opening, and appropriate brackets for parallel arm door closers, surface vertical rod exit device strikes, or other stop mounted hardware. Factory-prepared coordinators for vertical rod devices as specified.

2.8 CYLINDRICAL LOCKS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
   a. BEST 9K3 SERIES

2. Acceptable Manufacturers and Products:
   a. No Substitute

B. Requirements:

1. Provide cylindrical locks conforming to ANSI/BHMA A156.2 Series 4000, Grade 1, and UL Listed for 3-hour fire doors.
2. Provide locksets with chassis manufactured from zinc alloy and corrosion-treated steel.
3. Provide locks with standard 2-3/4 inches (70 mm) backset with 9/16 inch (14 mm) throw.
4. Provide ASA strikes unless extended lip strikes are necessary to protect trim.
5. Lockset to have anti-rotational studs that are through-bolted.
6. Lever Handles: High-quality zinc alloy with trim components of brass or bronze.
   a. Lever Design: 15 D

2.9 EXIT DEVICES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
   a. Von Duprin 99/33A series

2. Acceptable Manufacturers and Products:
   a. No Substitute

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 withstand 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.

2.10 POWER SUPPLIES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
   a. Schlage/Von Duprin PS900 Series

2. Acceptable Manufacturers and Products:
   a. Securitron BPS series
   b. Security Door Controls 600 series

B. Requirements:

1. Provide power supplies approved by manufacturer of supplied electrified hardware.
2. Provide appropriate quantity of power supplies necessary for proper operation of electrified locking components as recommended by manufacturer of electrified locking components with consideration for each electrified component using power supply, location of power supply, and approved wiring diagrams. Locate power supplies as directed by Architect.
3. Provide regulated and filtered 24 VDC power supply, and UL class 2 listed.
4. Provide power supplies with the following features:
   a. 12/24 VDC Output, field selectable.

b. Class 2 Rated power limited output.
c. Universal 120-240 VAC input.
d. Low voltage DC, regulated and filtered.
e. Polarized connector for distribution boards.
f. Fused primary input.
g. AC input and DC output monitoring circuit w/LED indicators.
h. Cover mounted AC Input indication.
i. Tested and certified to meet UL294.
j. NEMA 1 enclosure.
k. Hinged cover w/lock down screws.
l. High voltage protective cover.

2.11 CYLINDERS

A. Manufacturers:

1. Scheduled Manufacturer and Product:
   a. University of North Texas – Restricted Best Preferred Keyway

2. Acceptable Manufacturers and Products:
   a. No Substitute

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.

2.12 KEYING

A. Scheduled System:

1. 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.

B. Requirements:

1. Construction Keying:
   a. 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).
   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.

2.13 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.

2.14 DOOR CLOSERS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
   a. LCN 4040XP series

2. Acceptable Manufacturers and Products:
   a. No Substitute

B. Requirements:

1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. ISO 9000 certify closers. Stamp units with date of manufacture code.
2. 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 piston with 5/8-inch (16 mm) diameter double heat-treated pinion journal. QR code with a direct link to maintenance instructions.
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. Provide snap-on cover clip, with plastic covers, that secures cover to spring tube.
6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck. Provide graphically labelled instructions on the closer body adjacent to each adjustment valve. Provide positive stop on reg valve that prevents reg screw from being backed out.
7. Provide closers with solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers.
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 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.

2.15 DOOR CLOSERS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
   a. LCN 1460 series

2. Acceptable Manufacturers and Products:
   a. No Substitute

B. Requirements:

1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory.
2. Provide door closers with fully hydraulic, full rack and pinion action cast iron cylinder.
3. Closer Body: 1-1/4-inch (32 mm) diameter, with 5/8-inch (16 mm) diameter 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. Pressure Relief Valve (PRV) Technology: Not permitted.
8. 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.

2.16 PROTECTION PLATES

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

2. Acceptable Manufacturers:
   a. Burns
   b. Trimco

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.

2.17 OVERHEAD STOPS AND OVERHEAD STOP/HOLDERS

A. Manufacturers:

1. Scheduled Manufacturers:
   a. Glynn-Johnson

2. Acceptable Manufacturers:
   a. Rixson
   b. Sargent

B. Requirements:

1. Provide overhead stop at any door where conditions do not allow for a wall stop or floor stop presents tripping hazard.
2. Provide friction type at doors without closer and positive type at doors with closer.

2.18 DOOR STOPS AND HOLDERS

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

2. Acceptable Manufacturers:
   a. Trimco
   b. Burns

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.

2.19 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

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.

2.20 SILENCERS

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

2. Acceptable Manufacturers:
   a. Burns
   b. 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.

2.21 DOOR POSITION SWITCHES

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Schlage

2. Acceptable Manufacturers:
   a. GE-Interlogix
   b. Sargent

B. Requirements:

1. Provide recessed or surface mounted type door position switches as specified.
2. Coordinate door and frame preparations with door and frame suppliers. If switches are being used with magnetic locking device, provide minimum of 4 inches (102 mm) between switch and magnetic locking device.

2.22 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

3.1 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.

3.2 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.
2. Connections to and from power supplies to electrified hardware.
3. Connections to fire/smoke alarm system and smoke evacuation system.
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.

L. Door Closers: Mount closers on room side of corridor doors, inside of exterior doors, and stair side of 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.

3.3 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. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of 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.

3.4 CLEANING AND PROTECTION

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 without damage or deterioration at time of Substantial Completion.

3.5 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:

83792 OPT0305044 Version 2

HARDWARE GROUP NO. 001

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	SFIC RIM HOUSING	80-129	626	SCH
1	EA	SFIC CORE	MATCH OWNERS EXISTING KEY SYSTEM	626	BES
	EA	SLIDING DOOR SYSTEM	ALL REMAINING HARDWARE BY DOOR SYSTEM SUPPLIER		

-COORDINATE CYLINDER REQUIREMENT WITH DOOR SYSTEM SUPPLIER.

HARDWARE GROUP NO. 002

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	SFIC RIM HOUSING	80-129	626	SCH
1	EA	SFIC CORE	MATCH OWNERS EXISTING KEY SYSTEM	626	BES
1	EA	CONSTRUCTION CORE	SFIC 7-PIN CONST CORE	GRN	BES
1	EA	SINGLE SWING DOOR SYSTEM	ALL REMAINING HARDWARE BY MFG.		

-COORDINATE CYLINDER REQUIREMENT WITH DOOR SYSTEM SUPPLIER.

HARDWARE GROUP NO. 003

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	SFIC RIM HOUSING	80-129	626	SCH
1	EA	SFIC CORE	MATCH OWNERS EXISTING KEY SYSTEM	626	BES
1	EA	CONSTRUCTION CORE	SFIC 7-PIN CONST CORE	GRN	BES
1	EA	SLIDING DOOR SYSTEM	ALL REMAINING HARDWARE BY DOOR SYSTEM SUPPLIER		

-COORDINATE CYLINDER REQUIREMENT WITH DOOR SYSTEM SUPPLIER.

HARDWARE GROUP NO. 009

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	SFIC RIM HOUSING	80-129	626	SCH
1	EA	SFIC CORE	MATCH OWNERS EXISTING KEY SYSTEM	626	BES
1	EA	CONSTRUCTION CORE	SFIC 7-PIN CONST CORE	GRN	BES
1	EA	SINGLE SWING DOOR SYSTEM	ALL REMAINING HARDWARE BY MFG.		

-COORDINATE CYLINDER REQUIREMENT WITH DOOR SYSTEM SUPPLIER.

HARDWARE GROUP NO. 103

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 (NRP AS REQ)	652	IVE
1	EA	OFFICE LOCK	9K-3-7-AB-15D-S3 MATCH OWNERS EXISTING KEY SYSTEM	626	BES
1	EA	CONSTRUCTION CORE	SFIC 7-PIN CONST CORE	GRN	BES
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HARDWARE GROUP NO. 201C

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 (NRP AS REQ)	652	IVE
1	EA	STOREROOM LOCK	9K-3-7-D-15D-S3 MATCH OWNERS EXISTING KEY SYSTEM	626	BES
1	EA	CONSTRUCTION CORE	SFIC 7-PIN CONST CORE	GRN	BES
1	EA	SURFACE CLOSER	4040XP SCUSH X MTG BRKTS, SPCR & PLATE AS REQ	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	488S H & J (USE SILENCERS @ NON-RATED DOORS) (PERIMETER SEAL BY ALF MFR @ ALF)	BK	ZER

HARDWARE GROUP NO. 551

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 (NRP AS REQ)	652	IVE
1	EA	CYLINDRICAL LOCK	9K-3-7-IN-15D-S3 MATCH OWNERS EXISTING KEY SYSTEM	626	BES
2	EA	CONSTRUCTION CORE	SFIC 7-PIN CONST CORE	GRN	BES
1	EA	SURFACE CLOSER	4040XP RW/PA X MTG BRKTS, PLATES AND SPACERS AS REQ	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	GASKETING	488S H & J (USE SILENCERS @ NON-RATED DOORS) (PERIMETER SEAL BY ALF MFR @ ALF)	BK	ZER

HARDWARE GROUP NO. C002

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	SFIC RIM HOUSING	80-129	626	SCH
1	EA	SFIC CORE	MATCH OWNERS EXISTING KEY SYSTEM	626	BES
1	EA	CONSTRUCTION CORE	SFIC 7-PIN CONST CORE	GRN	BES
1	EA	SINGLE SWING DOOR SYSTEM	ALL REMAINING HARDWARE BY MFG.		

-COORDINATE CYLINDER REQUIREMENT WITH DOOR SYSTEM SUPPLIER.
-ACCESS CONTROL TO BE PROVIDED BY SECURITY CONTRACTOR.

HARDWARE GROUP NO. C201

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 (NRP AS REQ)	652	IVE
1	EA	POWER TRANSFER	EPT10 CON	689	VON
1	EA	ELECTROMECHANICAL LOCK	9KW-3-7-DEU-15D-S3 (FAIL SECURE) MATCH OWNERS EXISTING KEY SYSTEM	626	BES
1	EA	CONSTRUCTION CORE	SFIC 7-PIN CONST CORE	GRN	BES
1	EA	SURFACE CLOSER	4040XP RW/PA X MTG BRKTS, PLATES AND SPACERS AS REQ	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	GASKETING	488S H & J (USE SILENCERS @ NON-RATED DOORS) (PERIMETER SEAL BY ALF MFR @ ALF)	BK	ZER
2	EA	HARNESS (1 IN DOOR & 1 IN FRAME)	ALLEGION CONNECT TYPE & LENGTH AS REQ		SCH
1	EA	HARNESS (TO POWER SUPPLY)	CON-6W - CONNECTION LEADS		SCH
1	EA	CREDENTIAL READER	BY SECURITY CONTRACTOR		
1	EA	DOOR CONTACT	679-05 TYPE AS REQ	BLK	SCE
1	EA	POWER SUPPLY	FOR CREDENTIAL READER BY SECURITY CONTRACTOR		
1	EA	POWER SUPPLY	PS902 120/240 VAC (COORDINATE POWER SUPPLIES WITH SECURITY PRIOR TO SUBMITTAL. OMIT WHERE PROVIDED BY SECURITY.)	LGR	SCE

-INGRESS BY THE CARD READER OR KEY OVERRIDE.
-FREE EGRESS BY LEVER.

HARDWARE GROUP NO. C711

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 (NRP AS REQ)	652	IVE
1	EA	POWER TRANSFER	EPT10 CON	689	VON
1	EA	ELEC PANIC HARDWARE	RX-99-L-M996-06-FSE-CON LENGTH AS REQ	626	VON
1	EA	SFIC RIM HOUSING	80-129	626	SCH
1	EA	SFIC CORE	MATCH OWNERS EXISTING KEY SYSTEM	626	BES
1	EA	CONSTRUCTION CORE	SFIC 7-PIN CONST CORE	GRN	BES
1	EA	SURFACE CLOSER	4040XP RW/PA X MTG BRKTS, PLATES AND SPACERS AS REQ	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE
2	EA	HARNESS (1 IN DOOR & 1 IN FRAME)	ALLEGION CONNECT TYPE & LENGTH AS REQ		SCH
1	EA	HARNESS (TO POWER SUPPLY)	CON-6W - CONNECTION LEADS		SCH
1	EA	CREDENTIAL READER	BY SECURITY CONTRACTOR		
1	EA	DOOR CONTACT	679-05 TYPE AS REQ	BLK	SCE
1	EA	POWER SUPPLY	FOR CREDENTIAL READER BY SECURITY CONTRACTOR		
1	EA	POWER SUPPLY	PS902 120/240 VAC (COORDINATE POWER SUPPLIES WITH SECURITY PRIOR TO SUBMITTAL. OMIT WHERE PROVIDED BY SECURITY.)	LGR	SCE

-INGRESS BY THE CARD READER OR KEY OVERRIDE.
-FREE EGRESS BY THE PUSH PAD.

HARDWARE GROUP NO. C711C

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 (NRP AS REQ)	652	IVE
1	EA	POWER TRANSFER	EPT10 CON	689	VON
1	EA	ELEC PANIC HARDWARE	RX-99-L-M996-06-FSE-CON LENGTH AS REQ	626	VON
1	EA	SFIC RIM HOUSING	80-129	626	SCH
1	EA	SFIC CORE	MATCH OWNERS EXISTING KEY SYSTEM	626	BES
1	EA	CONSTRUCTION CORE	SFIC 7-PIN CONST CORE	GRN	BES
1	EA	SURFACE CLOSER	4040XP SCUSH X MTG BRKTS, SPCR & PLATE AS REQ	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
3	EA	SILENCER	SR64	GRY	IVE
2	EA	HARNESS (1 IN DOOR & 1 IN FRAME)	ALLEGION CONNECT TYPE & LENGTH AS REQ		SCH
1	EA	HARNESS (TO POWER SUPPLY)	CON-6W - CONNECTION LEADS		SCH
1	EA	CREDENTIAL READER	BY SECURITY CONTRACTOR		
1	EA	DOOR CONTACT	679-05 TYPE AS REQ	BLK	SCE
1	EA	POWER SUPPLY	FOR CREDENTIAL READER BY SECURITY CONTRACTOR		
1	EA	POWER SUPPLY	PS902 120/240 VAC (COORDINATE POWER SUPPLIES WITH SECURITY PRIOR TO SUBMITTAL. OMIT WHERE PROVIDED BY SECURITY.)	LGR	SCE

-INGRESS BY THE CARD READER OR KEY OVERRIDE.
-FREE EGRESS BY THE PUSH PAD.

HARDWARE GROUP NO. CE002

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	EXISTING DOOR	REUSE EXISTING HARDWARE		B/O

-ACCESS CONTROL TO BE PROVIDED BY SECURITY CONTRACTOR.

HARDWARE GROUP NO. E103

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 (NRP AS REQ)	652	IVE
1	EA	OFFICE LOCK	9K-3-7-AB-15D-S3 MATCH OWNERS EXISTING KEY SYSTEM	626	BES
1	EA	CONSTRUCTION CORE	SFIC 7-PIN CONST CORE	GRN	BES
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

-PREP DOOR & FRAME AS REQUIRED FOR NEW HARDWARE. PATCH OR FILL ALL EXISTING UNUSED HOLES OR PREPS IN THE DOOR & FRAME.
-AT EXISTING FRAMES FIELD VERIFY AND MATCH EXISTING HINGE AND STRIKE SIZE.

HARDWARE GROUP NO. E103S

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 (NRP AS REQ)	652	IVE
1	EA	OFFICE LOCK	9K-3-7-AB-15D-S3 MATCH OWNERS EXISTING KEY SYSTEM	626	BES
1	EA	CONSTRUCTION CORE	SFIC 7-PIN CONST CORE	GRN	BES
1	EA	OH STOP	900S SERIES X SIZE & MOUNTING AS REQ	630	GLY
1	EA	SILENCER	SR64	GRY	IVE

-PREP DOOR & FRAME AS REQUIRED FOR NEW HARDWARE. PATCH OR FILL ALL EXISTING UNUSED HOLES OR PREPS IN THE DOOR & FRAME.
-AT EXISTING FRAMES FIELD VERIFY AND MATCH EXISTING HINGE AND STRIKE SIZE.

HARDWARE GROUP NO. E107E

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HINGE	5BB1 4.5 X 4.5 (NRP AS REQ)	652	IVE
1	EA	CONST LATCHING BOLT	FB51P/FB61P AS REQ	630	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	OFFICE LOCK	9K-3-7-AB-15D-S3 MATCH OWNERS EXISTING KEY SYSTEM	626	BES
1	EA	CONSTRUCTION CORE	SFIC 7-PIN CONST CORE	GRN	BES
1	EA	SURFACE CLOSER	4040XP RW/PA X MTG BRKTS, PLATES AND SPACERS AS REQ	689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
2	EA	WALL STOP	WS406/407CCV	630	IVE
2	SET	MEETING STILE	8193AA (2 PCS - 1 SET) HEIGHT AS REQ	AA	ZER
2	EA	SILENCER	SR64	GRY	IVE

-PREP DOORS & FRAME AS REQUIRED FOR NEW HARDWARE. PATCH OR FILL ALL EXISTING UNUSED HOLES OR PREPS IN THE DOOR & FRAME.
-AT EXISTING FRAMES FIELD VERIFY AND MATCH EXISTING HINGE SIZE.

HARDWARE GROUP NO. E203

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 (NRP AS REQ)	652	IVE
1	EA	STOREROOM LOCK	9K-3-7-D-15D-S3 MATCH OWNERS EXISTING KEY SYSTEM	626	BES
1	EA	CONSTRUCTION CORE	SFIC 7-PIN CONST CORE	GRN	BES
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	SILENCER	SR64	GRY	IVE

-PREP DOOR & FRAME AS REQUIRED FOR NEW HARDWARE. PATCH OR FILL ALL EXISTING UNUSED HOLES OR PREPS IN THE DOOR & FRAME.
-AT EXISTING FRAMES FIELD VERIFY AND MATCH EXISTING HINGE AND STRIKE SIZE.

HARDWARE GROUP NO. E303

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 (NRP AS REQ)	652	IVE
1	EA	PRIVACY	9K-3-0-L-15D-S3	626	BES
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

-PREP DOOR & FRAME AS REQUIRED FOR NEW HARDWARE. PATCH OR FILL ALL EXISTING UNUSED HOLES OR PREPS IN THE DOOR & FRAME.
-AT EXISTING FRAMES FIELD VERIFY AND MATCH EXISTING HINGE AND STRIKE SIZE.

HARDWARE GROUP NO. E303S

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 (NRP AS REQ)	652	IVE
1	EA	PRIVACY	9K-3-0-L-15D-S3	626	BES
1	EA	OH STOP	900S SERIES X SIZE & MOUNTING AS REQ	630	GLY
3	EA	SILENCER	SR64	GRY	IVE

-PREP DOOR & FRAME AS REQUIRED FOR NEW HARDWARE. PATCH OR FILL ALL EXISTING UNUSED HOLES OR PREPS IN THE DOOR & FRAME.
-AT EXISTING FRAMES FIELD VERIFY AND MATCH EXISTING HINGE AND STRIKE SIZE.

HARDWARE GROUP NO. E551

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 (NRP AS REQ)	652	IVE
1	EA	CYLINDRICAL LOCK	9K-3-7-IN-15D-S3 MATCH OWNERS EXISTING KEY SYSTEM	626	BES
2	EA	CONSTRUCTION CORE	SFIC 7-PIN CONST CORE	GRN	BES
1	EA	SURFACE CLOSER	4040XP RW/PA X MTG BRKTS, PLATES AND SPACERS AS REQ	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	GASKETING	488S H & J (USE SILENCERS @ NON-RATED DOORS) (PERIMETER SEAL BY ALF MFR @ ALF)	BK	ZER

-PREP DOOR & FRAME AS REQUIRED FOR NEW HARDWARE. PATCH OR FILL ALL EXISTING UNUSED HOLES OR PREPS IN THE DOOR & FRAME.
-AT EXISTING FRAMES FIELD VERIFY AND MATCH EXISTING HINGE AND STRIKE SIZE.

HARDWARE GROUP NO. E801

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	PUSH PLATE	8200 8" X 16"	630	IVE
1	EA	PULL PLATE	8302 10" 6" X 16"	630	IVE
1	EA	SURFACE CLOSER	4040XP RW/PA X MTG BRKTS, PLATES AND SPACERS AS REQ	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

-PREP DOOR & FRAME AS REQUIRED FOR NEW HARDWARE. PATCH OR FILL ALL EXISTING UNUSED HOLES OR PREPS IN THE DOOR & FRAME.
-AT EXISTING FRAMES FIELD VERIFY AND MATCH EXISTING HINGE SIZE.

HARDWARE GROUP NO. E810S

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	CONT. HINGE	112XY HEIGHT AS REQ	628	IVE
2	EA	LONG DOOR PULL	PR 9266F 72" OVERALL LENGTH (BTB MOUNT)	630	IVE
2	EA	OH STOP	900S SERIES X SIZE & MOUNTING AS REQ	630	GLY
2	EA	SURFACE CLOSER	1461 RW/PA X MTG BRKTS, PLATES AND SPACERS AS REQ	689	LCN

-PREP DOOR & FRAME AS REQUIRED FOR NEW HARDWARE. PATCH OR FILL ALL EXISTING UNUSED HOLES OR PREPS IN THE DOOR & FRAME.

HARDWARE GROUP NO. EC201C

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	HINGE	5BB1 4.5 X 4.5 (NRP AS REQ)	652	IVE
1	EA	ELECTRIC HINGE	5BB1HW 4.5 X 4.5 CON TW8	652	IVE
1	EA	ELECTROMECHANICAL LOCK	9KW-3-7-DEU-15D-S3 (FAIL SECURE) MATCH OWNERS EXISTING KEY SYSTEM	626	BES
1	EA	CONSTRUCTION CORE	SFIC 7-PIN CONST CORE	GRN	BES
1	EA	SURFACE CLOSER	4040XP SCUSH X MTG BRKTS, SPCR & PLATE AS REQ	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	488S H & J (USE SILENCERS @ NON-RATED DOORS) (PERIMETER SEAL BY ALF MFR @ ALF)	BK	ZER
2	EA	HARNESS (1 IN DOOR & 1 IN FRAME)	ALLEGION CONNECT TYPE & LENGTH AS REQ		SCH
1	EA	HARNESS (TO POWER SUPPLY)	CON-6W - CONNECTION LEADS		SCH
1	EA	CREDENTIAL READER	BY SECURITY CONTRACTOR		
1	EA	DOOR CONTACT	679-05 TYPE AS REQ	BLK	SCE
1	EA	POWER SUPPLY	FOR CREDENTIAL READER BY SECURITY CONTRACTOR		
1	EA	POWER SUPPLY	PS902 120/240 VAC (COORDINATE POWER SUPPLIES WITH SECURITY PRIOR TO SUBMITTAL. OMIT WHERE PROVIDED BY SECURITY.)	LGR	SCE

-PREP DOOR & FRAME AS REQUIRED FOR NEW HARDWARE. PATCH OR FILL ALL EXISTING UNUSED HOLES OR PREPS IN THE DOOR & FRAME.
-AT EXISTING FRAMES FIELD VERIFY AND MATCH EXISTING HINGE AND STRIKE SIZE.
-INGRESS BY THE CARD READER OR KEY OVERRIDE.
-FREE EGRESS BY LEVER.

University of North Texas Eagle Student Services Center

Door#	HwSet#
101A	E551
101B	E551
102	E103
103	E103
104	E103
105	E103
106A	C711
107	E303
108	E303S
109A	E551
109B	E551
110	E103
111	E103
112	E103
113	E103
114	E103
115	E103
116	E103
117	CE002
118	E103S
120	E103S
121	201C
122	E103
123A	E103
123B	E107E
124A	E103
124B	E103
125	E103S
126	E203
127	C711C
128	E103
129	E103S
130	E103S
132	E103
133	E103
134	E801
135	E801
135A	E801
201A	001
201B	C002
202	103
203	E103
204	E103
205	C002
206	103
207	E103

University of North Texas Eagle Student Services Center

Door#	HwSet#
208	103
209	103
210A	C201
210B	201C
212	C002
213	EC201C
214	E103
215	103
216	E103
217	E103
218	E103
219	103
220	E103
221	E551
221A	E303
222	E103S
223	E103
224	E810S
225	E103
226	E103
227	E103
228	E103S
229	E103
230A	002
230B	551
231	103
232	103
233	003
234	003
235	003
236	003
238	E801
239	E801
301	009

Project: University of North Texas Eagle Student Services Center
Print Date: 01/31/2023

Allegion: OPT0305044

2

END OF SECTION

SECTION 088000

GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Glass products.
2. Glazing sealants.
3. Miscellaneous glazing materials.

1.2 DEFINITIONS

A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters in accordance with ASTM C1036.

C. IBC: International Building Code.

1.3 COORDINATION

A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances to achieve proper safety margins for glazing retention under each design load case, load case combination, and service condition.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and manufacturers of fabricated glass units.

B. Product Certificates: For glass.

1.6 PRECONSTRUCTION TESTING

A. Preconstruction Adhesion and Compatibility Testing: Test each glass product, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.

1. Testing is not required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.

2. Use ASTM C1087 to determine whether priming and other specific joint-preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glass, tape sealants, gaskets, and glazing channel substrates.
3. Test no fewer than eight Samples of each type of material, including joint substrates, shims, sealant backings, secondary seals, and miscellaneous materials.
4. Schedule enough time for testing and analyzing results to prevent delaying the Work.
5. For materials failing tests, submit sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials in accordance with manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

B. Comply with insulating-glass manufacturer's written instructions for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.8 FIELD CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or are below 40 deg F (4.4 deg C).

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Glass: Obtain tinted glass from single source from single manufacturer.

B. Source Limitations for Glazing Accessories: For each product and installation method, obtain from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design glazing.

2.3 GLASS PRODUCTS, GENERAL

A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.

B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

C. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than thickness indicated.

1. Minimum Glass Thickness for Exterior Lites: 6 mm.

D. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where fully tempered float glass is indicated, provide fully tempered float glass.

2.4 GLASS PRODUCTS

A. Clear Annealed Float Glass: ASTM C1036, Type I, Class 1 (clear), Quality-Q3.

B. Fully Tempered Float Glass: ASTM C1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

2.5 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C1281 and AAMA 800 for products indicated below:

1. AAMA 804.3 tape, where indicated.
2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:

1. AAMA 810.1, Type 1, for glazing applications in which tape acts as primary sealant.
2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.6 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, recommended in writing by manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks:

1. EPDM with Shore A durometer hardness of 85, plus or minus 5.

2. Type recommended in writing by sealant or glass manufacturer.

D. Spacers:

1. Neoprene blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
2. Type recommended in writing by sealant or glass manufacturer.

E. Edge Blocks:

1. EPDM with Shore A durometer hardness per manufacturer's written instructions.
2. Type recommended in writing by sealant or glass manufacturer.

F. Cylindrical Glazing Sealant Backing: ASTM C1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

2.7 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

1. Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.

a. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Presence and functioning of weep systems.
3. Minimum required face and edge clearances.
4. Effective sealing between joints of glass-framing members.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that leave visible marks in the completed Work.

3.3 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.

C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

F. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm).

1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
2. Provide 1/8-inch- (3-mm-) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and in accordance with requirements in referenced glazing publications.

H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

I. Set glass lites with proper orientation so that coatings face exterior or interior as specified.

J. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended in writing by gasket manufacturer.

3.4 GASKET GLAZING (DRY)

A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended in writing by gasket manufacturer.

D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without

developing bending stresses in glass. Seal gasket joints with sealant recommended in writing by gasket manufacturer.

E. Install gaskets so they protrude past face of glazing stops.

3.5 CLEANING AND PROTECTION

A. Immediately after installation, remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.

1. If, despite such protection, contaminating substances do contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.

C. Remove and replace glass that is damaged during construction period.

D. Wash glass on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

3.6 MONOLITHIC GLASS SCHEDULE

A. Clear Glass Type: Fully tempered float glass.

1. Minimum Thickness: 6 mm.
2. Safety glazing required.

END OF SECTION 088000

SECTION 092216

NON-STRUCTURAL METAL 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, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Non-load-bearing steel framing systems for interior partitions.
2. Non-load-bearing steel framing systems for suspended interior ceilings, and for suspended glass partition system sliding doors.
3. Non-load-bearing steel framing systems for lateral bracing of stud walls, glass partition system, and sliding glass door system.
4. Non-load-bearing steel framing systems for support and bracing of additionally indicated systems.
5. Accessory supports for walls and counters.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E119 by an independent testing agency.

2.2 FRAMING SYSTEMS

A. Framing Members, General: Comply with ASTM C754 for conditions indicated.

1. Steel Sheet Components: Comply with ASTM C645 requirements for steel unless otherwise indicated.
2. Protective Coating: ASTM A653/A653M, G40 (Z120), hot-dip galvanized unless otherwise indicated.

B. Studs and Tracks: ASTM C645. Use either conventional steel studs and tracks or embossed, high-strength steel studs and tracks.

1. Steel Studs and Tracks:

a. Minimum Base-Steel Thickness: 0.0329 inch (0.836 mm).
b. Depth: As indicated on Drawings.

2. Embossed, High Strength Steel Studs and Tracks: Roll-formed and embossed with surface deformations to stiffen the framing members so that they are structurally comparable to conventional ASTM C645 steel studs and tracks.

C. Slip-Type Head Joints: Where indicated, provide one of the following:

1. 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.

1) Dietrich Metal Framing; SLP-TRK Slotted Deflection Track.
2) Steel Network Inc. (The); VertiClip SLD Series.
3) Superior Metal Trim; Superior Flex Track System (SFT).

D. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.

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. Fire Trak Corp.; Fire Trak System.
b. Grace Construction Products; FlameSafe FlowTrak System.
c. Metal-Lite, Inc.; The System.

E. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.

1. Minimum Base-Metal Thickness: 0.033 inch.

F. Cold-Rolled Channel Bridging: Steel, 0.0538-inch minimum base-steel thickness, with minimum 1/2-inch-wide flanges.

1. Depth: 1-1/2 inches.
2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch-thick, galvanized steel.

G. Hat-Shaped, Rigid Furring Channels: ASTM C645.

1. Minimum Base-Steel Thickness: 0.0329 inch.
2. Depth: As indicated on Drawings.

H. Cold-Rolled Furring Channels: 0.053-inch uncoated-steel thickness, with minimum 1/2-inch-wide flanges.

1. Depth: 3/4 inch.
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.

I. Z-Shaped Furring: With slotted or non-slotted 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.

J. Backing Plate: Proprietary fire-retardant-treated wood blocking and bracing in width indicated.

1. Product: ClarkDietrich; Danback Fire-Retardant Treated Wood Backing Plate D16F (for 16" o.c.) D24F (for 24" o.c.) or comparable product.

2.3 SUSPENSION SYSTEMS

A. Tie Wire: ASTM A 641 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. Powder-Actuated Fasteners: Suitable for application indicated, fabricated from corrosion-resistant materials with clips or other devices for attaching hangers of type indicated, and capable of sustaining, without failure, a load equal to 10 times that imposed by construction as determined by testing according to ASTM E 1190 by an independent testing agency.

C. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.16 inch in diameter.

D. Flat Hangers: Steel sheet, 1 by 3/16 inch by length indicated.

E. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.053 inch and minimum 1/2-inch- wide flanges.

1. Depth: 2-1/2 inches.

F. Furring Channels (Furring Members):

1. Cold-Rolled Channels: 0.053-inch uncoated-steel thickness, with minimum ½ inch-wide flanges, 3/4 inch deep.
2. Steel Studs and Runners: ASTM C 645.

a. Minimum Base-Metal Thickness: 0.033 inch.
b. Depth: As indicated on Drawings.

3. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch deep.

a. Minimum Base-Metal Thickness: 0.033 inch.

G. Grid Suspension System for Gypsum Board Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.

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. Armstrong World Industries, Inc.; Drywall Grid Systems.
b. Chicago Metallic Corporation; Drywall Grid System.
c. USG Corporation; Drywall Suspension System.

2.4 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.

C. Pony-Wall Bracing (Provide at partial height walls cantilevered up from the floor or other surfaces/substrates)

1. 2 inch x 2 inch x 1/8 inch wall steel tube fully-welded to 3-1/2 inch x 5 inch deep x ¼ inch thick steel base plate with (4) pre-punched mounting holes.
2. Products: *SKB Knee Brace Kit* as manufactured by Softforms, www.kneewall.com or approved equivalent. Acceptable alternative is Pony Wall by ClarkDietrich, www.clarkdietrich.com/.
3. Fasteners: 3/8 inch x 3-1/2 inch long expansion bolts as recommended by the manufacturer. Use (4) bolts per mounting plate.
4. Height: Fabricate or job-cut height of brace tube to be no lower than 2 inch below knee-wall height.
5. Spacing: At ends of low stud walls which are part of island or peninsula configurations with countertops, provide braces at 32 inch maximum within the low stud island and peninsula walls. Where low walls without countertops are located between full height walls provide braces at 48 inch on center maximum. Where low walls with countertops are located between full height walls provide braces at 32 inch on center maximum. Provide and fasten one metal stud on each side of each brace using self-tapping screws at nominal 6 inch centers vertically.

D. Countertop Brackets

1. Cantilevered from a Wall: Provide brackets at countertops cantilevered out from walls. Supports shall be made of 2 inch wide, minimum x 0.25 inch thick, minimum x legs of steel sized to support counters sizes indicated. Brackets shall not have diagonal braces as part of their design – the design of the braces will be “angle” or “L” shaped. The brackets shall be sized to extend closer than 6 inches to edge of the counter supported, but no closer than 1 inch to the outer edge of the counter.

   a. Spacing: As indicated, but no more than 32 inch on center and attached to studs or Concrete Masonry Units.
   b. For countertops cantilevered out from full height walls, provide one of the following or a comparable product:

      1) Front Mounting Countertop Support Bracket by Centerline Brackets (Cantilevered Counter Support Bracket) 888-960-3854 www.countertopbracket.com/

      2) Hamilton Bracket available through the Architectural Depot (Cantilevered Counter Support Bracket) 888-573-3768 www.architecturaldepot.com/

      3) Comparable to products above, additional indicated products, and / or “Surface Mount EH Counter Support Bracket with Rounded Ends” by Rakks (Surface Mount Counter Support) 781-455-8700 https://rakks.com/

2. Top of Pony Wall: Provide brackets at countertops on top of pony walls cantilevered from the floor. Supports shall be made of 2 inch wide, minimum x 0.25 inch thick, minimum x legs of steel sized to support counters sizes indicated. Brackets shall not have diagonal braces as part of their design – the design of the braces will be "angle" or "L" shaped, or . The brackets shall be sized to extend closer than 6 inches to edge of the counter supported, but no closer than 1 inch to the outer edge of the counter. Align pony wall brackes and countertop brackets to attach to the same studs.

   a. Spacing: As indicated, but no more than 32 inch on center and attached to studs or Concrete Masonry Units.
   b. For countertops mounted in island and pennisula configurations on top of pony walls, provide one of the following or a comparable product:

      1) Front Mounting Countertop Support Bracket by Centerline Brackets (Cantilevered Counter Support Bracket) 888-960-3854 www.countertopbracket.com/. Do not use there brackets where the edge of the counter is more than 21 inches beyond the face of the associated wall – the maximum counter depth these brackets may be used with is 21 inches deep.

      2) Hamilton Bracket available through the Architectural Depot (Cantilevered Counter Support Bracket) 888-573-3768 www.architecturaldepot.com/

      3) Center Levered Bar Support Bracket by Centerline Brackets (Cantilevered Counter Support Bracket) 888-960-3854 www.countertopbracket.com/

      4) Comparable to products above, additional indicated products, and / or "Surface Mount EH Counter Support Bracket with Rounded Ends" by Rakks (Surface Mount Counter Support) 781-455-8700 https://rakks.com/

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.

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.

1. Single-Layer Application: 16 inches o.c unless otherwise indicated.
2. Multilayer Application: 16 inches o.c., unless otherwise indicated.

3. Tile Backing Panels: 16 inches o.c. unless otherwise indicated.

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.
4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.

   a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.

5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.

E. Direct Furring:

1. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.

F. Z-Shaped Furring Members:

1. Erect insulation, specified in Section 072100 "Thermal Insulation," vertically and hold in place with Z-shaped furring members spaced 24 inches o.c.
2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.

G. 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.

H. Install countertop accessories and pony wall accessories in compliance with any product / manufacturer recommendations or requirements. Additionally comply with any installation requirements of the project Structural Engineer.

3.5 INSTALLING SUSPENSION SYSTEMS

A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

1. Hangers: 48 inches (1219 mm) o.c.
2. Carrying Channels (Main Runners): 48 inches (1219 mm) o.c.
3. Furring Channels (Furring Members): 16 inches (406 mm) o.c.

B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.

C. 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 connect or suspend steel framing from ducts, pipes, or conduit.

D. Framing at Glass Partition Walls: For glass doors which are part of the glass partition system, provide lateral bracing (perpendicular to the wall plane) at each (both) jamb(s) of both glass pivot doors and glass sliding doors. Provide the bracing for framing above the doors, above the gypsum board ceiling, furr down, or suspended wall. Provide 20 gauge framing for all the framing above the glass doors and for at least 2-feet beyond the jamb edges of the doors.

E. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.

F. 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.

G. 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.

END OF SECTION 092216

SECTION 092900

GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior gypsum board.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 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.

1.4 FIELD CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, those that are moisture damaged, and those that are 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. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

2.2 GYPSUM BOARD, GENERAL

A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.3 INTERIOR GYPSUM BOARD

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Georgia-Pacific Gypsum LLC.
2. Lafarge North America Inc.
3. National Gypsum Company.
4. USG Corporation.

B. Gypsum Board, Type X: ASTM C 1396/C 1396M.

1. Thickness: 5/8 inch, unless otherwise indicated on drawings.
2. Long Edges: Tapered.

C. Gypsum Ceiling Board: ASTM C1396/C1396M.

1. Thickness: 1/2 inch.
2. Long Edges: Tapered.

D. Moisture- and Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.

1. Core: 5/8 inch, Type X.
2. Long Edges: Tapered.
3. Mold Resistance: ASTM D 3273, score of 10.

2.4 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized steel sheet.
2. Shapes:

a. Cornerbead.
b. LC-Bead: J-shaped; exposed long flange receives joint compound.
c. L-Bead: L-shaped; exposed long flange receives joint compound.
d. U-Bead: J-shaped; exposed short flange does not receive joint compound.
e. Expansion (control) joint.
f. Curved-Edge Corner-bead: With notched or flexible flanges.

3. Partition end enclosure assembly: Extruded aluminum adjustable end-wall enclosure for transition from partition walls to window mullions:

a. Basis of Design: Gordon Architectural Engineered Solutions; Mullion Mate.
b. Series 40 Plus, Composite STC = 38 when tested in 65 STC wall, per ASTM E90-09 (2106) and ASTM E413-16.
c. Finish: Clear anodized.

2.5 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:

1. Interior Gypsum Board: Paper.

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.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound.

a. Use setting-type compound for installing paper-faced metal trim accessories.

3. Fill Coat: For second coat, use drying-type, all-purpose compound.
4. Finish Coat: For third coat, use drying-type, all-purpose compound.

2.6 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.

D. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
2. Thickness: As indicated by stud depths.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates including welded hollow-metal frames and framing, with Installer present, for compliance with requirements and other conditions affecting performance.

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 APPLYING AND FINISHING PANELS, GENERAL

A. Comply with ASTM C 840.

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, except floors. 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. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 APPLYING INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:

1. Wallboard Type: As indicated on Drawings.
2. Type X: As indicated on Drawings and where required for fire-resistance-rated assembly.
3. Moisture- and Mold-Resistant Type: As indicated on Drawings.

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.
2. On partitions/walls, apply gypsum panels vertically (parallel to framing unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.

   a. Stagger abutting end joints not less than 24 inches in alternate courses of panels.
   b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.

3. On Z-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 partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
3. On Z-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.
4. Fastening Methods: Fasten base layers and face layers separately to supports with screws.

D. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written recommendations and temporarily brace or fasten gypsum panels until fastening adhesive has set.

3.4 INSTALLING 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 at locations indicated on Drawings and in specific locations approved by Architect for visual effect. Minimum requirements per ASTM C 840 below are to be provided unless otherwise indicated:

1. Ceilings:

   a. Install control joints in areas exceeding 2500 sq.ft.
   b. Space control joints not more than 50 feet o.c.
   c. Install control joints where ceiling framing or furring changes direction.

2. Partitions and Furring:

   a. Install control joints in partitions and wall furring runs exceeding 30 feet.
   b. Space control joints not more than 30 feet o.c.
   c. Install control joints in furred assemblies where control joints occur in base exterior wall.

C. Interior Trim: Install in the following locations:

1. Cornerbead: Use at outside corners.
2. LC-Bead: Use at exposed panel edges.
3. Drywall End Closure: At walls abutting window mullions.

3.5 FINISHING 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 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 C 840:

1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
2. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated

a. Primer and its application to surfaces are specified in other Division 09 Sections.

3.6 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.

END OF SECTION 092900

SECTION 09 50 00

ACOUSTICAL METAL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Section Includes

1. Drawings and general conditions of Contract, including General and Supplementary Conditions and Division 01 Specification sections apply to work of this section.

1.2 SUMMARY

A. Section Includes

1. Acoustical metal ceiling panels
2. Exposed grid suspension system
3. Wire hangers, fasteners, main runners, cross tees, and wall angle moldings
4. Perimeter Trim

B. Related Sections:

1. Section 09 51 33 Acoustical Panel Ceilings
2. Section 09 29 00 - Gypsum Board
3. Divisions 23 - HVAC Air Distribution
4. Division 26 - Electrical

C. Alternative Products

1. Prior Approval: Unless otherwise provided for in the Contract documents, proposed product substitutions may be submitted no later than TEN (10) working days prior to the date established for receipt of bids. Acceptability of a proposed substitution is contingent upon the Architect's review of the proposal for acceptability and approved products will be set forth by the Addenda. If included in a Bid are substitute products that have not been approved by Addenda, the specified products shall be provided without additional compensation.
2. Submittals that do not provide adequate data for the product evaluation will not be considered. The proposed substitution must meet all requirements of this section, including but not necessarily limited to, the following: Single source materials suppliers (if specified in Section 1.5); Underwriters' Laboratories Classified Acoustical performance; Panel design, size, composition, color, and finish; Suspension system component profiles and sizes; Compliance with the referenced standards.

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. ASTM A 1008 Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability
2. ASTM A 641 Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire
3. ASTM A 653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process

4. ASTM C 423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
5. ASTM C 635 Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings
6. ASTM C 636 Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels
7. ASTM D 3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
8. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials
9. ASTM E 580 Installation of Metal Suspension Systems in Areas Requiring Moderate Seismic Restraint
10. ASTM E 1111 Standard Test Method for Measuring the Interzone Attenuation of Ceilings Systems
11. ASTM E 1414 Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum
12. ASTM E 1264 Classification for Acoustical Ceiling Products

B. International Building Code

C. ASHRAE Standard 62 1 2004 Ventilation for Acceptable Indoor Air Quality

D. NFPA 70 National Electrical Code

E. ASCE 7 American Society of Civil Engineers, Minimum Design Loads for Buildings and Other Structures

F. International Code Council-Evaluation Services - AC 156 Acceptance Criteria for Seismic Qualification Testing of Non-structural Components

G. International Code Council-Evaluation Services Report - Seismic Engineer Report

1. ESR 1308 - Armstrong Suspension Systems

1.4 SYSTEM DESCRIPTION

A. Continuous / Wall-to-Wall

1.5 SUBMITTALS

A. Product Data: Submit manufacturer's technical data for each type of acoustical ceiling unit and suspension system required.

B. Samples: Minimum 6-inch x 6-inch samples of specified acoustical panel; 8-inch-long samples of exposed wall molding and suspension system, including main runner and 4-foot cross tees.

C. Shop Drawings: Layout and details of acoustical ceilings show locations of items that are to be coordinated with or supported by the ceilings.

D. Certifications: Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards. For acoustical performance, each carton of material must carry an approved independent laboratory classification of NRC, CAC, and AC.

E. If the material supplied by the acoustical subcontractor does not have an Underwriter's Laboratory classification of acoustical performance on every carton, subcontractor shall be required to send material from every production run appearing on the job to an independent or NVLAP approved laboratory for testing, at the architect's or owner's discretion. All products not conforming to manufacturer's current

published values must be removed, disposed of, and replaced with complying product at the expense of the Contractor performing the work.

1.6 QUALITY ASSURANCE

A. Single-Source Responsibility: Provide acoustical panel units and grid components by a single manufacturer.

B. Fire Performance Characteristics: Identify acoustical ceiling components with appropriate markings of applicable testing and inspecting organization.

1. Surface Burning Characteristics: ASTM E 84 and complying with ASTM E 1264 Classification.

C. Acoustic Panels: As with other architectural features located at the ceiling, may obstruct, or skew the planned fire sprinkler water distribution pattern through possibly delay or accelerate the activation of the sprinkler or fire detection systems by channeling heat from a fire either toward or away from the device. Designers and installers are advised to consult a fire protection engineer, NFPA 13, or their local codes for guidance where automatic fire detection and suppression systems are present.

D. Coordination of Work: Coordinate acoustical ceiling work with installers of related work including, but not limited to building insulation, gypsum board, light fixtures, mechanical systems, electrical systems, and sprinklers.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver acoustical ceiling units to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical ceiling units, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical ceiling units carefully to avoid chipping edges or damaged units in any way.

1.8 PROJECT CONDITIONS

A. Space Enclosure with Standard Ceilings: Do not install interior ceilings until space is enclosed and weatherproof; wet work in place is completed and nominally dry; work above ceilings is complete; and ambient conditions of temperature and humidity are continuously maintained at values near those intended for final occupancy. Building areas to receive ceilings shall be free of construction dust and debris.

1.9 WARRANTY

A. Acoustical Panel: Submit a written warranty executed by the manufacturer, agreeing to repair or replace panels that fail within the warranty period. Failures include, but are not limited to the following:

1. Acoustical Panels: Sagging and warping
2. Grid System: Rusting and manufacturer's defects.

B. Warranty Period:

1. Acoustical Metal panels: One (1) year from date of substantial completion
2. Grid: One (1) year from date of substantial completion

C. The Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

1.10 MAINTENANCE

A. Extra Materials: Deliver extra materials to Owner. Furnish extra materials described below that match products installed. Packaged with protective covering for storage and identified with appropriate labels.

1. Acoustical Metal Ceiling Units: Furnish quality of full-size units equal to 5.0 percent of amount installed.
2. Exposed Suspension System Components: Furnish quantity of each exposed suspension component equal to 2.0 percent of amount installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Metal Ceiling Panels:

1. Armstrong World Industries, Inc.

B. Suspension Systems:

1. Armstrong World Industries, Inc.

2.2 ACOUSTICAL CEILING UNITS

A. Acoustical Panels Type AMP

1. Acoustical Panels Type **APC-2**:

a. Surface Texture: Smooth
b. Composition: Electrogalvanized Steel 0.028-inch thick
c. Color: Effects “Sesame” unless otherwise indicated
d. Size: 6-inch x 96-inch
e. Edge Profile: Linear
f. Perforation Option: Perforated-M2
g. Noise Reduction Coefficient(NRC): 0.70
h. Ceiling Attenuation Class (CAC): N/A
i. Sabin: N/A
j. Articulation Class (AC): N/A
k. Flame Spread: ASTM E 1264; Class A (FM)
l. Light Reflectance White Panel: 0.83
m. Dimensional Stability: Standard
n. Acceptable Product: Armstrong MetalWorks Linear - Synchro, 8223W06M1 as manufactured by Armstrong World Industries

2. Infill Metal Panel Accessories:

a. 8233W06M1___ 6IN End Cap
b. 8243W06 – 6IN Splice Plate
c. 7113 – Spreader Hold Down
d. 7237 – Cut Plank Support

e. 7277MF – Main Beam Carrier 2 (MBCB) -Mill Finish
f. Series 5574 -Carrier Molding
g. XL8926 – 2' Drywall Cross Tee
h. 5346FXCB - 6" Effects Wood Look Trim – in color matching the ceiling.
i. 7239 – Adjustable Trim Clip
j. 8161 – Metalworks Linear Pressure Spring

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not proceed with installation until all wet work such as concrete, terrazzo, plastering and painting has been completed and thoroughly dried out, unless expressly permitted by manufacturer's printed recommendations.

3.2 PREPARATION

A. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less than half width units at borders and comply with reflected ceiling plans. Coordinate panel layout with mechanical and electrical fixtures.

3.3 INSTALLATION

A. Follow manufacturer installation instructions

B. Install suspension system and panels in accordance with the manufacturer's instructions BPLA-292540, and in compliance with ASTM C636 and with the authorities having jurisdiction.

3.4 ADJUSTING AND CLEANING

A. Replace damaged and broken panels.

B. Clean exposed surfaces of ceilings panels, including trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch up of minor finish damage. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

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 installation of acoustical panels and exposed suspension systems for interior ceilings.

B. Related Sections:

1. Section 012200 “Unit Prices” for unit price information to provide new acoustical panel ceiling grid suspension systems if existing materials are not suitable for reinstallation.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

1. Product data for each type of product specified.
2. Samples for verification purposes of each type of exposed finish required, prepared on samples of size indicated below and of same thickness and material indicated for final unit of Work. Where finishes involve normal color and texture variations, include sample sets showing full range of variations expected.

   a. 6-inch-square samples of each acoustical panel type, pattern, and color.
   b. Set of 12-inch-long samples of exposed suspension system members, including moldings, for each color and system type required.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has successfully completed acoustical ceilings similar in material, design, and extent to those indicated for Project.

B. Fire-Performance Characteristics: Provide acoustical ceilings that are identical to those tested for the following fire-performance characteristics, per ASTM test method indicated below, by UL or other testing and inspecting organizations acceptable to authorities having jurisdiction. Identify acoustical ceiling components with appropriate markings of applicable testing and inspecting organization.

1. Surface Burning Characteristics: As follows, tested per ASTM E 84 and complying with ASTM E 1264 for Class A products.

   a. Flame Spread: 25 or less.
   b. Smoke Developed: 50 or less.

C. Single-Source Responsibility for Ceiling Units: Obtain each type of acoustical ceiling unit from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.

D. Single-Source Responsibility for Suspension System: Obtain each type of suspension system from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.

1. Obtain suspension system from same manufacturer that produces acoustical ceiling units.

E. Coordination of Work: Coordinate layout and installation of acoustical ceiling units and suspension system components with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system components (if any), and partition system (if any).

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical ceiling units to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical ceiling units, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical ceiling units carefully to avoid chipping edges or damaging units in any way.

1.6 PROJECT CONDITIONS

A. Space Enclosure: Do not install interior acoustical ceilings until space is enclosed and weatherproof, wet-work in space is completed and nominally dry, work above ceilings is complete, and ambient conditions of temperature and humidity will be continuously maintained at values near those indicated for final occupancy.

1.7 EXTRA MATERIALS

A. Deliver extra materials to Owner. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with appropriate labels.

1. Acoustical Ceiling Units: Furnish quantity of full-size units equal to 2.0 percent of amount installed.
2. Exposed Suspension System Components: Furnish quantity of each exposed component equal to 2.0 percent of amount installed.

PART 2 - PRODUCTS

2.1 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: Comply with ASTM E 1264 for Class A materials.
2. Smoke-Developed Index: 50 or less.

B. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 ACOUSTICAL PANELS, GENERAL

A. Product:

1. Match existing ceiling panels at project site.

B. Source Limitations:

1. Acoustical Ceiling Panel: Obtain each type from single source from single manufacturer.
2. Suspension System: Obtain each type from single source from single manufacturer.

C. Source Limitations: Obtain each type of acoustical ceiling panel and supporting suspension system from single source from single manufacturer.

D. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectance unless otherwise indicated.

1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches away from test surface according to ASTM E 795.

E. Acoustical Panel Colors and Patterns: Match appearance characteristics indicated for each product type.

1. Where appearance characteristics of acoustical panels are indicated by referencing pattern designations in ASTM E 1264 and not manufacturers' proprietary product designations, provide products selected by Architect from each manufacturer's full range that comply with requirements indicated for type, pattern, color, light reflectance, acoustical performance, edge detail, and size.

2.3 MINERAL-BASE PANELS - WATER FELTED (**APC-1**)

A. Description: Mineral-base panels, water felted, with painted finish and perforated and fissured pattern, non-directional, non-fire-resistance rated.

B. Type, Form, and Finish: Type III, Form 2, Pattern C E, units per ASTM E 1264 with painted finish that comply with pattern and other requirements indicated.

C. Perforated and Fissured Pattern: Units matching pattern indicated by reference to manufacturers' standard pattern designations, with other characteristics as follows:

1. Color/Light Reflectance Coefficient: White/LR 0.82.
2. Noise Reduction Coefficient: NRC 0.55.
3. Ceiling Attenuation Class: CAC 33.
4. Edge Detail: Square.
5. Size: 24 inches by 24 inches by 5/8 inch.

D. Products:

1. Basis-of-Design: Fine Fissured Humiguard Plus (#1728), Armstrong World Industries, Inc. 877-276-7876 www.armstrong.com
2. Fine Fissured, CertainTeed Corporation 800-233-8990 www.certainteed.com
3. Radar ClimaPlus, USG Corporation 800-950-3839 www.usg.com

2.4 METAL SUSPENSION SYSTEMS, GENERAL

A. Metal Suspension System Standard: Provide 1) manufacturer's standard direct-hung metal suspension systems of types, 2) all accessories available and designed for the installation of the particular system being installed, 3) in appropriate structural classifications, and 4) finishes indicated that comply with applicable ASTM C 635 requirements.

B. Finishes and Colors: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.

C. Grid Members:

1. Minimum 0.015 inch bare metal thickness.
2. Minimum 300 lb. tension/ compression connection value.
3. UL-certified for load compliance as required by ASTM C635

D. Attachment Devices: Size for 5 times design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.

1. Postinstalled Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing per ASTM E 1190, conducted by a qualified testing and inspecting agency

E. Wire for Hangers and Ties: ASTM A 641, Class 1 zinc coating, soft temper.

1. Zinc-Coated Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
2. Gage: Provide wire sized so that stress at 3 times hanger design load (ASTM C 635, Table 1, Direct-Hung), will be less than yield stress of wire, but provide not less than 0.106-inch diameter (12 gage).

F. Hanger Rods: Mild steel, zinc coated, or protected with rust- inhibitive paint.

G. Flat Hangers: Mild steel, zinc coated, or protected with rust inhibitive paint.

H. Angle Hangers: Angles with legs not less than 7/8 inch wide, formed with 0.0365-inch-thick galvanized steel sheet complying with ASTM A 446, Coating Designation G90, with bolted connections and 5/16-inch-diameter bolts.

I. Edge Moldings and Trim: Metal or extruded aluminum of types and profiles indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that fit type of edge detail and suspension system indicated.

1. For lay-in panels with reveal edge details, provide stepped edge molding that forms reveal of same depth and width as that formed between edge of panel and flange at exposed suspension member.

J. Hold-Down Clips: Manufacturer's standard hold-down.

2.5 NON-FIRE-RESISTANCE-RATED DIRECT-HUNG SUSPENSION SYSTEMS

A. Wide-Face Capped Double-Web Steel Suspension System: Main and cross-runners roll-formed from prepainted or electrolytic zinc- coated cold-rolled steel sheet, with prefinished 15/16-inch-wide metal caps on flanges; other characteristics as follows:

1. Structural Classification: Intermediate-duty system.
2. End Condition of Cross Runners: Override (stepped) type.
3. Face Design: Flat, flush.
4. Cap Material: Steel cold-rolled sheet.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and structural framing to which ceiling system attaches or abuts, with Installer present, for compliance with requirements specified in this and other sections that affect installation and anchorage of ceiling system. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Coordination: Furnish layouts for preset inserts, clips, and other ceiling anchors whose installation is specified in other sections.

B. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less-than-half-width units at borders, and comply with reflected ceiling plans.

3.3 INSTALLATION

A. General: Install acoustical ceiling systems to comply with installation standard referenced below, per manufacturer's instructions and CISCA "Ceiling Systems Handbook."

1. Standard for Installation of Ceiling Suspension Systems: Comply with ASTM C 636.

B. Arrange acoustical units and orient directionally patterned units in a manner shown by reflected ceiling plans.

C. Suspend ceiling hangers from building 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 structural or ceiling suspension system. 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 the 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. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
3. Secure wire hangers by looping and wire-tying, either directly to structures or to inserts, eyescrews, or other devices that are secure and appropriate for substrate, and in a manner that will not cause them to deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
4. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eyescrews, or other devices that are secure and appropriate for structure to which hangers are attached as well as for type of hanger involved, and in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
5. Do not support ceilings directly from permanent metal forms
6. Do not attach hangers to steel deck tabs.
7. Do not attach hangers to steel roof deck. Attach hangers to structural members.
8. Space hangers not more than 4'-0" o.c. along each member supported directly from hangers, unless otherwise shown, and provide hangers not more than 8 inches from ends of each member.

D. Install edge moldings of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical units.

1. Screw-attach moldings to substrate at intervals not over 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to tolerance of 1/8 inch in 12'-0". Miter corners accurately and connect securely.

E. Install acoustical panels in coordination with suspension system, with edges concealed by support of suspension members. Scribe and cut panels to fit accurately at borders and at penetrations.

3.4 CLEANING

A. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch-up of minor finish damage. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 095113

SECTION 096513

RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes the following:

1. Resilient wall base.
2. Resilient flooring accessories.

1.3 SUBMITTALS

A. Product Data: For each type of product specified.

B. Samples for Verification: In manufacturer's standard sizes, one of each product color and pattern specified.

C. Product Certificates: Signed by manufacturers of resilient wall base and accessories certifying that each product furnished complies with requirements.

1.4 QUALITY ASSURANCE

A. Installer qualifications: Engage and experienced installer to perform work of this Section who has specialized in installing resilient products similar to those required for this Project and with a record of successful in-service performance.

B. Source Limitations: Obtain each type and color of product specified from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.

C. Fire-Test-Response Characteristics: Provide products with the following fire-test-response characteristics as determined by testing identical products per test method indicated below by a testing and inspecting agency acceptable to authorities having jurisdiction.

1. Critical Radiant Flux: 0.45 W/sq. Cm or greater when tested per ASTM E 648.
2. Smoke Density: Maximum specific optical density of 450 or less when tested per ASTM E 662.

1.5 DELIVERY STORAGE, AND HANDLING

A. Deliver products to Project site in manufacturer's original, unopened cartons and containers, each bearing names of product and manufacturer, Project identification, and shipping and handling instructions.

B. Store products in dry spaces protected from the weather, with ambient temperatures maintained between 50 and 90 deg F.

C. Move products into spaces where they will be installed at least 48 hours before installation, unless longer conditioning period is recommended in writing by manufacturer.

1.6 PROJECT CONDITIONS

A. Maintain a temperature of not less than 70 deg F (21 deg C) or more than 95 deg F (35 deg C) in spaces to receive resilient products for at least 48 hours before installation, during installation, and for at least 48 hours after installation, unless manufacturer's written recommendations specify longer time periods. After postinstallation period, maintain a temperature of not less than 55 deg F (13 deg C) or more tan 95 deg F (35 deg C).

B. Do not install products until they are at the same temperature as the space where they are to be installed.

C. For resilient products installed on traffic surfaces, close spaces to traffic during installation and for time period after installation recommended in writing by manufacturer.

D. Coordinate resilient product installation with other construction to minimize possibility of damage and soiling during remainder of construction period. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Provide products complying with requirements of the contract documents and made by one of the following:

1. Resilient base and accessories:

a) Burke Flooring 800-447-8442 www.burkeflooring.com
b) Flexco Corporation 800-633-3151 www.flexcofloors.com
c) Johnsonite, a Tarkett company
d) Roppe Corporation, U.S.A. 800-537-9527 www.roppe.com

2.2 THERMOSET-RUBBER BASE

A. Product Standard: ASTM F1861, Type TS (rubber, vulcanized thermoset), Group I (solid, homogeneous).

B. Rubber Wall Base: Type I and with requirements specified on the Finish Drawings.

1. 4 inch straight at carpet unless otherwise indicated, and 4 inch cove base at hard floors unless otherwise indicated.
2. Provide in coils approximately 100-feet in length.

3. Provide pre-molded outside corners.
4. Color(s) as indicated on Finish Drawings.

2.3 RESILIENT ACCESSORIES

A. Rubber Accessories: Products complying with requirements:

1. Transition strips.

2.4 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based formulation provided or approved by resilient product manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where installation of resilient products will occur, with Installer and manufacturer's representative present, for compliance with manufacturer's requirements, including those for maximum moisture content. Verify that substrates and conditions are satisfactory for resilient product installation and comply with requirements specified. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. General: Comply with manufacturer's written installation instructions for preparing substrates indicated to receive resilient products.

B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, and depressions in substrates.

C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.

D. Broom and vacuum clean substrates to be covered immediately before installing resilient products. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. General: Install resilient products according to manufacturer's written installation instructions.

B. Apply resilient wall base to walls, columns, pilasters, and other permanent fixtures in rooms and areas where base is required.

1. Install wall base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
2. Tightly adhere wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
3. Do not stretch base during installation.
4. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler materials.
5. Install premolded outside corners before installing straight pieces.

    a) Outside corners have minimum 3" leg.

6. Form inside corners on job, from straight pieces of maximum lengths possible, by cutting an inverted V-shaped notch in toe of wall base at the point where corner is formed. Shave back of base where necessary to produce a snug fit to substrate.

C. Place resilient products so they are butted to adjacent materials and bond to substrates with adhesive. Install reducer strips at edges of flooring that would otherwise be exposed.

D. Apply resilient products to stairs as indicated and according to manufacturer's written installation instructions.

E. Provide resilient transition strips at all transitions from different types of resilient flooring, resilient flooring to carpet, and resilient flooring to existing flooring.

3.4 CLEANING AND PROTECTING

A. Perform the following operations immediately after installing resilient products:

1. Remove adhesive and other surface blemishes using cleaner recommended by resilient product manufacturers.
2. Sweep or vacuum horizontal surfaces thoroughly.
3. Do not wash resilient products until after time period recommended by resilient product manufacturer.
4. Damp-mop or sponge resilient products to remove marks and soil.

B. Protect resilient products against mars, marks, indentations, and other 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 resilient product manufacturer.

C. Clean resilient products not more than 4 days before dates scheduled for inspections intended to establish date of Substantial Completion in each area of Project. Clean products according to manufacturer's written recommendations.

END OF SECTION 096513

SECTION 096513.33

METAL FLOORING ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Metal flooring accessories.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 9 Section "Luxury Vinyl Tile."
2. Division 9 Section "Carpet."

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data for each type of product specified.

C. Samples for initial selection purposes for items not indicated by a model number or a Basis-of-Design product, of manufacturer's standard sample sets in form of pieces cut from each type of product specified showing full range of colors and patterns available.

D. Samples for verification purposes of items indicated by a model number or a Basis-of-Design product, in manufacturer's standard sizes, but not less than 12 inches long, of each different color and pattern of product specified.

E. Product certificates, in lieu of laboratory test reports when permitted by Architect, signed by manufacturer certifying that each product complies with requirements.

1.4 QUALITY ASSURANCE

A. Single-Source Responsibility for Products: Obtain each type and color of product specified from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.

B. Fire Performance Characteristics: Provide products with the following fire performance characteristics as determined by testing products per ASTM test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

1. Critical Radiant Flux: 0.45 watts per sq. cm or more per ASTM E 648.
2. Smoke Density: Less than 450 per ASTM E 662.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Single-Source Responsibility for Products: Obtain each type and color of product specified from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.

B. Fire Performance Characteristics: Provide products with the following fire performance characteristics as determined by testing products per ASTM test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

1. Critical Radiant Flux: 0.45 watts per sq. cm or more per ASTM E 648.
2. Smoke Density: Less than 450 per ASTM E 662.

1.6 PROJECT CONDITIONS

A. Maintain a minimum temperature of 70 deg F (21 deg C) in spaces to receive products specified in this Section for at least 48 hours prior to installation, during installation, and for not less than 48 hours after installation. After this period, maintain a temperature of not less than 55 deg F (13 deg C).

B. Do not install products until they are at the same temperature as that of the space where they are to be installed.

C. Close spaces to traffic during installation of products specified in this Section.

1.7 SEQUENCING AND SCHEDULING

A. Sequence installing products specified in this Section with other construction to minimize possibility of damage and soiling during remainder of construction period.

1.8 EXTRA MATERIALS

A. Deliver extra materials to Owner. Furnish extra materials matching products installed as described below, packaged with protective covering for storage, and identified with labels clearly describing contents.

1. Furnish not less than 10 linear feet for each 500 linear feet or fraction thereof of each different type and color of resilient wall base installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the Work include the following:

1. Pemko Manufacturing Company, Inc. an ASSA ABLOY Group company 800-824-3018 www.pemko.com
2. Reese Enterprises, Inc. 800-328-0953 www.reeseusa.com
3. Zero International, Inc. 800-635-5335 www.zerointernational.com

2.2 METAL ACCESSORIES

A. Metal Accessories: Provide manufacturer's two-piece metal transition strips, mechanically fastened to floor, with snap-in rubber trim, colors and finishes as selected by Architect.

2.3 INSTALLATION ACCESSORIES

A. Concrete Slab Primer: Nonstaining type as recommended by flooring manufacturer.

B. Trowelable Underlayments and Patching Compounds: Latex-modified, portland-cement-based formulation provided or approved by flooring manufacturer for applications indicated.

C. Adhesives: Water-resistant type recommended by manufacturer to suit resilient flooring product and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas where installation of products specified in this Section will occur, with Installer present, to verify that substrates and conditions are satisfactory for installation and comply with manufacturer's requirements and those specified in this Section.

3.2 PREPARATION

A. General: Comply with manufacturer's installation specifications for preparing substrates indicated to receive products indicated.

B. Use trowelable leveling and patching compounds per manufacturer’s directions to fill cracks, holes, and depressions in substrates.

C. Remove coatings, including curing compounds, and other substances that are incompatible with flooring adhesives and that contain soap, wax, oil, or silicone, by using a terrazzo or concrete grinder, a drum sander, or a polishing machine equipped with a heavy-duty wire brush.

D. Broom or vacuum clean substrates to be covered immediately before installing products specified in this Section. Following cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust.

E. Apply concrete slab primer, if recommended by flooring manufacturer, prior to applying adhesive. Apply according to manufacturer's directions.

3.3 INSTALLATION

A. General: Install products specified in this Section using methods indicated according to manufacturer's installation directions at locations meeting the requirements for the accessories as scheduled on the drawings.

B. Apply metal accessories according to manufacturer's installation instructions.

3.4 CLEANING AND PROTECTION

A. Perform the following operations immediately after completing installation:

1. Remove visible adhesive and other surface blemishes using cleaner recommended by manufacturers of resilient product involved.
2. Sweep or vacuum floor thoroughly.
3. Do not wash floor until after time period recommended by manufacturer.
4. Damp-mop metal accessories to remove black marks and soil.

B. Protect flooring against mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods indicated or recommended by manufacturer of resilient product involved.

C. Apply protective floor polish to metal accessories that are free from soil, visible adhesive, and surface blemishes.

   1. Use commercially available metal, cross-linked, acrylic product acceptable to resilient accessory manufacturer.
   2. Coordinate selection of floor polish with Owner's maintenance service.
   3. Cover metal accessories on floors and stairs with undyed, untreated building paper until inspection for Substantial Completion.

D. Clean products specified in this Section not more than 4 days prior to dates scheduled for inspections intended to establish date of Substantial Completion in each area of Project. Clean products using method recommended by manufacturer.

   1. Strip protective floor polish that was applied after completing installation, prior to cleaning.
   2. Reapply floor polish after cleaning.

END OF SECTION 096513.33

SECTION 096519.24

LUXURY VINYL TILE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Luxury vinyl tile (LVT).
2. Patching / repairing of existing floor substrates too damaged and / or unlevel to receive new flooring. Refer to requirements for bidding further down in the specification.

B. Related Sections include the following:

1. Division 9 Section "Resilient Wall Base and Accessories" for resilient wall base, reducer strips, and other accessories installed with resilient floor tile.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Verification: Full-size units of each color and pattern of LVT required. Show through color pattern representative of product to be installed on the job. Samples smaller than full size will not be accepted.

C. Maintenance Data: For resilient products to include in maintenance manuals.

D. Floor cleaning data.

E. Closeout Submittals: Submit the following:

1. Operation and Maintenance Data: Operation and maintenance data for installed products in accordance with Division 1 Sections indicating closeout requirements (Maintenance Data and Operation Data). Include methods for maintaining installed products, and precautions against cleaning materials and methods detrimental to finishes and performance.
2. Warranty: Warranty documents specified herein.

1.4 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Provide products identical to those tested for fire-exposure behavior per test method indicated by a testing and inspecting agency acceptable to authorities having jurisdiction.

B. Single-Source Responsibility: Provide types of flooring and accessories supplied by one manufacturer, including leveling and patching compounds, and adhesives.

C. Installer: Select an installer who is competent in the installation of Armstrong resilient solid vinyl tile flooring.

1. Engage installers certified as Armstrong Commercial Certified Installers. Confirm installer's certification by requesting their credentials.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store 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 (10 deg C) or more than 90 deg F (32 deg C). Store tiles on flat surfaces.

1.6 PROJECT CONDITIONS

A. Maintain temperatures within range recommended by manufacturer, but not less than 70 deg F (21 deg C) or more than 95 deg F (35 deg C), 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 postinstallation period, maintain temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).

C. Close spaces to traffic during floor covering installation.

D. Close spaces to traffic for 48 hours after floor covering installation.

E. Install products after other finishing operations, including painting, have been completed.

1.7 WARRANTY

A. Resilient Flooring: Submit a written warranty executed by the manufacturer, agreeing to repair or replace resilient flooring that fails within the warranty period.

B. Warranty Period: 15 years for LVT-1, 20 years for LVT-2

C. If the product is required to be installed using the appropriate Manufacturer’s system for the Warranty to be valid, comply with these requirements and any other requirements. If the Product is installed not using the specific instructions from the Manufacturer will void the warranty.

1.8 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Floor Tile: Furnish 1 box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide the named products, or a comparable product by other manufacturers.

2.2 COLORS AND PATTERNS

A. Colors and Patterns: As indicated by manufacturer's designations in the Color Schedule on the Drawings.

2.3 FLOOR TILE

A. Luxury Vinyl Tile (LVT-1, LVT-2): ASTM F 1700.

1. Manufacturers: As indicated in the Color Schedule on the Drawings.

B. Class: III, unless otherwise indicated.

C. Wearing Surface: Type A – Smooth in minimum thickness as is standard with the Basis-of-Design products.

D. Thickness: As is standard with the Basis-of-Design products.

E. Size: As indicated, or as is standard with the Basis-of-Design products.

F. Fire-Test-Response Characteristics:

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm per ASTM E 648.
2. Smoke Generation: Maximum Specific Optical Density of 450 or less per ASTM E 662.

2.4 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.

1. Patching compound Basis-of-Design:

a. Ardex V1200 Self Leveling underlayment, or comparable product (in the sole opinion of the Architect – use this product or receive acceptance to provide another prior to bidding). Coverage: Approximately 25 sq. ft. per bag at 1/4” (2.3 sq. m at 6 mm). Coverage will vary depending on the texture of the surface being smoothed.

B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated. Only use adhesives that are compatible with the tiles to be used.

1. Adhesives available for use in high humidity installation conditions (for up to 99.0 percent Relative Humidity in the floor substrate):

a. TEC Flexera vinyl adhesive, if acceptable to the LVT manufacturer. Otherwise use a manufacturer accepted and recommended adhesive.
b. TEC TrowelFast vinyl adhesive, if acceptable to the LVT manufacturer. Otherwise use a manufacturer accepted and recommended adhesive.
c. Comparable and compatible products will be accepted upon submittal, review, and after being judged to be acceptable, by the Architect and accepted by the LVT manufacturer.

C. Metal Edge Strips: Extruded aluminum with mill finish of width shown, of height required to protect exposed edges of tiles, and in maximum available lengths to minimize running joints.

D. Cleaning Materials and Floor Finish Materials: Provide products acceptable to the flooring manufacturer.

1. Cleaner: Provide a manufacturer recommended cleaner for the installed floor material.
2. Floor Finish: Provide 5 coats of “Spartan Upper Limits” floor finish, or if not acceptable to the flooring manufacturer or the Owner’s maintenance service, provide a manufacturer recommended floor finish/wax, acceptable to the Architect and the Owner's maintenance service, for the installed floor finish.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances, moisture content, and other conditions affecting performance.

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.
2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written recommendations 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.
2. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
3. Moisture Testing:

a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
b. Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.

C. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.

D. Access Flooring Panels: Remove protective film of oil or other coating using method recommended by access flooring manufacturer.

E. Use trowelable leveling and patching compound to fill cracks, holes, and depressions in substrates.

F. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

1. Do not install resilient products until they are same temperature as space where they are to be installed.

G. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, and dust. Proceed with installation only after unsatisfactory conditions have been corrected.

H. Review and confirm compatibility of adhesives and tiles.

3.3 TILE INSTALLATION

A. Lay out 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 square with room axis, unless otherwise indicated.

B. Match 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.

1. Lay tiles with grain direction alternating in adjacent tiles (basket-weave pattern) in pattern of colors and sizes indicated.

C. Scribe, cut, and fit tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, edgings, door frames, thresholds, and nosings.

D. Extend tiles into toe spaces, door reveals, closets, and similar openings.

E. 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, nonstaining marking device.

F. Install tiles on covers for telephone and electrical ducts and similar items in finished floor areas. Maintain overall continuity of color and pattern with pieces of tile installed on covers. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.

G. Adhere 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. Perform the following operations immediately after completing resilient product 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.

a. Do not wash surfaces until after time period recommended by manufacturer.

B. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods recommended in writing by manufacturer.

1. Cover products installed on horizontal surfaces with undyed, untreated building paper until Substantial Completion.
2. Do not move heavy and sharp objects directly over surfaces. Place hardboard or plywood panels over flooring and under objects while they are being moved. Slide or roll objects over panels without moving panels.

END OF SECTION 096519.24

SECTION 096816

CARPET

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. Carpet tile.

B. Related Requirements:

1. Section 096513 “Resilient Base and Accessories” for resilient base and transition strips.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to carpet 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 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. Locations where dye lot changes occur.
4. Seam locations, types, and methods.
5. Type of subfloor.
6. Type of installation.
7. Pattern type, repeat size, location, direction, and starting point.
8. Pile direction.
9. Types, colors, and locations of insets and borders.
10. Types, colors, and locations of edge, transition, and other accessory strips.

11. 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- (300-mm-) square Sample.
2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch- (300-mm-) long Samples.

D. Samples for Initial Selection: For each type of product.

1. Include Samples of exposed edge, transition, and other accessory stripping involving color or finish selection.

E. 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: 12-inch- (300-mm-) square Sample.
2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch- (300-mm-) long Samples.

F. Product Schedule: For carpet. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For carpet, for tests performed by a qualified testing agency.

C. Sample Warranties: For special warranties.

1.6 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.

1.7 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. Carpet: Equal to 2 percent of amount of carpet installed for each type indicated, but not less than 10 sq. yd. (8.3 sq. m).

1.8 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is certified by the International Certified Floorcovering Installers Association at the Commercial II certification level.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Comply with the Carpet and Rug Institute's CRI 104.

B. Deliver carpet in original mill protective covering with mill register numbers and tags attached.

1.10 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 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 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.

1.11 WARRANTY

A. Special Warranty for Carpet: Manufacturer agrees to repair or replace components of carpet installation that fail in materials or workmanship within specified warranty period.

1. Warranty does not include deterioration or failure of carpet 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 loss of face fiber, edge raveling, snags, and runs.
b. Loss of tuft bind strength.
c. Excess static discharge.
d. Delamination.

3. Warranty Period: Lifetime from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 Carpet Tile – CPT-1, CPT-2, CPT-3

A. Manufacturer: Milliken

B. Style and Color: As scheduled on drawings.

C. Applied Treatments:

1. Applied Soil-Resistance Treatment: Manufacturer's standard material.

D. Performance Characteristics:

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm according to NFPA 253.
2. Electrostatic Propensity: Less than 3.5 kV according to AATCC 134.

2.2 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet manufacturer.

B. Adhesives: Water-resistant, mildew-resistant, nonstaining type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet and is recommended or provided by carpet manufacturer

C. 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

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 performance.

B. Examine carpet for type, color, pattern, and potential defects.

C. Concrete Slabs: Verify that finishes comply with requirements 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. (304.8 sq. m) and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.

a. Relative Humidity Test: Using in situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
b. Perform additional moisture tests recommended in writing by adhesive and carpet manufacturers. Proceed with installation only after substrates pass testing.

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 (3 mm) wide or wider, and protrusions more than 1/32 inch (0.8 mm), 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.

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. Install pattern parallel to walls and borders.

D. Do not bridge building expansion joints with carpet.

E. 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.

F. Extend carpet 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 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.

END OF SECTION 096816

SECTION 09 72 00

WALLCOVERINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Heavy-duty, wool felt textile wallcovering.

1.3 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product Data for each type of product specified. Include data on physical characteristics, durability, fade resistance, and flame-resistance characteristics.

C. Shop Drawings showing location and extent of each wallcovering type. Indicate seams and termination points.

D. Samples for verification in sets for each color, texture, and pattern specified, showing the full range of variations expected in these characteristics.

1. Wallcovering Material: Full-width sample, from dye lot used for the Work.

a. Submit sample with specified treatments applied.
b. Mark top and face of material.
c. Show complete pattern repeat.

E. Product certificates signed by manufacturers of wallcoverings certifying that their products comply with specified requirements.

F. Maintenance data for wallcovering to include in the operation and maintenance manual specified in Division 1.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer who has completed 5 projects similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Fire-Test-Response Characteristics: Provide wallcoverings with the following surface-burning characteristics as determined by testing identical products per ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

1. Heavy-duty, synthetic, textile wallcovering:

a. Flame Spread: 75 or less.
b. Smoke Developed: 450 or less.

C. Provide wallcoverings complying with UBC 8-2 Cornerburn Test requirements.

D. Mockups: Prior to installing wallcovering, construct mockups for each form of construction and finish required to verify selections made under Sample Submittals and to demonstrate aesthetic effects as well as qualities of materials and execution. Mockups shall be built by the Subcontractor responsible for the Project Work. Build mockups to comply with the following requirements, using all conditions and materials indicated for the completed Work.

1. Locate mockups on-site in the location and of the size indicated or, if not indicated, as directed by Architect.
2. Notify Architect 7 days in advance of the dates and times when mockups will be constructed.
3. Demonstrate the proposed range of aesthetic effects and workmanship.
4. Obtain Architect's approval of mockups before start of wallcovering Work.
5. Retain and maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
6. When directed, demolish and remove mockups from Project site.
7. Approved mockups in an undisturbed condition at the time of Substantial Completion may become part of the completed Work if allowed by and coordinated with the Architect in the field.

1.5 PROJECT CONDITIONS

A. Space Enclosure and Environmental Limitations: Do not install wallcovering until space is enclosed and weatherproof, wet-work in space is completed and nominally dry, work above ceilings is complete, and ambient temperature and humidity conditions are and will be continuously maintained at values near those indicated for final occupancy.

B. Lighting: Do not install wallcovering until a lighting level of not less than 15 foot-candles (160 lux) is provided on the surfaces to receive wallcovering.

C. Ventilation: Provide continuous ventilation during installation and for not less than the time recommended by the wallcovering manufacturer for full drying or curing.

1.6 EXTRA MATERIALS

A. Furnish extra materials described below, before installation begins, that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.

1. Rolls of Wallcovering Material: Full-size units equal to 5 percent of amount of each type installed.

PART 2 - PRODUCTS

2.1 PRODUCTS

A. Subject to compliance with requirements, provide the named product in each designation that follows:

2.2 HEAVY-DUTY, WOOL FELT TEXTILE WALLCOVERING

A. Basis-of-Design: Chevron Block by Filzfelt.

B. Thickness: 13 mm.

2.3 ADHESIVES

A. Adhesives: Provide manufacturer's recommended adhesive, primer, and sealer, produced expressly for use with selected wallcovering on substrate as shown on drawings. Provide materials which are mildew-resistant and nonstaining to wallcovering.

2.4 ACCESSORIES

A. Wall Liner: Nonwoven, underlayment and adhesive as recommended by wallcovering manufacturer.

B. Release Coat: Provide sealer or undercoat for new gypsum wallboard substrates as recommended by wallcovering manufacturer.

C. Provide undercoat for previously painted gypsum wallboard and other substrates as recommended by wallcovering manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates for compliance with requirements for moisture content and other conditions affecting performance of Work of this Section. Do not proceed with installation until unsatisfactory conditions have been corrected.

B. Test substrate with electronic moisture meter to verify that surfaces to be covered do not exceed moisture content permitted by the manufacturer.

3.2 PREPARATION

A. Comply with manufacturer's written instructions for surface preparation.

B. Clean substrates of substances that could impair wallcovering's bond, including mold, mildew, oil, grease, incompatible primers, and dirt.

C. Acclimatize wallcovering materials by removing them from packaging in the installation areas not less than 24 hours before installation.

D. Prepare substrates to achieve a smooth, dry, clean surface free of flaking, unsound coatings, cracks, and defects.

1. Painted Surfaces: Treat areas susceptible to pigment bleeding.
2. Metals: If not factory primed, clean and apply rust-inhibiitve zinc primer.
3. Moisture Content: Maximum of 5 percent on new plaster, concrete, and concrete masonry units when tested with an electronic moisture meter.
4. Prime new gypsum board with primer recommended by wallcovering manufacturer.
5. Allow new plaster to cure. Treat areas of high alkalinity.

E. Remove switchplates, wall plates, and surface-mounted fixtures in areas where wallcovering is to be applied. Upon completion of wallcovering installation in each space are area, reinstall items removed using workmen skilled in the trades involved.

F. Check painted surfaces for pigment bleeding. Sand gloss, semigloss, and eggshell finishes with fine sandpaper.

G. Install wall liner, with no gaps or overlaps, where required by wallcovering manufacturer. Form smooth wrinkle-free surface for finished installation. Do not begin wallcovering installation until wall liner has dried.

3.3 INSTALLATION, GENERAL

A. General: Comply with wallcoverings manufacturers' written installation instructions applicable to products and applications indicated, except where more stringent requirements apply.

B. Verify that colors and patterns of wallcoverings are those specified before beginning installation.

C. Cut wallcovering panels in roll number sequence. Change run numbers at partition breaks and corners only.

D. Place panels consecutively in the order cut from rolls, including filling spaces above or below openings. Hang by reversing alternate strips except on match patterns.

E. Install wallcovering with no gaps or overlaps.

F. Match pattern 72 inches (1830 mm) above finish floor.

G. Install seams vertical and plumb at least 6 inches (150 mm) from outside corners and 3 inches (75 mm) from inside corners. No horizontal seams.

H. Remove air bubbles, wrinkles, blisters, and other defects.

I. Trim edges for color uniformity, pattern match, and tight closure at seams and edges. Butt seams.

3.4 CLEANING

A. Remove excess adhesive at finished seams, perimeter edges, and adjacent surfaces.

B. Use cleaning methods recommended by wallcovering manufacturer.

C. Replace strips that cannot be cleaned.

END OF SECTION 09 72 00

SECTION 099000

PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes surface preparation, painting, and finishing of exposed interior items and surfaces.

1. Surface preparation, priming, and finish coats specified in this Section are in addition to shop-priming and surface treatment specified under other Sections.

B. Paint exposed surfaces whether or not colors are designated in schedules, except where a surface or material is specifically indicated not to be painted or is to remain natural. Where an item or surface is not specifically mentioned, paint the same as similar adjacent materials or surfaces. If color or finish is not designated, the Architect will select from standard colors or finishes available.

1. Painting includes field-painting exposed bare interior pipes, conduit, sprinkler piping, , ducts, hangers, exposed steel and iron work, and primed metal surfaces of mechanical and electrical equipment.

C. Painting is not required on prefinished items, finished metal surfaces, concealed surfaces, operating parts, and labels.

1. Concealed surfaces not to be painted include wall or ceiling surfaces in the following generally inaccessible areas:

a. Foundation spaces.
b. Furred areas.
c. Pipe spaces.
d. Duct shafts.

2. Finished metal surfaces not to be painted include:

a. Anodized aluminum.
b. Stainless steel.
c. Chromium plate.
d. Copper.
e. Bronze.
f. Brass.

3. Operating parts not to be painted include moving parts of operating equipment.
4. Labels: Do not paint over Underwriters Laboratories, Factory Mutual or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

1.3 SUBMITTALS

A. General: Submit the following according to Conditions of the Contract and Division 1 Specification Sections.

B. Product data for each paint system specified, including block fillers and primers.

1. Provide the manufacturer's technical information including label analysis and instructions for handling, storage, and application of each material proposed for use.
2. List each material and cross-reference the specific coating, finish system, and application. Identify each material by the manufacturer's catalog number and general classification.
3. Certification by the manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs).

C. Samples for initial color selection in the form of manufacturer's color charts.

1. Provide draw-down cards of final color selections in appropriate gloss finish for Architect’s approval.

1.4 QUALITY ASSURANCE

A. Applicator Qualifications: Engage an experienced applicator who has completed painting system applications similar in material and extent to those indicated for the Project that have resulted in a construction record of successful in-service performance.

B. Single-Source Responsibility: Provide primers and undercoat paint produced by the same manufacturer as the finish coats.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the job site in the manufacturer's original, unopened packages and containers bearing manufacturer's name and label, and the following information:

1. Product name or title of material.
2. Product description (generic classification or binder type).
3. Manufacturer's stock number and date of manufacture.
4. Contents by volume, for pigment and vehicle constituents.
5. Thinning instructions.
6. Application instructions.
7. Color name and number.

B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F (7 deg C). Maintain containers used in storage in a clean condition, free of foreign materials and residue.

1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

1.6 JOB CONDITIONS

A. Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50 deg F (10 deg C) and 90 deg F (32 deg C).

B. Apply solvent-thinned paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 45 deg F (7 deg C) and 95 deg F (35 deg C).

1. Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85 percent; or at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.
2. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by the manufacturer during application and drying periods.

1.7 EXTRA MATERIALS

A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.

1. Quantity: Furnish 1 gal. of each material and color applied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer: Subject to compliance with requirements, provide products of one of the following or approved substitute:

1. Benjamin Moore (B-M)
2. PPG Industries, Pittsburgh Paints (PPG).
3. Sherwin Williams (S-W).

2.2 PAINT MATERIALS, GENERAL

A. Material Compatibility: Provide block fillers, primers, finish coat materials, and related materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by the manufacturer based on testing and field experience.

B. Material Quality: Provide the manufacturer's best-quality trade sale paint material of the various coating types specified. Paint material containers not displaying manufacturer's product identification will not be acceptable.

1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish the manufacturer's material data and certificates of performance for proposed substitutions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions under which painting will be performed for compliance with paint application requirements. Surfaces receiving paint must be thoroughly dry before paint is applied.

1. Do not begin to apply paint until unsatisfactory conditions have been corrected.
2. Start of painting will be construed as the Applicator's acceptance of surfaces and conditions within a particular area.

B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.

1. Notify the Architect about anticipated problems using the materials specified over substrates primed by others.

3.2 PREPARATION

A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted, or provide surface-applied protection prior to surface preparation and painting. Remove these items, if necessary, to completely paint the items and adjacent surfaces. Following completion of painting operations in each space or area, have items reinstalled by workers skilled in the trades involved.

B. Cleaning: Before applying paint or other surface treatments, clean the substrates of substances that could impair the bond of the various coatings. Remove oil and grease prior to cleaning. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

C. Surface Preparation: Clean and prepare surfaces to be painted according to the manufacturer's instructions for each particular substrate condition and as specified.

1. Provide barrier coats over incompatible primers or remove and reprime. Notify Architect in writing about anticipated problems using the specified finish-coat material with substrates primed by others.
2. Cementitious Materials: Prepare concrete, concrete masonry block, cement plaster, and mineral-fiber-reinforced cement panel surfaces to be painted. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen, as required, to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.

   a. Use abrasive blast-cleaning methods if recommended by the paint manufacturer.
   b. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application. Do not paint surfaces where moisture content exceeds that permitted in manufacturer's printed directions.

3. Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.

   a. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer before applying primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.
   b. Prime, stain, or seal wood to be painted immediately upon delivery. Prime edges, ends, faces, undersides, and backsides of wood, including cabinets, counters, cases, and paneling.
   c. When transparent finish is required, backprime with spar varnish.
   d. Backprime paneling on interior partitions where masonry, plaster, or other wet wall construction occurs on backside.
   e. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately upon delivery.

4. Ferrous Metals: Clean ungalvanized ferrous metal surfaces that have not been shop-coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with recommendations of the Steel Structures Painting Council (SSPC).

a. Blast steel surfaces clean as recommended by the paint system manufacturer and according to requirements of SSPC specification SSPC-SP 10.
b. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
c. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by the paint manufacturer, and touch up with the same primer as the shop coat.

5. Galvanized Surfaces: Clean galvanized surfaces with nonpetroleum-based solvents so that the surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods. Test for passification: Degrease and clean per SFPC-1 (solvent wipe).

D. Materials Preparation: Carefully mix and prepare paint materials according to manufacturer's directions.

1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
2. Stir material before application to produce a mixture of uniform density; stir as required during application. Do not stir surface film into material. Remove film and, if necessary, strain material before using.
3. Use only thinners approved by the paint manufacturer and only within recommended limits.

3.3 APPLICATION

A. General: Apply paint according to manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied.

B. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.

1. Paint colors, surface treatments, and finishes are indicated in the schedules.
2. Provide finish coats that are compatible with primers used.
3. The number of coats and the film thickness required are the same regardless of the application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. Sand between applications where sanding is required to produce a smooth even surface according to the manufacturer's directions.
4. Apply additional coats if undercoats, stains, or other conditions show through final coat of paint until paint film is of uniform finish, color, and appearance. Give special attention to ensure that surfaces, including edges, corners, crevices, welds, and exposed fasteners, receive a dry film thickness equivalent to that of flat surfaces.
5. The term exposed surfaces includes areas visible when permanent or built-in fixtures, convector covers, covers for finned tube radiation, grilles, and similar components are in place. Extend coatings in these areas, as required, to maintain the system integrity and provide desired protection.
6. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before the final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
7. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, nonspecular black paint.
8. Sand lightly between each succeeding enamel or varnish coat.
9. Omit primer on metal surfaces that have been shop-primed and touch-up painted.

C. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

1. Allow sufficient time between successive coats to permit proper drying. Do not recoat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and where application of another coat of paint does not cause the undercoat to lift or lose adhesion.

D. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to the manufacturer's directions.

1. Hollow Metal Door Frames: Apply by spray method only. Do not brush apply.
2. Brushes: Use brushes best suited for the material applied.
3. Rollers: Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by the manufacturer for the material and texture required.
4. Equipment: Use airless spray equipment with orifice size as recommended by the manufacturer for the material and texture required.

E. Minimum Coating Thickness: Apply materials no thinner than the manufacturer's recommended spreading rate. Provide the total dry film thickness of the entire system as recommended by the manufacturer.

F. Mechanical and Electrical Work: Painting mechanical and electrical work includes items exposed in occupied spaces.

G. Electrical items to be painted include, but are not limited to, the following:

1. Conduit and fittings.
2. Switchgear.

H. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.

I. Prime Coats: Before applying finish coats, apply a prime coat of material, as recommended by the manufacturer, to material that is required to be painted or finished and that has not been prime-coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.

J. Pigmented (Opaque) Finishes: Completely cover to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

K. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, cloudiness, color irregularity, runs, brush marks, orange peel, nail holes, or other surface imperfections.

1. Provide satin finish for final coats unless otherwise indicated.

L. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with specified requirements.

3.4 CLEANING

A. Cleanup: At the end of each work day, remove empty cans, rags, rubbish, and other discarded paint materials from the site.

1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping. Be careful not to scratch or damage adjacent finished surfaces.

3.5 PROTECTION

A. Protect work of other trades, whether being painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as acceptable to Architect.

B. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their work after completing painting operations.

1. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINT SCHEDULE

A. General: Provide the following paint systems for the various substrates, as indicated. Sherwin-Williams is the Basis-of-Design.

1. Offices Spaces: “Harmony” eggshell.
2. Trim: “ProClassic” semigloss
3. Corridors and Classrooms Spaces: “Harmony” semigloss.

B. Concrete Masonry Units:

1. Eggshell Finish: Two finish coats over filled surface.

a. Block Filler: High-performance latex block filler.

1) 1 coat PPG Pitt-Glaze Block Filler, 16-90. MWF 25.0 mils, MDF 12.5 mils per coat.
2) 1 coat SW Heavy Duty Block Filler, B42W46, MWF 25.0 mils, MDF 12.5 mils per coat.

b. First and Second Coats: Interior, eggshell finish, latex-based paint.

1) PPG Speedhide Interior Enamel Eggshell Latex, 6-411 Series.
2) SW ProMar 200 Low Sheen ES, B20W1251, MWF 4.0 mils, MDF 1.5 mils per coat.

C. Gypsum Drywall Systems:

1. Eggshell Acrylic Latex Finish: Three coats with total dry film thickness not less than 2.5 mils.

a. Primer: White, interior, latex-based primer.

1) PPG Speedhide Quick-Drying Latex Primer-Sealer, 6-2. MWF 3.0 mils, MDF 1.0 mil per coat.
2) SW PrepRite 200 Primer, B28W200, MWF 4.0 mils, MDF 1.1 mils per coat.

b. First and Second Coats: Interior acrylic latex.

1) PPG Speedhide Interior Enamel Eggshell Latex, 6-411 Series.
2) SW ProMar 200 Low Sheen ES, B20W1251, MWF 4.0 mils, MDF 1.5 mils per coat.

2. Semi-Gloss Acrylic Latex Finish: Three coats with total dry film thickness not less than 2.5 mils.

a. Primer: White, interior, latex-based primer.

1) PPG Speedhide Quick-Drying Latex Primer-Sealer, 6-2. MWF 3.0 mils, MDF 1.0 mil per coat.
2) SW PrepRite 200 Primer, B28W200, MWF 4.0 mils, MDF 1.1 mils per coat.

b. First and Second Coats: Interior acrylic latex.

1) PPG Speedhide Interior Enamel Semi-Gloss Latex, 6-500 Series.
2) SW ProMar 200 Interior Latex Semi-Gloss Enamel, Applied at a dry film thickness of not less than 1.7 mils. MPI #43.

D. Woodwork and Hardboard:

1. Semi-Gloss Acrylic Latex Finish: Three coats.

a. Primer:

1) PPG Speedhide Water Base Undercoater, 6-855. MWF 4.0 mils, MDF 1.5 mils per coat.
2) SW PrepRite Classic Primer, B28W101, MWF 4.0 mils, MDF 1.5 mils per coat.

b. First and Second Coats: Semi-gloss Acrylic Latex.

1) PPG Speedhide 6-510 Series Interior Semi-Gloss Latex, MWF 3.0 to 4.0 mils, MDF 0.9 mils to 1.2 mils per coat.
2) SW ProMar 200 Interior Latex Semi-Gloss, B31W2200 Series, MWF 4.0 mils, MDF 1.5 mils per coat.

E. Ferrous Metal:

1. Semi-Gloss Finish: Two finish coats over primer.

a. Primer: Synthetic, quick-drying, rust-inhibiting primer. As required for spot priming shop primer.

1) PPG Speedhide Water Base Inhibitive Metal Primer, 90-712. MWF 5.0 mils, MDF 2.0 mils per coat.
2) SW Pro Industrial Pro-Cryl Universal Metal Primer, B66-310, MWF 5.0 – 10.0 mils, MDF 2.0 – 4.0 mils per coat.

b. First and Second Coats: Interior semi-gloss acrylic latex paint.

1) PPG Speedhide Latex Interior Semi-Gloss Enamel, 6-510, MWF 4 mils, MDF 1.4 mils per coat.
2) SW DTM Acrylic Semi-Gloss coating, B66W200 Series, MWF 6.5 mils, MDF 2.5 mils per coat.

F. Zinc-Coated Metal:

1. Semi-gloss Finish: Two coats over primer.

a. Primer: Galvanized metal primer.

1) PPG Speedhide Water Base Inhibitive Metal Primer, 90-712. MWF 4.8 mils, MDF 2.0 mils per coat.
2) SW Pro Industrial Pro-Cryl Universal Metal Primer, B66-310, MWF 5.0 – 10.0 mils, MDF 2.0 – 4.0 mils per coat.

b. Second and Third Coats: Semi-gloss Acrylic Latex.

1) PPG Speedhide Latex Interior Semi-Gloss Enamel, 6-510, MWF 4 mils, MDF 1.4 mils per coat.
2) SW DTM Acrylic Semi-Gloss coating, B66W200 Series, MWF 6.5 mils, MDF 2.5 mils per coat.

END OF SECTION 099000

SECTION 10 21 13.16

PLASTIC-LAMINATE-CLAD TOILET COMPARTMENTS

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 toilet compartments including toilet enclosures and / or entrance screens and / or urinal screens, configured as indicated.

B. Related Requirements:

1. Section 06 10 00 "Rough Carpentry" for blocking.
2. Section 10 28 00 "Toilet, Bath, and Laundry Accessories" for accessories such as toilet tissue dispensers, grab bars, purse shelves, and similar accessories mounted on toilet compartments.

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 toilet compartments.

B. Shop Drawings: For 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 overhead support or bracing locations.

C. Samples for Verification: For the following products, in manufacturer's standard sizes unless otherwise indicated:

1. Each type of material, color, and finish required for toilet compartments, prepared on 6-inch- (152-mm-) square Samples of same thickness and material indicated for Work.
2. Each type of hardware and accessory.

D. Product Schedule: For toilet compartments, prepared by or under the supervision of supplier, detailing location and selected colors for toilet compartment material.

1.4 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of toilet compartment.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For toilet compartments to include in maintenance manuals.

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 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: 200or less.
2. Smoke-Developed Index: 450 or less.

B. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1 for toilet compartments designated as accessible.

2.2 PLASTIC-LAMINATE-CLAD TOILET COMPARTMENTS

A. Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the Work include, but are not limited to, the following:

1. Accurate Partitions Corp. 708-442-6801 www.accuratepartitions.com (ASI and Global)
2. Ampco 305-821-5700 www.ampco.com
3. Bobrick Washroom Equipment, Inc. 800-553-1600 www.bobrick.com
4. Bradley Corporation, Mills Partitions 800-272-3539 www.bradleycorp.com
5. General Partitions Mfg. Corp. 814-833-1154 www.generalpartitions.com

B. Toilet-Enclosure Style: Floor Supported and Overhead braced.

C. Urinal-Screen Style: Cantilevered from wall.

D. Door, Panel, Screen, and Pilaster Construction: One-piece, plastic-laminate facing sheets pressure laminated to core material without splices or joints in facings or cores; with laminate applied to edges before faces to seal edges and prevent laminate from being pried loose. Seal exposed core material at cutouts to protect core from moisture.

1. Core Material: Particleboard.
2. Doors and Panels: Finished to not less than 1 inch (25 mm) thick.
3. Pilasters: Provide construction to comply with the following with or without steel-sheet core reinforcement:

a. Finished to not less than 1-1/4 inches (32 mm) thick.

E. Pilaster Shoes: Formed from stainless-steel sheet, not less than 0.031-inch (0.79-mm) nominal thickness and 3 inches (76 mm) high, finished to match hardware.

F. Brackets (Fittings):

1. Stirrup Type: Ear or U-brackets, chrome-plated zamac or chrome-plated brass.

G. Plastic-Laminate Finish: Color and pattern as indicated, in each room.

1. Color and Pattern: As indicated by manufacturer's designations or if not indicated, as selected by Architect from manufacturer's full range.

2.3 HARDWARE AND ACCESSORIES

A. Hardware and Accessories: Manufacturer's standard heavy-duty 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 in-swinging door from hitting compartment-mounted accessories.
5. Door Bumper: Manufacturer's standard rubber-tipped bumper at out-swinging doors and entrance-screen doors.
6. Door Pull: Manufacturer's standard unit at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible.

B. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail in manufacturer's standard finish.

C. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel, finished to match the items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless-steel, hot-dip galvanized-steel, or other rust-resistant, protective-coated steel anchors compatible with related materials.

2.4 MATERIALS

A. Particleboard: ANSI A208.1, Grade M-2.

1. Verify particleboard is made without added urea formaldehyde.

B. Plastic Laminate: NEMA LD 3, general-purpose HGS grade, 0.048-inch (1.2-mm) nominal thickness.

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."

D. Aluminum Castings: ASTM B 26/B 26M.

E. Aluminum Extrusions: ASTM B 221 (ASTM B 221M).

F. Brass Castings: ASTM B 584.

G. Brass Extrusions: ASTM B 455.

H. Stainless-Steel Sheet: ASTM A 666, Type 304, stretcher-leveled standard of flatness.

I. Stainless-Steel Castings: ASTM A 743/A 743M.

J. Zamac: ASTM B 86, commercial zinc-alloy die castings.

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. Anchor compartment components which touch the floor as indicated for floor-anchored units below.

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. Toilet Partition Panel and Door Size:

1. Height: 55 inches minimum, unless otherwise indicated, with doors of the same height.

E. 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. All lateral bracing shall be connected back to a wall at two locations, minimum.

F. Door Size and Swings: Unless otherwise indicated, provide 24-inch- (610-mm-) wide in-swinging doors for standard toilet compartments and 36-inch- (914-mm-) wide out-swinging doors with a minimum 32-inch- (813-mm-) 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

A. General: Comply with manufacturer's written installation instructions for mounting of partitions and screens. 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 (13 mm).
   b. Panels and Walls: 1 inch (25 mm).

2. Stirrup Brackets: Match the previous panel installation holes where new panels are replacing existing panels. Secure panels to walls and to pilasters with no fewer than two brackets attached near top and bottom of panel.

   a. Locate and align wall brackets for wall anchors at existing holes where previous partition panel mounting stirrup holes exist, and / or in masonry or tile joints at new partition panel mounting locations.
   b. Align brackets at pilasters with brackets at walls.

B. Overhead-Braced Units: Secure pilasters to floor and level, plumb, and tighten. Set pilasters with anchors penetrating not less than 1-3/4 inches (44 mm) into structural floor unless otherwise indicated in manufacturer's written instructions. Secure continuous head rail to each pilaster with no fewer than two fasteners. Hang doors to align tops of doors with tops of panels, and adjust so tops of doors are parallel with overhead brace when doors are in closed position.

C. Floor-Anchored Units: Set pilasters with anchors penetrating not less than 2 inches (51 mm) into structural floor unless otherwise indicated in manufacturer's written instructions. Level, plumb, and tighten pilasters. Hang doors and adjust so tops of doors are level with tops of pilasters when doors are in closed position.

D. 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 in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors and doors in entrance screens to return doors to fully closed position.

END OF SECTION 102113.16

SECTION 102215

FIXED GLASS PANEL PARTITIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes fixed, frameless glass panel partitions with swinging and sliding glass doors.

B. Related Requirements: Related project requirements can be found in the following documents:

1. Section 09 22 16 "Non-Structural Metal Framing" for overhead gypsum bulkhead supports which attach glass panel partition tracks to structure, and for bracing at door openings.

1.2 REFERENCE STANDARDS

1. AAMA 611 Voluntary Specification for Anodized Architectural Aluminum

B. American Society of Civil Engineers/Structural Engineering Institute (ASCE/SEI): www.asce.org:

1. ASCE/SEI 7 Minimum Design Loads for Buildings and Other Structure

C. ASTM International (ASTM): www.astm.org:

1. ASTM A666 Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar
2. ASTM B221/ASTM B221M Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
3. ASTM C1048 Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass
4. ASTM C1172 Standard Specification for Laminated Architectural Flat Glass
5. ASTM E90 Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
6. ASTM E413 Classification for Rating Sound Insulation
7. ASTM E557 Guide for the Installation of Operable Partitions

D. Builders Hardware Manufacturers Association (BHMA): www.buildershardware.com:

1. ANSI/BHMA A156 Series

E. Code of Federal Regulations

1. 16 CFR 1201 Safety Standard for Architectural Glazing Materials

F. International Code Council (ICC): www.iccsafe.org:

1. ICC A117.1 Accessible and Usable Buildings and Facilities (ANSI)

G. U.S. Architectural & Transportation Barriers Compliance Board: www.access-board.gov:

1. Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate installation of glass panel partitions with installation of floor, wall, and ceiling construction to comply with substrate tolerance requirements of partition manufacturer.
2. Coordinate installation of anchors and secondary structural members indicated on approved glass panel partition shop drawings and specified in other sections.

B. Preinstallation Conference: Conduct conference at Project Site.

1.4 ACTION SUBMITTALS

A. Product Data: For each glass panel partition and door component specified, including:

1. Glass panels.
2. Frame and sill tracks.
3. Door hardware and accessories.

B. Shop Drawings: For fixed glass panel partitions.

1. Include plans, elevations, sections, and details. Provide numbered panel installation sequence.
2. Show locations and requirements for tracks, bracing, blocking, and attachments to other work.

C. Samples for Verification: For each exposed component including hardware, for each color and finish selected, of size indicated below:

1. Glass: Units 12 inches (300 mm) square.
2. Exposed Frame, Track, and Sill Members: Not less than 6 inches (150 mm) long.
3. Hardware: One of each type of exposed door hardware items.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified installer.

B. Warranty: Sample of unexecuted manufacturer warranty.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Experienced Installer equipped and trained for installation of glass panel partitions required for this Project with record of successful completion of not less than five projects of similar scope.

B. Single Source Responsibility: Provide glass panel partitions and associated hardware by a single manufacturer through a single source.

C. Mockups: Provide mockup consisting of initial sections of tracks, frames, and glass panels with operating doors and hardware, in location as directed by Architect. Proceed with work upon approval of mockup by Architect. Work accepted by the Architect may remain and become part of the final work.

1.7 WARRANTY

A. Special Manufacturer's Warranty: Standard form in which manufacturer agrees to repair or replace components of glass panel partitions that demonstrate deterioration or faulty operation due to defects in materials or workmanship under normal use within warranty period specified.

1. Warranty Period: Five years date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Provide glass door assemblies manufactured by dormakaba USA, Inc.; (844) 773-2669; email: specifications@dormakaba.com ; website: www.dormakaba.us.

2.2 PERFORMANCE REQUIREMENTS

A. Acoustical Performance: Provide glass panel partition tested by qualified testing agency as follows:

1. Sound-Transmission Requirements: Tested for laboratory sound-transmission loss performance according to ASTM E90, determined by ASTM E413, and rated for not less than STC indicated.

2.3 GLASS PANEL PARTITIONS

A. Fixed Glass Panel Partitions: Frameless glass panel partition with top track and bottom sill guide, with butt-glazed dry joint between panels, and equipped with swinging and sliding doors where indicated.

1. Basis of Design: **dormakaba, PURE**.
2. Sound Transmission Class (STC), ASTM E 90 and Outdoor-Indoor Transmission Class (OITC), ASTM E 1332:

   a. Framed partition with 12.0 mm thick laminated glass: STC 33; OITC 30.
   b. Swinging door with 12.0 mm thick laminated glass: STC 15; OITC 15.
   c. Sliding door with 12.0 mm thick laminated glass: STC 15; OITC 15.

3. Partition Top Track: Aluminum extrusion, low-profile.
4. Sill Guide: Aluminum extrusion.

2.4 GLASS PANELS AND DOORS

A. General: Provide either of the two types of glass indicated below. Do not provide a combination of the two glass types. Choose one or the other and provide that kind of glass everywhere for the system.

B. Glass Panels, General: Provide glass panels that comply with 16 CFR 1201, Category II requirements for safety glazing. Permanently mark glazing with certification label of the SGCC.

1. Glass and Door Panel Thickness: Thickness required for size of panel based upon manufacturer's written recommendations, but not less than 12 mm.

C. Fully Tempered Clear Float Glass: ASTM C1048, Kind FT, Condition A, Type I, Class 1, Quality-Q3; thickness 12.0 mm.

D. Laminated Fully Tempered Clear Float Glass: ASTM C1172; consisting of two plies of 6 mm. thick glass with interlayer of 0.060-inch-thick clear polybutyral; unit thickness 12.7 mm.

2.5 SWINGING DOORS

A. Accessibility Standard: Comply with applicable provisions in ADA-ABA Accessibility Guidelines for Buildings and Facilities, ICC A117.1, and the 2012 Texas Accessibility Standard.

B. Single Door: Glass panel matching partition panel material and thickness; 36 (914 mm) wide by partition height unless otherwise indicated.

2.6 SLIDING DOORS

A. Accessibility Standard: Comply with applicable provisions in ADA-ABA Accessibility Guidelines for Buildings and Facilities, ICC A117.1, and the 2012 Texas Accessibility Standard.

B. Doors: Glass panel matching partition panel material and thickness, of size indicated on Drawings.

C. Sliding Door Track: Extruded aluminum track designed for operation, size, and weight of glass panel door, with factory-finished head closure trim and seals as required for acoustical performance indicated.

D. Track Mounting:

1. Ceiling-mount with sidelite.

E. Door Panel Carriers: Trolley system designed for operation, size, and weight of glass panel door, with ball-bearing wheels.

F. Manual Sliding Door Operation:

1. Single door with regulated sliding and cushioned close.

a. Basis of Design: DORMAKABA PURE with SoftClose.

2.7 MATERIALS

A. Aluminum: ASTM B221 (ASTM B221M), with strength and durability characteristics of not less than Alloy 6063-T5.

B. Stainless Steel: ASTM A666, Type 304.

2.8 FINISHES

A. Aluminum Finish:

1. Clear anodic finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.
2. Powder Coat: Manufacturer's standard thermosetting polyester or acrylic urethane powder coating with cured-film thickness not less than 1.5 mils (0.04 mm), in color selected by Architect from manufacturer's full range.

B. Stainless Steel Finishes: No. 4 directional satin finish.

2.9 DOOR HARDWARE AND FITTINGS

A. Door Hardware, General: All-glass door hardware units in types, sizes, quantities, and mounting locations recommended by manufacturer for glass door types, sizes, and operation. For exposed components, match metal and finish of exposed partition fittings unless otherwise noted.

B. Pulls and Handles: Back-to-back. Provide at sliding doors and pivot doors.

1. Design: Vertical bar, 1 ¼" diameter, 12 inch.

a. Basis of Design: **DORMAKABA, TG 9387 Ladder Pull**.

C. Electromagnetic Locks: BHMA A156.23; electrically powered; with electromagnet attached to adjacent glass panel and armature plate attached to door; full interior type. Provide at pivot doors.

1. Provide power pack for electrified door hardware for concealed installation.
2. Coordinate lock operation with requirements of for access control for the room."

D. Patch Fittings for Swinging Doors (if required to install hardware or to make door work): At head and sill on pivot side, and at lock and strike at swing side. Provide at pivot doors.

1. Basis of Design: DORMAKABA, PURE Pivot Header.

E. Concealed Overhead Closers and Bottom Pivots: Center hung; BHMA A156.4, Grade 1. Provide housings, bottom arms, top walking beam pivots, mounting plates, and accessories. Provide at pivot doors.

1. Basis of Design: DORMAKABA, RTS88
2. Swing: Single acting, with positive dead stop.
3. Hold Open: 90 degree.
4. Opening Force: Comply with interior door operating force of authorities having jurisdiction for accessibility requirements and egress doors.

F. Exit Devices: BHMA A156.3 and UL 305. Provide at pivot doors.

1. Basis of Design: dormakaba GP 1000 (Top Latching).
2. Tested and approved by BHMA for ANSI 156.3, Grade 1.
3. UL 305 and ULC-S132 tested to the Standard for Panic Hardware.
4. Devices shall be able to be mounted on tempered or tempered laminated glass doors with thicknesses from 3/8 inches through 7/8 inches.
5. Function: Device latch to retract when actuating portion of device is depressed with 15 lbs. of pressure.
6. Devices to have “Dogging” feature. Operation by push-pull when latch toggle is locked down (dogged).
7. Actuation portion of device to have the ability to be adjusted horizontally and vertically +/- ½ inch for precise installation.
8. Latching: Provide Fixed Strike; Electric strike for access control – at top latching devices only.
9. Provide Exterior Pull mounted on pull side; As selected by Architect from manufacturer's standard designs.
10. Pull to have the ability to be adjusted horizontally and vertically +/- ½ inch for precise installation.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine partition substrates to determine if work is within glass panel partition manufacturer's required tolerances and ready to receive work. Proceed with installation of partitions once conditions affecting installation and performance of partitions meet manufacturer's requirements.

B. Verify that partition construction adjacent to acoustically-rated glass panel partition system with sliding doors complies with requirements of ASTM E557.

3.2 PARTITION INSTALLATION

A. General: Comply with glass panel partition manufacturer's written installation instructions and approved shop drawings.

B. Install glass panel partitions after other finishing operations have been completed.

C. Set units level, plumb, and true to line, with uniform joints.

D. Fasten glass panel partition track and sill to building structure and supports as indicated on approved shop drawings, utilizing approved fasteners and spacing.

E. Set, seal, and grout floor closer cases.

3.3 ADJUSTING

A. Adjust doors and hardware to produce smooth operation and tight, uniform fit.

B. Adjust door closers to required timing and force.

C. Adjust latches and locks for smooth operation.

D. Test and adjust hardware linked to access control system.

E. Replace damaged panels and accessories.

3.4 CLEANING

A. Clean glass panels in accordance with glass manufacturer's written instructions. Do not use cleaning agents or methods not approved by glass manufacturer.

B. Clean exposed metal surfaces to factory new appearance.

END OF SECTION

SECTION 102800

TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Public-use washroom accessories.

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 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For manufacturer's special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For accessories to include in maintenance manuals.

1.6 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: 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 WASHROOM ACCESSORIES

A. Source Limitations: Obtain public-use washroom accessories from single source from single manufacturer.

B. Toilet Tissue (Roll) Dispenser:

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the Work include the following:

   a. AJW Products, Inc. 845-562-3332 www.ajw.com
   b. American Specialties, Inc. (ASI) 914-476-9000 www.americanspecialties.com
   c. Bobrick Washroom Equipment, Inc. 800-553-1600 www.bobrick.com
   d. Bradley Corporation 800-272-3539 www.bradleycorp.com
   e. GAMCO Commercial Restroom Accessories, A Division of Bobrick Washroom Equipment, Inc. 518-877-7444 www.gamcousa.com

2. Description: Double-roll dispenser.
3. Mounting: Surface mounted.
4. Operation: Spindleless without controlled delivery with self-locking device extending through core that prevents core removal until roll is empty.
5. Capacity: Designed for 5-inch- (127-mm-) diameter tissue rolls.
6. Material and Finish: Chrome-plated zinc alloy (zamac) or steel.

C. Grab Bar:

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the Work include the following:

   a. AJW Products, Inc. 845-562-3332 www.ajw.com
   b. American Specialties, Inc. 914-476-9000 www.americanspecialties.com
   c. Bobrick Washroom Equipment, Inc. 800-553-1600 www.bobrick.com
   d. Bradley Corporation 800-272-3539 www.bradleycorp.com
   e. GAMCO Commercial Restroom Accessories, A Division of Bobrick Washroom Equipment, Inc. 518-877-7444 www.gamcousa.com

2. Mounting: Flanges with concealed fasteners.
3. Material: Stainless steel, 0.05 inch (1.3 mm) thick.

   a. Finish: Smooth, No. 4 finish (satin).

4. Outside Diameter: 1-1/2 inches (38 mm).
5. Configuration and Length: Straight, 36 inches (914 mm) long behind water closet, straight 42 inches (1067 mm) long at sides of water closet and 18 inches (457 mm) straight vertical at sides of water closet.

2.2 MATERIALS

A. Stainless Steel: ASTM A 666, Type 304, 0.031-inch (0.8-mm) minimum nominal thickness unless otherwise indicated.

B. Brass: ASTM B 19, flat products; ASTM B 16/B 16M, rods, shapes, forgings, and flat products with finished edges; or ASTM B 30, castings.

C. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.036-inch (0.9-mm) minimum nominal thickness.

D. Galvanized-Steel Sheet: ASTM A 653/A 653M, with G60 (Z180) hot-dip zinc coating.

E. Galvanized-Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.

F. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.

G. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).

2.3 FABRICATION

A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.

2.4 KEY TESTING AND DELIVERY

A. Keys: Provide universal keys for internal access to accessories for servicing and resupplying.

B. Test each key for proper operation of locking units. Group and package master keys and copies by manufacturer clearly marked as to manufacturer and the units that key copies will fit. One master key and its copies will fit all lockable units supplied by that manufacturer.

C. Deliver marked key packages to Owner’s representative and obtain receipt. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install accessories according to 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.

B. Grab Bars: Install to withstand a crushing and shape deforming load of at least 250 lbf (1112 N) applied in from any direction, when tested according to ASTM F 446. Install grab bars to resist bending tensile and moment forces generated by a load of 250 lbf. applied from any direction, or as otherwise required by authorities having jurisdiction, whichever is more stringent.

C. Do not allow any accessories to touch any plumbing pipes or other plumbing elements in the accessory vicinity that may impart chilling or heating effects to the accessory. i.e., move or reposition plumbing elements to create air space (1/4 inch minimum) between the accessory and plumbing elements.

3.2 ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.

B. Remove temporary labels and protective coatings.

C. Clean and polish exposed surfaces according to manufacturer's written instructions.

END OF SECTION 102800

SECTION 10 44 13

FIRE PROTECTION CABINETS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fire-protection cabinets for the following:

a. Portable fire extinguishers.

B. Related Requirements:

1. Section 10 44 16 "Fire Extinguisher Cabinets."

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product. Show door hardware, cabinet type, trim style, and panel style. Include roughing-in dimensions and details showing recessed-, semirecessed-, or surface-mounting method and relationships of box and trim to surrounding construction.

B. Shop Drawings: For fire-protection cabinets. Include plans, elevations, sections, details, and attachments to other work.

C. Samples: For each type of exposed finish required.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance Data: For fire-protection cabinets to include in maintenance manuals.

1.4 COORDINATION

A. Coordinate sizes and locations of fire-protection cabinets with wall depths. **Contractor is responsible for determining which cabinet will fit in the existing wall cavities and not stick more than 4 inches beyond the face of the wall and into the adjacent space**. More than a 4 inch protrusion creates an accessibility issue, making the protruding cabinet non-compliant with accessibility codes. **Coordinate size of extinguishers in the extinguisher specifications section with the size of cabinets so that the cabinets can accommodate the extinguishers indicated, or a smaller size extinguisher if the wall cavity requires a smaller cabinet.**

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Rated Fire-Protection Cabinets: Where indicated, provide listed and labeled cabinets to comply with requirements in ASTM E 814 for fire-resistance rating of walls into which they are installed.

2.2 FIRE-PROTECTION CABINET

A. Design Requirements: **Cabinets shall not extend more than 4 inches from wall surface from which they project**, in compliance with 2010 ADA, ANSIA117.1 and 2012 TAS.

B. Cabinet Type: Suitable for fire extinguisher.

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporation in the Work include the following:

a. J.L. Industries, Inc. 800-554-6077 www.jlindustries.com
b. Kidde, A UTC Fire & Security Company 800-8806788 www.kidde.com
c. Larsen's Manufacturing Company 800-527-7367 www.larsensmfg.com
d. Potter Roemer 866-644-3473 www.potterroemer.com/home

C. Cabinet Construction: Nonrated at unrated walls; match wall rating at rated walls, with a minimum of 1-hour fire rated at any rated wall.

1. Fire-Rated Cabinets: Construct fire-rated cabinets with double walls fabricated from 0.0478-inch- (1.21-mm-) thick cold-rolled steel sheet lined with minimum 5/8-inch- (16-mm-) thick fire-barrier material. Provide factory-drilled mounting holes.

D. Cabinet Material: Cold-rolled steel sheet.

E. Semirecessed Cabinet: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend). **Cabinets shall not extend more than 4 inches from wall surface from which they project**, in compliance with 2010 ADA, ANSIA117.1 and 2012 TAS.

1. Rolled-Edge Trim: Maximum 4-inch (102-mm) backbend depth.

F. Cabinet Trim Material: Same material and finish as door.

G. Door Material: Steel sheet.

H. Door Style: Fully glazed panel with frame.

I. Door Glazing: Tempered float glass (clear).

J. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.

1. Provide projecting door pull and friction latch.
2. Provide continuous hinge, of same material and finish as trim, permitting door to open 180 degrees.

K. Accessories:

1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire-protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
2. Door Lock: Cam lock that allows door to be opened during emergency by pulling sharply on door handle.
3. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated or as directed by Architect.

a. Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISHER."

1) Location: Applied to cabinet door.
2) Application Process: Pressure-sensitive vinyl letters.
3) Lettering Color: Red or White in contrasting color to the cabinet color, as selected by the Architect.
4) Orientation: Vertical.

L. Materials:

1. Cold-Rolled Steel: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.

   a. Finish: Baked enamel or powder coat.
   b. Color: As selected by Architect from full range of industry colors and color densities.

2. Tempered Float Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, Class 1 (clear).

2.3 FABRICATION

A. Fire-Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.

1. Weld joints and grind smooth.
2. Provide factory-drilled mounting holes.
3. Prepare doors and frames to receive locks.
4. Install door locks at factory.

B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles.

1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch (13 mm) thick.
2. Miter and weld perimeter door frames.

C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.4 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's AMP 500, "Metal Finishes Manual for Architectural and Metal Products," for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces of fire-protection cabinets from damage by applying a strippable, temporary protective covering before shipping.

C. Finish fire-protection cabinets after assembly.

D. 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.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine walls and partitions for suitable framing depth and blocking where semirecessed cabinets will be installed.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare recesses for semirecessed fire-protection cabinets as required by type and size of cabinet and trim style.

3.3 INSTALLATION

A. General: Install fire-protection cabinets in locations and at mounting heights indicated or, if not indicated, at heights indicated below and acceptable to authorities having jurisdiction.

1. Fire-Protection Cabinets: Adjust cabinet height as needed to cause the top of the extinguisher handle to be as high as possible, but not greater than 44 inches (1372 mm) above the floor, in compliance with 2010 ADA, ANSIA117.1 and 2012 TAS for worst-case possible reach condition. These heights are applicable to all age groups. **Cabinets shall not extend more than 4 inches from wall surface from which they project**, in compliance with 2010 ADA, ANSIA117.1 and 2012 TAS.

B. Fire-Protection Cabinets: Fasten cabinets to structure, square and plumb.

1. Fasten mounting brackets to inside surface of fire-protection cabinets, square and plumb.

C. Identification: Apply vinyl lettering at locations indicated.

3.4 ADJUSTING AND CLEANING

A. Remove temporary protective coverings and strippable films, if any, as fire-protection cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.

B. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

C. On completion of fire-protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.

D. Touch up marred finishes, or replace fire-protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire-protection cabinet and mounting bracket manufacturers.

E. Replace fire-protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 10 44 13

SECTION 10 44 16 - FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes portable, hand-carried fire extinguishers.

B. Related Requirements:

1. Section 10 44 13 "Fire Protection Cabinets."

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguisher.

1.3 INFORMATIONAL SUBMITTALS

A. Warranty: Sample of special warranty.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.

1.5 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Failure of hydrostatic test according to NFPA 10.
b. Faulty operation of valves or release levers.

2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."

B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

1. Provide fire extinguishers approved, listed, and labeled by FM Global.

2.2 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

A. Fire Extinguishers: Type, size, and capacity for each fire-protection cabinet indicated.

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporation in the Work include the following:

a. Badger Fire Protection 800-446-3857 www.badgerfire.com
b. J.L. Industries 800-554-6077 www.jlindustries.com
c. Kidde, A UTC Fire & Security Company 800-8806788 www.kidde.com
d. Larsen's Manufacturing Company 800-527-7367 www.larsensmfg.com
e. Potter Roemer 866-644-3473 www.potterroemer.com/home

2. Valves: Manufacturer's standard.
3. Handles and Levers: Manufacturer's standard.
4. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B.

B. Multipurpose Dry-Chemical Type in Steel Container: UL-rated 4-A:60-B:C, 10-lb (4.5-kg) nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container. This type of extinguisher is to be used everywhere except kitchens. Rooms where microwaves are the only installed cooking appliance installed, shall receive this type of extinguisher. **Before acquiring the 10-lb extinguishers, coordinate their size with the cabinet size to confirm the extinguisher will fit in the cabinets.**

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine fire extinguishers for proper charging and tagging.

1. Remove and replace damaged, defective, or undercharged fire extinguishers.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install fire extinguishers in locations indicated and in compliance with requirements of authorities having jurisdiction.

END OF SECTION 10 44 16

SECTION 12 32 16

MANUFACTURED PLASTIC-LAMINATE-FACED CASEWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes plastic-laminate-faced cabinets of stock design.

B. Related Requirements:

1. Section 06 10 00 "Rough Carpentry" for wood blocking for anchoring casework.
2. Section 09 65 13 "Resilient Base and Accessories" for resilient base applied to plastic-laminate-faced casework.
3. Section 12 36 23.13 "Plastic-Laminate-Clad Countertops."

1.2 DEFINITIONS

A. Definitions in the AWI's, AWMAC's, and WI's collaborative work: Architectural Woodwork Standards (AWS Edition 2, or later) apply to the work of this Section, except as otherwise indicated.

B. MDF: Medium-density fiberboard. **Not allowed on the project**.

C. Hardwood Plywood: A panel product composed of wood layers or plies of wood veneer, joined with adhesive between all layers, and faced both front and back with hardwood veneers. Hardboard core, MDF core, lumber core and particleboard core plywood will not be allowed.

D. Only Veneer Core Hardwood and Veneer Core Softwood Plywood, both with 7 plies minimum, will be allowed and considered “Plywood” for this job. Where plywood is mentioned, it shall be 7-ply minimum veneer core plywood.

E. Base: The bottom support for base cabinets: the substructure on which the top of the cabinet stands or rests; occurs at cabinets mounted on the floor. The Cabinet Base shall be a water resistant wood or other material structure upon which the top of the cabinet shall be built. It shall be provided from the floor surface to a height that is four (4) inches above the finished floor. The base shall be provided at all faces/sides of all cabinets. For rectilinear and four sided cabinets, the base shall be provided at the front, left side, right side and rear of the cabinet. Where cabinets are more than four sided, and there is not a single front, left side, right side or rear, the base shall be provided at all the sides of the polygon shaped cabinet. Where the cabinet has a curved footprint, the bottom of the curved panel, and all the other sides of the cabinet shall be provided with a base. At cabinets with less than four sides, all the sides shall be provided with a base.

F. Thermoset Decorative Overlay (TDO): Melamine. **Not allowed on the project**.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

B. Keying Conference: Conduct conference at Project site. Incorporate keying conference decisions into final keying requirements.

1.4 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that casework can be supported and installed as indicated.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work. Show fabrication details, including types and locations of hardware. Show installation details, including field joints and filler panels. Indicate manufacturer's catalog numbers for casework. Comply with AWS Section 1 – Submittals, and, in addition, the following

1. Coordinate shop drawings with other work involved.
2. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers, and other items installed in casework.
3. Comply with Section 10 of the American Woodwork Institute - Architectural Woodwork Standards (AWS) – or the latest published AWI standard superseding the AWS unless indicated otherwise in this specification.

C. Keying Schedule: Include schematic keying diagram and index each key set to unique designations that are coordinated with the Contract Documents.

D. Samples: For cabinet finishes.

E. Samples for Verification: Comply with AWS Section 1 – Submittals. 8-by-10-inch (200-by-250-mm) Samples for each type of finish and the following:

1. Submit section of countertop showing top, front edge, and backsplash construction with submittals (refer to Section 123623.13 “Plastic Laminate Clad Countertops”).
2. Submit both hinged and sliding door samples.
3. One full-size finished base cabinet complete with hardware, doors, and drawers.
4. One full-size finished wall cabinet complete with hardware, doors, and adjustable shelves.
5. Maintain full-size Samples at Project site during construction in an undisturbed condition as a standard for judging the completed Work. Unless otherwise indicated, approved sample units may become part of the completed Work if in undisturbed condition at time of Substantial Completion. Notify Architect of their exact locations.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Certificates: For each type of product, not limited to the following.

1. Composite wood products.
2. High-pressure decorative laminate.
3. Adhesives.

C. Woodwork Quality Standard Compliance Letter: Before the end of the project, provide a notarized letter from an executive of the casework manufacturing company who is authorized to represent the manufacturer regarding the quality of their product, signed by the executive and notarized, certifying that the casework manufacturer's products for the job have been built in compliance with the specifications and the AWI Architectural Woodwork Standard (AWS), or in lieu of the AWS, in compliance with the AWI’s latest published casework standard superseding the AWS, in the quality grade indicated in this specification for requirements not covered by this specification. Compliance with this specification and the

AWS, or AWI's superseding standard, where this specification does not cover an aspect of casework design, is required for the job. Submit an unsigned sample letter with the initial shop drawing submittal for the Architect's review.

D. Sample Warranty: For special warranty.

1.7 QUALITY ASSURANCE

A. General: The work and the administration of the work shall comply with the requirements of the AWS Edition 2, or later edition if published.

B. Installer Qualifications: An authorized representative who is trained and approved by manufacturer for installation of units required for this Project.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver final casework only after painting, utility roughing-in, and similar operations that could damage, soil, or deteriorate casework have been completed in installation areas. If casework must be stored in other than installation areas, store only in areas where environmental conditions meet requirements specified in "Project Conditions" Article.

B. Keep finished surfaces covered with polyethylene film or other protective covering during handling and installation.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install casework until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period. Maintain temperature and relative humidity during the remainder of the construction period in range recommended for Project location by the AWI's, AWMAC's, and WI's "Architectural Woodwork Standards."

B. Established Dimensions: Where casework 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.

C. Locate concealed framing, blocking, and reinforcements that support casework by field measurements before being enclosed, and indicate measurements on Shop Drawings.

1.10 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of casework that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Delamination of components or other failures of glue bond.
b. Warping of components.
c. Failure of operating hardware.
d. Deterioration of finishes.

2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the Work only include the following – that means that only the following may bid the project without receiving prior approval to bid from Stantec:

1. Cabinets by Design 770.418.1200 www.cabinetsbydesigninc.com/
2. Calmar Manufacturing Co. 563-562-3261 www.imperialwoodworking.com/calmar.html
3. LSI Corporation of America 763-559-4664 www.lsi-casework.com
4. TMI Systems Design Corporation 800-456-6716 www.tmisystems.com
5. Westmark Products, Inc. 800-755-3470 www.westmarkproducts.com
6. **Millwork Companies: Millwork Companies, with or without product lines comparable to the listed manufacturers,** are not allowed to bid the project, until it is proven to Stantec that the company(s) can do the work to a satisfactory level of quality as judged by Stantec.

   a. In order to bid the casework part of the work, you shall express your desire to bid the casework to Stantec at least twenty (20) days prior to the bid date. Include with your letter of introduction adequate information to allow Stantec to forward to you our Interior Architectural Millwork specification section (an e-mail address will do). You will be required to comply with this newly issued Interior Architectural Woodwork specification.
   b. Millwork Companies: Millwork Companies shall comply with the requirements of the AWI Architectural Woodwork Standards Edition 2 (Custom quality level) and the additional requirements of this specification. Subject to compliance with requirements, acceptable Millwork Companies are:

      1) Hayes Millwork 940.484.7775 hayesbuildingservices.com/ Denton
      2) JC Manufacturing 903-473-3770 www.jcmfgcorp.com/ Emory
      3) JC Millwork 469-702-2570 www.jcmillwork.com/ Flower Mound
      4) Legacy Millwork and Lockers 214-466-1700 http://legacylockers.com/ Dallas
      5) Phoenix Millwork 281-388-2211 www.phoenixmillwork.net/ Alvin

B. Source Limitations: Obtain plastic-laminate-faced cabinets from single manufacturer.

2.2 CASEWORK, GENERAL

A. Quality Standard: Unless otherwise indicated, comply with the AWI's, AWMAC's, and WI's "Architectural Woodwork Standards" for grades of casework indicated for construction, finishes, installation, and other requirements.

1. Grade: Custom.

B. Product Designations: Drawings indicate sizes, configurations, and finish materials of manufactured plastic-laminate-faced cabinets by referencing designated manufacturer's catalog numbers or by referencing designations of Casework Design Series numbering system in Appendix A of the AWI's, AWMAC's, and WI's "Architectural Woodwork Standards.". Other manufacturers' casework of very similar sizes and door and drawer configurations (in the opinion of the Architect, of same finish materials, and complying with the Specifications may be considered. See Section 01 25 00 “Substitution Procedures”".

2.3 CASEWORK

A. Design:

1. Reveal overlay.

B. Exposed Materials:

1. Plastic Laminate: Grade HGS on horizontal surfaces and Grade VGS on vertical surfaces.

a. Colors and Patterns: Match Architect's sample.

2. Unless otherwise indicated, provide specified edgebanding on all exposed edges.

C. Semiexposed Materials:

1. Plastic Laminate: Grade VGS unless otherwise indicated. Provide plastic laminate for semiexposed surfaces unless otherwise indicated.

a. Provide plastic laminate of same grade as exposed surfaces for interior faces of doors and drawer fronts and other locations where opposite side of component is exposed.

2. Unless otherwise indicated, provide specified edgebanding on all semiexposed edges.

D. Concealed Materials (use where indicated):

1. Solid Wood / Lumber: Any hardwood or softwood species, with no defects affecting strength or utility.
2. Plywood: Hardwood plywood, 7-ply minimum veneer core, shall also be cabinet-grade.
3. Plastic Laminate: Grade BKL.

2.4 MATERIALS

A. General: Use materials where they are indicated.

B. Maximum Moisture Content for Lumber: 7 percent for hardwood and 12 percent for softwood.

C. Hardwood Plywood: HPVA HP-1, minimum 7-ply veneer core, shall also be cabinet-grade.

D. Softwood Plywood: DOC PS 1, minimum 7-ply veneer core, shall also be cabinet-grade.

E. Plastic Laminate: High-pressure decorative laminate complying with NEMA LD 3.

1. Manufacturer: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the Work include, but are not limited to, the following:

a. Formica Corporation 800-367-6422 www.formica.com
b. Lamin-Art, Inc. 800-323-7624 www.laminart.com
c. Nevemar Surface Systems 203.925.1556 part of Panolam Surface Systems www.nevamar.com/
d. Pionite Surface Systems part of Panolam Surface Systems 203.925.1556 www.pionite.com
e. Wilsonart International, Inc., a Division of Illinois Tool Works Inc. 800-433-3222 www.wilsonart.com

F. Edgebanding for Plastic Laminate for Cabinets: Plastic laminate matching adjacent cabinet surface material.

G. Glass for Glazed Doors: Clear tempered glass complying with ASTM C 1048, Kind FT, Condition A, Type I, Class 1, Quality-Q3; not less than 5.0 mm thick.

H. Urea Formaldehyde: All products used in the casework shall be no-added-urea-formaldehyde products.

2.5 COLORS AND FINISHES

A. Plastic-Laminate Colors, Patterns, and Finishes: As indicated by manufacturer's designations, or if not indicated, as selected by Architect from plastic-laminate manufacturer's full range.

B. PVC Edgebanding Color (at shelves): Match plastic adjacent laminate color.

C. Plastic Laminate Edgebanding Color (at cabinets): Match plastic adjacent laminate color.

2.6 FABRICATION

A. Plastic-Laminate-Faced Cabinet Construction: As required by referenced quality standard, but not less than the following:

1. Balanced Construction Throughout. Laminate clad panels shall be constructed in accordance with AWI AWS requirements for “Balanced Construction”
2. Bottoms and Ends of Cabinets (materials over side panels), and Tops of Wall Cabinets and Tall Cabinets: 3/4-inch (19-mm) 7-ply minimum veneer core plywood. Bottoms here refers to the bottom of the cabinet above the “Base” of the cabinet.
3. Cabinet bases (see definition of base) shall be of dimensional lumber.
4. Frames, side panels, and structural parts of the cabinets shall be of 7-ply minimum veneer core plywood and or dimensional lumber.
5. Shelves: 3/4-inch- (19-mm-) 7-ply minimum veneer core plywood.

    a. Shelves Up To 32 inch (813 mm) Span: Adjustable and fixed shelves with end supports only, with end-to-end spans, shall be 3/4 inch (19 mm) minimum thick. Fixed shelves with support along at least one of their long edges, shall also be 3/4 inch (19 mm) minimum thick.
    b. Shelves, 32 inch (813 mm) to 42 inch (1,067 mm) Span: Adjustable and fixed shelves with end supports only, with end-to-end spans, shall be 1 inch (25 mm) minimum thick. Fixed shelves with support along at least one of their long edges, shall also be 1 inch (25 mm) minimum thick.
    c. All fixed shelves shall be full shelf thickness “stop dado” jointed to their supports. The full depth of the stop dado joint shall begin no more than 1-1/2 inch from the face of the shelf and end at the back of the shelf. Such joint shall be continuous.
    d. Full Sub-top: Required on all base units, except sink base units. Provide 3/4-inch (19-mm) panel product, glued and pinned or screwed. Sink units are provided with open top and a stretcher at the front, attached to the sides. Back of sink bases to be split removable access panel.

6. Backs of Cabinets: 1/2-inch- (12.7-mm-) thick 7-ply minimum veneer core plywood where exposed, 1/4-inch (6.4-mm) 7-ply minimum veneer core hardwood plywood dadoed into sides, bottoms, and tops where not exposed.
7. Drawer Fronts: 3/4-inch (19-mm) 7-ply minimum veneer core.
8. Drawer Sides and Backs: 1/2-inch (12.7-mm) 7-ply minimum veneer-core hardwood plywood, with glued dovetail.
9. Drawer Bottoms: 1/4-inch (6.4-mm) veneer core hardwood plywood glued and dadoed into front, back, and sides of drawers. Use 1/2-inch (12.7-mm) material for drawers more than 24 inches (600 mm) wide.
10. Doors 36 Inches (900 mm) High or Less: 3/4 inch (19 mm) thick, with 7-ply minimum veneer cores and solid-wood stiles and rails.
11. Doors More Than 36 Inches (900 mm) High: 1-1/16 inches (27 mm) thick, with honeycomb cores and solid hardwood stiles and rails.
12. Stiles and Rails of Glazed Doors 36 Inches (900 mm) High or Less: 3/4 inch (19 mm) thick, with solid lumber cores.
13. Stiles and Rails of Glazed Doors More Than 36 Inches (900 mm) High: 1-1/16-inch- (27-mm-) thick, with solid wood cores.

B. Filler Strips: Provide as needed to close spaces between cabinets and walls, ceilings, and indicated equipment. Fabricate from same material and with same finish as cabinets.

C. Owner Specific Requirements

1. General Contractor shall field verify dimensions.
2. General Contractor shall submit the following:

   a. Provide mock-up of the lower cabinet with file drawer.
   b. Submit sample of casework hardware.

3. General Contractor shall coordinate electrical and plumbing requirements with casework manufacturer.
4. General Contractor shall ensure all millwork/casework is sealed to gypsum board walls and or ceramic tile walls.
5. Quantities not verified.
6. Provide 2x minimum size blocking at walls at all casework locations (including all upper and lower cabinets).
7. Provide a 1x2 wood nailer OR blocking behind gypsum board at each countertop “SpeedBrace”.
8. Provide 1/3 inch thick minimum veneer core plywood back or 1x4 nailer’s at all upper cabinets.
9. File drawer cabinets = 4 sided drawer box with drawer front attached.
10. Ensure file drawers to accommodate 8-1/2x11 Pendaflex hanging files with tabs front to rear, typical.
11. Open shelf cabinet’s interiors to be plastic laminate.
12. Minimum number of splices at all laminate. No splices on pieces less than 12 feet.
13. Provide PVC edge banding at all adjustable shelves, typical. PVC edge banding to match color of exterior face laminate. Provide samples. PVC edging to be machine applied with hot melt glue under pressure.
14. All casework doors over 3 feet tall shall be 1 inch thick minimum.
15. Provide two (2) door bumpers at each door 42 inches or less tall.
16. Provide three (3) door bumpers at doors over 42 inches tall.
17. Filler panel pieces shall be 3 inch wide maximum.
18. Fill the top and bottom voids between corner cabinets and filler panels and gypsum board on all walls, bookcases, and tall cabinets (including the typical teacher’s cabinets).
19. Close top horizontal face of filler panels and corners of upper cabinets. All filler panels shall be closed at their tops so that nothing may fall behind the fillers. Fillers shall also be closed at the toe spaces. Voids behind fillers shall be inaccessible and completely closed-off and sealed off.
20. Locks: Coded on face of lock with key code – physical impression stamping or engraved.
21. Provide locks at all doors and drawers.
22. Provide two (2) 2 inch diameter grommets at each knee space, typical. Location by Owner.
23. Pull out drawers to have hanging file folder provisions.

2.7 CASEWORK HARDWARE AND ACCESSORIES

A. Hardware, General: The hardware indicated establishes a “Basis of Design” for appearance and performance, except where labeled with “**UNT**”. Comparable products by other manufacturers may be allowed where the design is, solely in the opinion of the Architect, equal or better than the “Basis of Design”. Where “**UNT**” is indicated, only use the product indicated. Caution, and attention to understanding the “Basis of Design”, should be exercised where substitutions to the “Basis of Design” are planned. Unless otherwise indicated, provide manufacturer's standard satin-finish, commercial-quality, heavy-duty hardware.

B. Frameless Concealed Hinges (**UNT**): Blum, Inc., Type B71T555, 120 degrees of opening, self-closing, nickel-plated steel. Provide two hinges for doors less than 48 inches (1220 mm) high, and provide three hinges for doors more than 48 inches (1220 mm) high.

C. Pulls: Solid aluminum wire pulls, fastened from back with two screws. For sliding doors, provide recessed stainless-steel flush pulls. Provide two pulls for drawers more than 24 inches (600 mm) wide.

D. Drawer Slides: BHMA A156.9, Type B05091.

1. Standard Duty (Grades 1, 2, and 3): Side mounted; full-extension type; zinc-plated steel with polymer rollers.
2. Heavy Duty (Grade 1HD-100 and Grade 1HD-200): Side mounted; full-extension type; zinc-plated, steel ball-bearing slides.
3. Box Drawer Slides: Grade 1HD-100, for drawers not more than 6 inches (150 mm) high and 24 inches (600 mm) wide.
4. File Drawer Slides: Grade 1HD-200, for drawers more than 6 inches (150 mm) high or 24 inches (600 mm) wide.
5. Pencil Drawer Slides: Grade 1, for drawers not more than 3 inches (75 mm) high and 24 inches (600 mm) wide.
6. Keyboard Slides: Grade 1HD-100, for computer keyboard shelves.
7. Trash Bin Slides: Grade 1HD-200, for trash bins not more than 20 inches (500 mm) high and 16 inches (400 mm) wide.

E. Label Holders: Stainless steel, sized to receive standard label cards approximately 1 by 2 inches (25 by 51 mm), attached with screws or brads.

1. Provide label holders where indicated.

F. Drawer and Hinged Door Locks: Cylindrical (cam) type, five-pin tumbler, brass with chrome-plated finish, and complying with BHMA A156.11, Grade 1.

1. Provide a minimum of two keys per lock and six master keys.
2. Provide locks where indicated.

G. Sliding-Door Hardware Sets: Manufacturer's standard, to suit type and size of sliding-door units.

H. Adjustable Shelf Supports (**UNT**): Two-pin locking plastic shelf rests complying with BHMA A156.9, Type B04013.

1. Basis-of-Design: Dual Peg Locking Tongue Support, Clear, 5mm x 3/4 inch (19 mm) or 1 inch (25 mm), Model # 3220CL, Bainbridge Manufacturing, Inc. 800-255-4702 www.bainbridgemfg.com. Provide near back and front of shelf. Other AWS accepted methods of adjustable shelf support will not be allowed. Design load is 300 pounds per support.

I. Adjustable Shelf Supports (**UNT**): Surface-mount, steel standards and shelf rests rated BHMA Grade 1, Knape & Vogt (KV) Type 233 Series Steel Standards for shelves. Provide near back and front of shelves – two vertical columns at each side of shelf. Other AWS accepted methods of adjustable shelf support will not be allowed.

J. Sliding Door Hardware Sets: Manufacturer’s standard, to suit type and size of sliding door units.

K. Cabinet Base Molding: Extruded rubber, color as indicated on the color schedule for rubber base, 4 inches high. Provide on exposed sides and fronts of floor-mounted cabinets.

L. Leg Shoes: Extruded vinyl or rubber, black, open bottom type.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances, location of framing and reinforcements, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 CASEWORK INSTALLATION

A. Grade: Install cabinets to comply with same grade as item to be installed.

B. Install casework level, plumb, and true; shim as required, using concealed shims. Where casework abuts other finished work, apply filler strips and scribe for accurate fit, with fasteners concealed where practical.

C. Base Cabinets: Set cabinets straight, level, and plumb. Adjust subtops within 1/16 inch (1.5 mm) of a single plane. Align similar adjoining doors and drawers to a tolerance of 1/16 inch (1.5 mm). Bolt adjacent cabinets together with joints flush, tight, and uniform.

D. Wall Cabinets: Hang cabinets straight, level, and plumb. Adjust fronts and bottoms within 1/16 inch (1.5 mm) of a single plane. Fasten to hanging strips, masonry, framing, wood blocking, or reinforcements in walls and partitions. Align similar adjoining doors to a tolerance of 1/16 inch (1.5 mm).

E. Fasten cabinets to adjacent cabinets and to masonry, framing, wood blocking, or reinforcements in walls and partitions to comply with the AWI's, AWMAC's, and WI's "Architectural Woodwork Standards."

F. Install hardware uniformly and precisely. Set hinges snug and flat in mortises unless otherwise indicated. Adjust and align hardware so moving parts operate freely and contact points meet accurately. Allow for final adjustment after installation.

G. Adjust casework and hardware so doors and drawers operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.

3.3 CLEANING

A. Repair or remove and replace defective work as directed on completion of installation.

B. Clean finished surfaces, touch up as required, and remove or refinish damaged or soiled areas to match original factory finish, as approved by Architect.

END OF SECTION 123216

SECTION 123623.13

PLASTIC-LAMINATE-CLAD COUNTERTOPS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes plastic-laminate countertops.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product, including panel products, high-pressure decorative laminate and adhesive for bonding plastic laminate.

B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

1. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, electrical switches and outlets and other items installed in plastic-laminate countertops.

C. Samples for Verification:

1. Plastic laminates, 8 by 10 inches (200 by 250 mm), for each type, color, pattern, and surface finish, with one sample applied to core material and specified edge material applied to one edge.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Certificates: For each type of product, not limited to the following.

1. Composite wood products.
2. High-pressure decorative laminate.
3. Adhesives.

C. Woodwork Quality Standard Compliance Letter: Before the end of the project, provide a notarized letter from an executive of the casework manufacturing company who is authorized to represent the manufacturer regarding the quality of their product, signed and notarized by the executive, certifying that the casework manufacturer's products for the job have been built in compliance with the specifications and the AWI Architectural Woodwork Standard (AWS), or in lieu of the AWS, in compliance with the AWI's latest published casework standard superseding the AWS, in the quality grade indicated in this specification for requirements not covered by this specification. Compliance with this specification and the AWS, or superseding standard, where this specification does not cover an aspect of casework design, is required. Submit an unsigned sample letter with the initial shop drawing submittals for Architect's review.

1.4 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that 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. Shop is familiar with and capable of complying with AWI's Quality Certification Program.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver countertops until painting and similar operations that could damage countertops have been completed in installation areas. If countertops must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.6 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install countertops until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F (16 and 32 deg C) and relative humidity between 50 and 60 percent during the remainder of the construction period.

B. Field Measurements: Where countertops 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.

C. Established Dimensions: Where countertops are indicated to fit to other construction, establish dimensions for areas where countertops 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 COUNTERTOPS

A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades indicated for construction, installation, and other requirements.

1. The Contract Documents contain selections chosen from options in the quality standard and additional requirements beyond those of the quality standard. Comply with those selections and requirements in addition to the quality standard.

B. AWI AWS Grade: Custom.

C. High-Pressure Decorative Laminate: NEMA LD 3, Grade HGS.

1. Manufacturer: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the Work include, but are not limited to, the following:

a. Formica Corporation 800-367-6422 www.formica.com
b. Lamin-Art, Inc. 800-323-7624 www.laminart.com
c. Nevemar Surface Systems 203.925.1556 part of Panolam Surface Systems www.nevamar.com/
d. Pionite Surface Systems part of Panolam Surface Systems 203.925.1556 www.pionite.com
e. Wilsonart International, Inc., a Division of Illinois Tool Works Inc. 800-433-3222 www.wilsonart.com

D. Edge Treatment: Same as laminate cladding on horizontal surfaces.

E. Core Material: Exterior-grade, 7-ply minimum veneer core plywood at all countertops and backsplashs.

F. Core Thickness: 3/4 inch (19 mm) or 1-1/8 inch (29 mm).

1. Build up countertop thickness to 1-1/2 inches (38 mm) at front, back, and ends with additional layers of core material laminated to top.

G. Backer Sheet: Provide plastic-laminate backer sheet, NEMA LD 3, Grade BKL, on underside of countertop substrate.

H. Urea Formaldehyde: All products used in the countertops shall be no-added-urea-formaldehyde products.

2.2 ACCESSORIES

A. Grommets for Cable Passage through Countertops: 2-inch (51-mm) OD, molded-plastic grommets and matching plastic caps with slot for wire passage. Provide in colors chosen by the Architect from the full line of colors in which the grommet is available.

2.3 MISCELLANEOUS MATERIALS

A. Adhesive for Bonding Plastic Laminate: Contact cement.

1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.

2.4 FABRICATION

A. Fabricate countertops to dimensions, profiles, and details indicated. Provide front and end overhang of 1 inch (25 mm) over base cabinets.

B. Complete fabrication, including assembly, 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 fabrication 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.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installation, condition countertops to average prevailing humidity conditions in installation areas.

B. Before installing countertops, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.2 INSTALLATION

A. Grade: Install countertops to comply with same grade as item to be installed.

B. Assemble countertops and complete fabrication at Project site to the extent that it was not completed in the shop.

1. Provide cutouts for appliances, plumbing fixtures, electrical work, and similar items.

C. Field Jointing: Where possible, make in the same manner as shop jointing, using dowels, splines, adhesives, and fasteners recommended by manufacturer. Prepare edges to be joined in shop so Project-

site processing of top and edge surfaces is not required. Locate field joints where shown on Shop Drawings.

1. Secure field joints in plastic-laminate countertops with concealed clamping devices located within 6 inches (150 mm) of front and back edges and at intervals not exceeding 24 inches (600 mm). Tighten according to manufacturer's written instructions to exert a constant, heavy-clamping pressure at joints.

D. Install countertops level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm).

E. Scribe and cut countertops to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

F. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.

1. Install countertops with no more than 1/8 inch in 96-inch (3 mm in 2400-mm) sag, bow, or other variation from a straight line.
2. Secure backsplashes to tops with concealed metal brackets at 16 inches (400 mm) o.c. and to walls with adhesive.
3. Seal junctures of tops, splashes, and walls with mildew-resistant silicone sealant or another permanently elastic sealing compound recommended by countertop material manufacturer.

3.3 ADJUSTING AND CLEANING

A. Repair damaged and defective countertops, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

B. Clean countertops on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 123623.13

SECTION 123661.19

QUARTZ AGGLOMERATE COUNTERTOPS

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 items indicated on the drawings which may include the following:

1. Quartz agglomerate countertops.
2. Quartz agglomerate backsplashes.
3. Quartz agglomerate end splashes.
4. Quartz agglomerate apron fronts.

1.3 ACTION SUBMITTALS

A. Product Data: For countertop materials.

B. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.

1. Show locations and details of joints.
2. Show direction of directional pattern, if any.

C. Samples for Initial Selection: For each type of material exposed to view, if not indicated.

D. Samples for Verification: For the following products:

1. Countertop material, 6 inches (150 mm) square.
2. Wood trim, 8 inches (200 mm) long.
3. One full-size quartz agglomerate countertop, with front edge and backsplash, 8 by 10 inches (200 by 250 mm), of construction and in configuration specified.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For quartz agglomerate countertops to include in maintenance manuals. Include Product Data for care products used or recommended by Installer and names, addresses, and telephone numbers of local sources for products.

1.6 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate countertops similar to that required for this Project, and whose products have a record of successful in-service performance.

B. Installer Qualifications: Fabricator of countertops.

1.7 FIELD CONDITIONS

A. Field Measurements: Verify dimensions of countertops by field measurements after base cabinets are installed but before countertop fabrication is complete.

1.8 COORDINATION

A. Coordinate locations of utilities that will penetrate countertops or backsplashes.

PART 2 - PRODUCTS

2.1 QUARTZ AGGLOMERATE COUNTERTOP MATERIALS

A. Quartz Agglomerate: Solid sheets consisting of quartz aggregates bound together with a matrix of filled plastic resin and complying with ICPA SS-1, except for composition.

1. Manufacturers: Subject to compliance with requirements, provide the named product, or a comparable product by one of the following:

a. CaesarStone USA 818-779-0999 www.caesarstoneus.com
b. Corian Quartz, E. I. du Pont de Nemours and Company www2.dupont.com\
c. Silestone

2. Colors and Patterns: Match Architect's samples, or if not indicated, as selected by Architect from manufacturer's full range.

B. Core Material:: Exterior-grade, 7-ply minimum veneer core plywood at all countertops and backsplashs.

2.2 COUNTERTOP FABRICATION

A. Fabricate countertops according to quartz agglomerate manufacturer's written instructions and the AWI/AWMAC/WI's "Architectural Woodwork Standards."

1. Grade: Custom.

B. Configuration as indicated on drawings and as follows:

1. Front: Straight, slightly eased at top.
2. Backsplash: Straight, slightly eased at corner.
3. End Splash: Matching backsplash.
4. Exposed Edges and Corners:

a. Countertops:

1) Outside Corners: Square, but slightly eased to match top edge unless otherwise indicated.

b. Backsplash:

1) Outside Corners: Square butt joints, but slightly eased to match corner.

C. Countertops: 3/4-inch- (19-mm-) thick, quartz agglomerate with front edge built up with same material.

D. Backsplashes: 3/4-inch- (19-mm-) thick, quartz agglomerate. Backsplashes shall not be less than 4 inches tall.

E. Fabricate tops with shop-applied edges unless otherwise indicated. Comply with quartz agglomerate manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.

1. Fabricate with loose backsplashes for field assembly.

F. Joints: Fabricate countertops without joints to greatest extent possible.

G. Sheet Size: Slabs shall be not less than 56-1/2 x 120 inches (1.44 x 3.05 m) to minimize number of joints in installation.

1. Joint Locations: Not within 18 inches (450 mm) of a sink or cooktop and not where a countertop section less than 36 inches (900 mm) long would result, unless unavoidable.
2. Joint Type: Bonded, 1/32 inch (0.8 mm) or less in width.

H. Cutouts and Holes:

1. Undercounter Plumbing Fixtures: Make cutouts for fixtures using template or pattern furnished by fixture manufacturer. Form cutouts to smooth, even curves.

a. Provide vertical edges, rounded to 3/8-inch (10-mm) radius at juncture of cutout edges with top surface of countertop, slightly eased at bottom, and projecting 3/16 inch (5 mm) into fixture opening.

2. Top-of-Counter-Mounted Plumbing Fixtures: Prepare countertops in shop for field cutting openings for counter-mounted fixtures. Mark tops for cutouts and drill holes at corners of cutout locations. Make corner holes of largest radius practical. Do not cut tops in shop.
3. Fittings: Drill countertops in shop for plumbing fittings, undercounter soap dispensers, and similar items.
4. Counter-Mounted Cooktops: Prepare countertops in shop for field cutting openings for cooktops. Mark tops for cutouts and drill holes at corners of cutout locations. Make corner holes of largest radius practical. Do not cut tops in shop.

2.3 INSTALLATION MATERIALS

A. Adhesive: Product recommended by quartz agglomerate manufacturer.

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the Work include, but are not limited to the following:

a. Akemi North America Inc. 631-218-3421 www.akemi.com
b. Bonstone Material Corporation 800-425-2214 www.bonstone.com
c. Tenax USA 800-341-0432 www.tenaxusa.com

2. Provide low VOC content of adhesives.

B. Sealant for Countertops: Comply with the following.

1. Clear, compatible silicone sealant of type recommended by or acceptable to the manufacturer for application and conditions of use.
2. Provide anti-bacterial type in food preparation areas.
3. Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the Work include, but are not limited to the following:

a. Dow Corning Corporation 800-248-2481 www.dowcorning.com
b. GE 877-943-7325 www.siliconeforbuilding.com

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates to receive quartz agglomerate countertops and conditions under which countertops will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of countertops.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install countertops level to a tolerance of 1/8 inch in 8 feet (3 mm in 2.4 m), 1/4 inch (6 mm) maximum. Do not exceed 1/64-inch (0.4-mm) difference between planes of adjacent units.

B. Fasten subtops to cabinets by screwing through subtops into cornerblocks of base cabinets. Shim as needed to align subtops in a level plane.

C. Secure countertops to subtops with adhesive according to quartz agglomerate manufacturer's written instructions. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with quartz agglomerate manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

D. Bond joints with adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to joints to prevent adhesive smears.

1. Clamp units to temporary bracing, supports, or each other to ensure that countertops are properly aligned and joints are of specified width.

E. Install backsplashes and end splashes by adhering to wall and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears. Seal joints between splashes and countertops with silicone sealer.

F. Install aprons to backing and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears. Fasten by screwing through backing. Predrill holes for screws as recommended by manufacturer.

G. Complete cutouts not finished in shop. Mask areas of countertops adjacent to cutouts to prevent damage while cutting. Make cutouts to accurately fit items to be installed, and at right angles to finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.

1. Seal edges of cutouts in particleboard subtops by saturating with varnish.

H. Apply sealant to gaps at walls; comply with Section 079200 "Joint Sealants."

END OF SECTION 12 36 61.19

SECTION 00 01 10.02 – TABLE OF CONTENTS OF THE ELECTRICAL SPECIFICATIONS AND ELECTRONIC SAFETY AND SECURITY SPECIFICATIONS

DIVISION 26 – ELECTRICAL

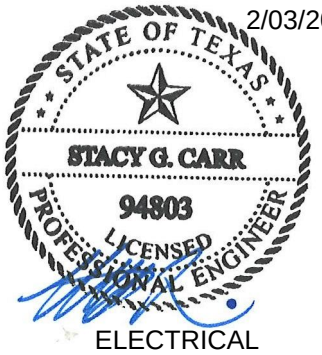
26 00 10 GENERAL REQUIREMENTS FOR ELECTRICAL SYSTEMS
26 05 00 COMMON WORK RESULTS FOR ELECTRICAL
26 05 19 LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES
26 05 26 GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS
26 05 29 HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS
26 05 33 RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS
26 05 53 IDENTIFICATION FOR ELECTRICAL SYSTEMS
26 09 43 DIGITAL LIGHTING CONTROLS
26 22 00 LOW VOLTAGE TRANSFORMER
26 24 16 PANELBOARDS
26 27 26 WIRING DEVICES
26 28 13 FUSES
26 28 16 ENCLOSED SWITCHES AND CIRCUIT BREAKERS
26 43 13 SURGE PROTECTION DEVICES
26 51 00 INTERIOR LIGHTING

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

28 31 11 DIGITAL, ADDRESSABLE FIRE-ALARM SYSTEM

END OF SECTION 00 01 10.02

2/03/2023



ELECTRICAL

SECTION 20 00 10 – GENERAL REQUIREMENTS FOR MECHANICAL, PLUMBING, & FIRE PROTECTION SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general provisions of the Contract and the requirements of all the 20 00 00, 21 00 00, 22 00 00, and 23 00 00 Sections apply to the Work specified in this Section.

1.2 GENERAL REQUIREMENTS

A. Provide all necessary labor, materials, equipment, accessories, transportation, and services required for the complete installation of all Heating, Ventilating, Air Conditioning, Plumbing, and Fire Protection Systems shown on the drawings. For convenience, drawings showing primarily H.V.A.C. have been numbered with M, drawings showing primarily Plumbing have been numbered with P and drawings showing primarily Fire Protection have been numbered with FP.

B. All materials shall be of United States domestic manufacture unless specified otherwise.

C. Make the installation in a manner that will comply with applicable Codes and laws. Where the requirements of Contract Documents exceed Code requirements, comply with Contract Documents. The edition or year-date for all codes and standards shall be that currently adopted and enforced by the municipality or other Local Authority having jurisdiction as of the date of the Contract.

D. The contractor and equipment suppliers shall certify that all materials and devices supplied for this project shall be free of asbestos. Certification signed by an officer of the respective company(s) responsible for production and distribution of the materials and devices supplied for the project shall be included with the submittals.

E. This Division shall provide all manpower, services, and materials to fulfill the requirements of the Commissioning Authority.

F. All equipment and products provided shall meet ASHRAE 90.1 (current edition) energy efficiency tables or local energy code requirements whichever is more stringent.

G. All equipment controllers shall be marked with the manufacturer's name or identification, the voltage, the current or horsepower rating, the short-circuit current rating, and such other necessary data to properly indicate the applications for which it is suitable per the NEC.

1.3 COORDINATION

A. Coordinate work of this Division with that of other trades in order that the various components of the Systems will be installed at the proper time, will fit the available space,

and will allow proper service access to those items requiring maintenance. This means adequate access to all equipment, not just that installed in this Division.

B. Any components of the Systems which are installed without regard to the above must be removed and relocated as directed by the Architect, at no additional cost to the Owner.

C. It is the Contractor's responsibility to provide materials with trim which will properly fit the types of ceiling, wall, or floor finishes actually installed. Model numbers in specifications or scheduled on drawings are not intended to designate the required trim.

D. Provide all mechanical equipment with electrical characteristics compatible with that shown on Electrical Drawings and described in Electrical Division of the specifications.

E. Prior to the fabrication of any ductwork or the installation of any devices in the ceilings, review all drawings to ascertain that the locations of all devices in the ceilings will create a pattern which is compatible with the reflected ceiling plan and the spacings of the various ceiling mounted devices.

1.4 DRAWINGS

A. The drawings are schematic in nature, but show the various components of the systems approximately to scale and attempt to indicate how they are to be integrated with other parts of the building. Determine exact locations by job measurements, by checking the requirements of other trades and by reviewing all Contract Documents.

B. The drawings indicate general routing of the various parts of the systems, but do not indicate all fittings, offsets, and runouts which are required. The Contract includes all fittings, offsets, and runouts required to fit the system into spaces allotted to them.

1.5 GENERAL REQUIREMENTS FOR ALL EQUIPMENT

A. Provide with all necessary parts and accessories even though the parts and accessories are not specifically mentioned herein.

B. Provide a factory applied finish on all exterior surfaces. Any items which have the finish marred must be touched up or refinished to a new condition before final acceptance.

C. Operating and Maintenance Material:

1. Within 90 days after the date of system acceptance, furnish six copies of spare parts lists, and operating and maintenance instructions, warranties, etc. in six hard-back ringed binders to the designated representatives of the Owner. Manuals shall be in accordance with ASHRAE Guidelines 4-1993. Material shall be tabbed and indexed according to type of information, equipment/component type, system installed and procurement source. A cross reference shall be provided so that each part, component, assembly and/or unit has its local vendor identified by company name, phone number, address and specific representative's name. Deliver to Architect at time of final acceptance. Binder contents shall also be provided as a ".pdf" file (portable document format) on a disk. The O & M manuals must present information in sufficient detail to clearly explain O & M requirements at the system, equipment, component, and

subassembly level. Types of information required in the O & M submittal must include the following for each piece of equipment requiring maintenance.

a. Operating instructions.

(1) Safety precautions.
(2) Operator pre-start.
(3) Startup, shutdown, and post shutdown procedures.
(4) Normal operations.
(5) Emergency operations.
(6) Operator service requirements.
(7) Environmental conditions.

b. Preventive maintenance.

(1) Lubrication idea.
(2) Preventive maintenance plan and schedule.

c. Corrective maintenance (Repair).

(1) Troubleshooting guides and diagnostic techniques.
(2) Wiring diagrams and control diagrams.
(3) Maintenance and repair procedures.
(4) Removal and replacement instructions.
(5) Spare parts and supply lists.
(6) Corrective maintenance work-hours.

d. Submittal data stating equipment size and selected options for each piece of equipment requiring maintenance.
e. Operation manuals and maintenance manuals for each piece of equipment requiring maintenance. Required routine maintenance actions shall be clearly identified.
f. Start-up reports for all equipment.
g. Final test and balance reports for all systems.
h. Final commissioning report.
i. Warranty information.
j. Names and addresses of the contractors that performed the installation of the systems.
k. Names and addresses of at least one service agency.
l. HVAC controls system maintenance and calibration information, including wiring diagrams, schematics, and control sequence descriptions. Desired or field-determined setpoints shall be permanently recorded on control drawings at control devices or, for digital control systems, in programming comments.
m. A complete narrative of how each system is intended to operate, including suggested setpoints.
n. Appendixes:

(1) Parts identification.
(2) Personnel training requirements.
(3) Testing equipment and special tools information.

2. Materials Safety Data Sheets (MSDS): Provide MSDS sheets on all installed equipment, materials, finishes, and on any fluid or product installed with or as

part of an installation in the building. The MSDS sheets should be bound in a three ring binder.

D. Rotating parts must be in static and dynamic balance.

E. Select all centrifugal blowers to perform at an efficient and stable point on their curves.

1.6 NOISE

A. Eliminate any abnormal noises, which are not considered by the Architect to be an inherent part of the systems as designed. Rattling equipment, piping, ducts, air devices, and squeaks in rotating equipment components will not be acceptable.

1.7 SUBSTITUTIONS

A. The names of manufacturers and model numbers have been used in the Contract Documents to establish type of equipment and standard of quality. Where only one name is mentioned for a particular item of material, then that manufacturer is the only one acceptable. Where several names are mentioned, any one of those listed may be furnished provided submittal contains sufficient information to show the equipment meets all the requirements of the Contract Documents. No attempt has been made to determine if each manufacturer listed will produce material that will comply with all requirements of this project. If they do, then that equipment will be acceptable. Where only one name is mentioned with the phrase "or approved equal", Contractor may submit an alternate manufacturer as outlined in Supplementary Conditions.

B. Substitution requests must be submitted for review and acceptance by the Architect and Engineer, 10 days or more prior to bidding.

C. Acceptance of materials and equipment will be based on manufacturer's published data and will be tentative subject to the submission of complete shop drawings indicating compliance with the contract documents and that adequate and acceptable clearances for entry, servicing and maintenance will exist.

D. Acceptance of materials and equipment under this provision shall not be construed as authorizing any deviation from the Contract Documents in any way. Any deviation from the Contract Documents must be presented in writing to the Architect and Engineer along with the substitution request. Deviations must be specifically noted on the cover page of the substitution request under the heading “DEVIATIONS:”. If no deviations exist, the Contractor shall indicate “DEVIATIONS: NONE” on the cover page of the substitution request. A failure to acknowledge deviations on the cover page of the substitution request will result in the substitution request being returned to the Contractor with the response “INSUFFICIENT INFORMATION”.

E. Voluntary alternates may be submitted for consideration on the proposal, with listed addition or deductions to the base bid, but will not affect the awarding of the contract.

1.8 PROTECTION OF EQUIPMENT

A. Do not deliver equipment to jobsite until progress of construction has reached the stage where equipment is actually needed, or until building is closed in enough to protect

equipment from the weather. Equipment allowed to stand in weather will be rejected, and Contractor is obligated to furnish new equipment of a like kind.

B. Adequately protect equipment from damage after delivery to job. Cover on site with heavy drop cloths as required to protect from plaster, dirt, other paint, water, or physical damage.

C. Equipment which has been damaged by construction activities will be rejected, and Contractor is obligated to furnish new equipment of a like kind.

D. At time of final acceptance, equipment must be clean. All air units shall have filters installed any time they are operated before final acceptance. Provide clean filters at time of final acceptance by the Owner.

1.9 RECORD DRAWINGS

A. Obtain, at Contractor's expense, a set of white prints and keep these on jobsite during construction. During course of construction, mark on these prints any changes which are made, noting particularly locations of those items which will need to be located for servicing.

B. At completion of job, obtain a set of Contract Drawings and incorporate all changes noted on the work prints. This must be done by a skilled draftsman. Mark each sheet "Record Drawings", with date, and deliver to Architect.

C. At the completion of the job, obtain a set of CAD disks and incorporate all changes noted on the work prints. This must be done by a skilled draftsman. Mark each sheet "Record Drawings", with date and deliver one full set of reproducable drawing plots and the CAD disks to the Architect.

D. Computer-Aided Drafting (CAD):

1. Provide CAD drawings when drawings are required elsewhere in Specifications (example: record drawings, coordination drawings, floor plans required in product submittals, etc.).
2. Produce all CAD drawings in AutoCAD for Windows, Release 2019 or later software product of Autodesk, Inc.
3. Obtain, at Contractor's expense, electronic CAD files with building floor plans and electrical information layers.
4. Contractor may retain CAD drafting service company or perform CAD work in-house.

E. Within 90 days after the date of system acceptance, record drawings of the actual installation be provided to the designated representative of the building owner. Record drawings shall include, as a minimum, the location and performance data on each piece of equipment, general configuration of duct and pipe distribution system including sizes, and the terminal air or water design flow rates.

1.10 SUBMITTALS

A. Equipment and materials submittals must show sufficient data to indicate complete compliance with Contract Documents as follows:

1. Proper sizes and capacities.
2. That the item will fit in the available space in a manner that will allow proper service.
3. Construction methods, materials, and finishes.
4. Specification review indicating compliance with each paragraph.

B. Catalog data must have the item or model number to be provided clearly marked and all accessories indicated. Submit literature showing details of each item of equipment. Mark out all inapplicable items. Plainly indicate the intended use of each item shown. Where "multiple choice" items are shown with no deletions, Engineer will require the furnishing of the highest quality or most expensive items. Equipment suppliers will mark all data using only black pen. Reviewing Contractors will add additional data or markings using only green pen. Red pen will be reserved for marks added to submittal data by reviewing Architect and Engineer.

C. For any item to be installed in or on a finished surface (such as tee bar acoustical ceiling, plaster wall) Contractor certifies by making the submittal that all applicable Contract Documents have been checked and that the item submitted is compatible with the surface finish on which it is to be installed.

D. Format for Required Submittals:

1. Refer to various Sections named in above list for other general items covered in each Section for which a submittal may be required but that is not specifically named in list. Such general items shall be submitted under the appropriate Submittal Type Number 23xxx-00 for that Section. For example, submit all Modular Central-Station Air Handling Units under Submittal Type Number 23 73 13-00.
2. Number of Copies: Electronic submissions are preferred. Where not feasible, provide the following.

    a. Submit two copies of each submittal. Architect will return one copy.
    b. Submit five copies where Coordination Drawings are required for operation and maintenance manuals. Architect will retain two copies; remainder will be returned. Mark up and retain one returned copy as a Project Record Drawing.

3. A separate submittal is required for each type of equipment; e.g., Modular Central-Station Air Handling Units in one submittal, Fan Coil Units in one submittal, HVAC Power Ventilators in one submittal, etc.

E. Interference Drawings:

1. Interference drawings are drawings which indicate conflict between the various systems and other components of the building such as beams, columns, walls, etc. They shall be drawn to scale and shall include plans, elevations, sections and other details as required to clearly define the interference and to indicate the Contractor's proposed solution.
2. They shall be submitted for approval whenever job measurements and an analysis of the drawings and specifications by the Contractor indicate that the various systems cannot be installed without significant deviation from the intent of the Contract. When such an interference is encountered, work shall cease in the general area of the conflict until a resolution to the question has been approved.

F. Coordination Drawings:

1. One complete set of coordination drawings shall be prepared by the Contractor. The sheet metal shop drawings shall be used as the basis for this coordination. When the sheet metal drawings have been prepared, the lighting, electrical conduit, mechanical piping, plumbing piping and fire protection piping shall be overlaid and drafted onto the coordination drawing. The intent of this process is to define areas of potential conflict and resolve those conflicts prior to fabrication or installation of any work.
2. In areas of congestion (where simply overlaying and drafting will create an unreadable product) the plan view scale shall be increased and/or multiple layered views shall be developed. Elevations of the individual elements shall be established and elevations shall be drawn to illustrate that the ductwork, piping, conduit, etc. will co-exist within the available space and that proper access to equipment, valves, filters, etc. has been established.
3. The completed "Coordination Drawings" set shall be submitted to the Architect for review prior to installation. Any work which proceeds without appropriate coordination and review will be subject to removal and relocation at no additional cost.

G. Submit shop drawings and/or submittals for all materials and equipment including, but not limited to, the items listed in Division 20, 21, 22, 23 specifications and on the drawings.

1.11 SERVICES TO EXISTING BUILDING

A. Do all work required to maintain plumbing services to all existing buildings located adjacent to the project site. Include all facilities which are required to enable the systems to function during construction in the same manner that they were functioning before start of construction.

1.12 PROTECTION OF EXISTING FACILITIES

A. Protect the existing facilities. Repair, at no cost to the Owner, all damage done to the existing facilities.

1.13 INSPECTION OF EXISTING FACILITIES

A. By submitting a proposal, Contractor certifies that he has reviewed the drawings and specifications, visited the site and has informed himself in detail as to all existing conditions as they may effect the new work. Failure to do so will not be considered sufficient justification to request or obtain extra compensation over and above the Contract Price.

1.14 WATER TREATMENT

A. At the appropriate time, give the Owner notice of the date when treatment system will be needed so as not to delay the project.

1.15 INDOOR AIR QUALITY REQUIREMENTS DURING CONSTRUCTION

A. Follow the requirements of SMACNA IAQ Guidelines for Occupied Buildings Under Construction.

1.16 WARRANTIES

A. System warranties with Owner's the beneficiary. At the time of delivery of the project to the building equipment warranties must be fully assigned to Owner for management. One year warranties are required for all equipment/products.

B. The following information on all the warranty must be provided.

1. Equipment or systems covered by the warranty.
2. Warranty period (dates).
3. Warranty contacts with names, addresses, and telephone numbers.
4. Bonding company name and address.

C. Equipment and product warranty list. Furnish a bound and indexed notebook containing written warranties for equipment/products. The equipment/product list must state the specification section applicable to the equipment/product, duration of the warranty, start date of the warranty, ending date of the warranty, and the point of contact for fulfillment of the warranty. Acceptable listing is a condition of final acceptance of the facility.

D. Equipment warranty guarantor's local representative. With each warranty the name address, and telephone number of the guarantor's representative nearest to the location where the equipment and appliances are installed.

END OF SECTION 20 00 10

SECTION 20 05 00 - COMMON WORK RESULTS

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.

B. Division 20, Common Work Results for Mechanical, requirements apply to this section.

1.2 SUMMARY

A. This Section includes the following:

1. Piping materials and installation instructions common to most piping systems.
2. Access Doors.
3. Transition fittings.
4. Dielectric fittings.
5. Mechanical sleeve seals.
6. Sleeves.
7. Escutcheons.
8. Grout.
9. Mechanical Demolition.
10. Equipment installation requirements common to equipment sections.
11. Painting and finishing.
12. Supports and anchorages.
13. Coordination drawings.

1.3 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and chases.

E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

F. The following are industry abbreviations for materials:

1. ABS: Acrylonitrile-butadiene-styrene plastic.
2. CPVC: Chlorinated polyvinyl chloride plastic.
3. PE: Polyethylene plastic.
4. PVC: Polyvinyl chloride plastic.
5. EPDM: Ethylene-propylene-diene terpolymer rubber.
6. NBR: Acrylonitrile-butadiene rubber.

1.4 ACTION SUBMITTALS

A. Product Data: For the following:

1. Transition fittings.
2. Dielectric fittings.
3. Mechanical sleeve seals.
4. Escutcheons.
5. Coordination drawings.

B. Design Submittals:

1. Product Data: For sealants, indicating VOC content.
2. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting materials.

1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.6 SUBMITTALS

A. Welding certificates.

B. Shop drawings and equipment submittals: Submit shop drawings and/or equipment submittals for all materials and equipment including, but not limited to, the items listed in Division 20, 21, 22, 23 specifications and on the drawings. Submittals shall be provided in electronic format.

C. As-built Drawings: Submit as-built drawings that include accurate dimensioned record drawings of all underground work, above ground piping, and ductwork systems. As-built drawings shall be submitted in electronic format.

D. Operation and Maintenance Manuals: When the building is substantially complete and before the building is taken over by the Owner for maintenance purposes, the contractor shall provide four sets of complete operation and maintenance manuals. The manual shall consist of an indexed loose-leaf binder containing the equipment data, manufacturer's installation, operating, and maintenance, repair parts manual for each system component, test reports, and as-built temperature control diagrams. Refer to Divisions 20, 21, 22, and 23 for additional submittal requirements. Provide an electronic copy of the operation and maintenance manual in addition to three (3) sets of loose-leaf hard copy binders. Preliminary copy of O&M manuals shall be submitted to commissioning agent for review. Schedule of preliminary submittal will be reviewed with Commissioning Agent at the commissioning kick off meeting.

E. Substitutions: The contractors' base bid must be in accordance with the materials or products specified. Any exceptions to this must be approved in writing by the Architect/Engineer, 10 days or more prior to bidding. Voluntary alternates may be submitted for consideration on the proposal, with listed addition or deductions to the base bid, but will not affect the awarding of the contract.

F. Coordination Drawings: Contractor shall prepare above ceiling coordination drawings for efficient installation of different components and coordination for installation of products and materials fabricated by each trade.

1. Content: Project-specific information, drawn accurately to scale, 1/4 inch per foot. Do not base Coordination Drawings on reproductions of the Contract Documents or standard printed data. Include the following information, as applicable:

a. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
b. Indicate required installation sequences.
c. Indicate dimensions shown on the Contract Drawings and make specific note of dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect for resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

2. Sheet Size: 30 by 42 inches**.**
3. Number of Copies: Electronic submissions are preferred. Where not feasible, provide the following.

a. Submit two opaque copies of each submittal. Architect will return one copy.
b. Submit five copies where Coordination Drawings are required for operation and maintenance manuals. Architect will retain two copies; remainder will be returned. Mark up and retain one returned copy as a Project Record Drawing.

4. Refer to individual Sections for Coordination Drawing requirements for Work in those Sections.

1.7 QUALITY ASSURANCE

A. Codes and Standards: Perform all Work in accordance with applicable Federal, State and local codes rules, ordinances and regulations. The electrical and physical properties of all materials, and the design, performance characteristics, and methods of construction of all items of equipment, shall be in accordance with the latest issue of the various, applicable Standards, Rules and Regulations of NFPA, UL, and as follows unless otherwise indicated.

1. Boiler Code
2. Elevator Code
3. ASHRAE 55
4. ASHRAE 62.1
5. ASHRAE 90.1

B. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."

C. Electrical Characteristics for Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy

ratings or efficiencies are specified, equipment shall comply with requirements.

D. Permits and inspections: Obtain and pay for all permits (temporary and permanent), fees, and inspections as required by any applicable laws and ordinances. Post such permits and inspection Certificates in a prominent place adjacent to the work. Deliver all certificates of final inspection or approval to the Architect/Engineer. Do not cover any concealed work until final inspection has been made and approval certificates obtained.

1.8 DELIVERY, STORAGE, HANDLING, AND INSTALLATION

A. Deliver ductwork, pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent ductwork and pipe end damage and to prevent entrance of dirt, debris, and moisture.

B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

C. During installation, provide temporary caps of sufficient material to prevent entrance of dirt, debris, and moisture.

1.9 COORDINATION

A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for installations.

B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

C. Coordinate requirements for access panels and doors for items requiring access that are concealed behind finished surfaces. Access panels and doors are specified in Division 08 Section "Access Doors and Frames."

D. Under provisions of commissioning documentation; testing of mechanical equipment, as well as training of owner’s operation and maintenance personnel, shall be required in cooperation with the commissioning agent.

E. Refer to the Owner/Utility tie-in schedule.

F. Each contractor shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work.

G. Each contractor shall coordinate its operations with operations, included in different sections, which 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 with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.
4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.

H. Contractor shall participate in whole building information modeling coordination process utilizing a three-dimensional software platform compatible with Autodesk® Navisworks®. Contractor shall include all time associated with detailing, coordination meetings, and model generation for the BIM coordination process.

1.10 WARRANTIES

A. In the event that any part of the work or equipment fails (abuse and causes beyond control of the contractor excepted), within this period of guarantee, it shall be replaced by the contractor at no cost to the owner.

B. All mechanical system components and controls shall be provided with a minimum 1-year warranty. Specific mechanical components may have longer warranty periods. Warranty shall be unconditional and include material, labor and response with 24 hours of notification.

1.11 SYSTEM STARTUP

A. Activation of the heating, ventilating and air conditioning equipment for testing and balancing will be allowed only after the construction is substantially complete, or by permission of the owner's construction representative.

B. Air handling systems used prior to final acceptance shall have specified filters installed during temporary use. Replace the temporary filters if the filters become loaded to capacity during system activation. Install replacement filters upon completion of the work and prior to final acceptance. Record the dates when the filters are changed for system start-up and when spare filters are provided with the commissioning agent documents.

1.12 MAINTENANCE

A. Contractor shall be responsible for maintenance of equipment and systems installed until final acceptance by Owner.

B. Lubricate rotating equipment in accordance with manufacturer's recommendations before activation. Re-lubricate as required during activation and prior to final acceptance.

C. Provide readily accessible and secured copper extensions to bearing lubrication fittings on equipment bearings.

1.13 SITE INSPECTION

A. Contractor shall visit the site prior to submitting Proposal to examine and verify existing conditions. Additional charges will not be allowed due to failure to complete site visit or to include necessary materials and labor to complete the work. Proposal being submitted implies site visit has occurred and Contractor understands the conditions which the work will be conducted.

1.14 CONSTRUCTION DOCUMENT INTERPRETATION

A. While efforts have been taken to eliminate contradictions, discrepancies, and ambiguities in the documents issued for construction, the Architect and Engineer cannot guarantee that the Contractor will find no contradictions, discrepancies, and ambiguities in the documents. If the Contractor finds a contradiction, discrepancy, or ambiguity in the documents, the Contractor shall bring the matter to the attention of the Architect and Engineer in the form of a Pre-Bid Request for Information (RFI). Any contradictions, discrepancies, or ambiguities not brought to the attention of the Architect and Engineer and addressed in the form of a Pre-Bid RFI shall be interpreted by the Contractor. The highest cost of implementation shall be included in the Contractor's bid.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 ACCESS DOORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Larson.
2. Milcor.
3. Nystrom.

B. Access doors in walls or ceilings shall be of 24"X24" in size, unless specified otherwise or space restricted.

C. Non-labeled door shall be 16-gauge prime painted steel frame; 14-gauge prime painted steel panel; concealed spring type hinges; and flush, screwdriver operated metal cam lock.

D. Labeled doors shall be UL listed; 16-gauge, prime painted steel frame; sandwich type with 20-gauge face sheets, flush design with filler panels; continuous hinges with stainless steel pins and flush, self-latching cylinder locks with two keys per lock. Coordinate doors and accessories with Division 08, Section 08 31 13 "ACCESS DOORS AND FRAMES".

E. All access doors shall have flush mounted handles.

2.3 PIPE, TUBE, AND FITTINGS

A. All pipe, tube, and fittings used for this project shall originate from mills or foundries located in the United States of America.

B. Refer to individual Division 21, 22, and 23 piping sections for pipe, tube, and fitting materials and

joining methods.

C. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.4 JOINING MATERIALS

A. Refer to individual Division 21, 22, and 23 piping sections for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.

   a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
   b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.

2. AWWA C110, rubber, flat face, 1/8-inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.

C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

D. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

E. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

F. Solvent Cements for Joining Plastic Piping:

1. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.

2.5 TRANSITION FITTINGS

A. AWWA Transition Couplings: Same size as, and with pressure rating at least equal to and with ends compatible with, piping to be joined.

1. Manufacturers:

   a. Cascade Waterworks Mfg. Co.
   b. Dresser Industries.
   c. Ford Meter Box Company.
   d. JCM Industries.
   e. Smith-Blair.
   f. Viking Johnson.

2. Underground Piping NPS 1-1/2 and smaller: Manufactured fitting or coupling.
3. Underground Piping NPS 2 and larger: AWWA C219, metal sleeve-type coupling.
4. Aboveground Pressure Piping: Pipe fitting.

B. Plastic-to-Metal Transition Fittings: CPVC and PVC one-piece fitting with manufacturer's

Schedule 80 equivalent dimensions; one end with threaded brass insert, and one solvent-cement-joint end.

1. Manufacturers:

   a. Eslon Thermoplastics.

C. Plastic-to-Metal Transition Adaptors: One-piece fitting with manufacturer's SDR 11 equivalent dimensions; one end with threaded brass insert, and one solvent-cement-joint end.

1. Manufacturers:

   a. Thompson Plastics.

D. Plastic-to-Metal Transition Unions: MSS SP-107, CPVC and PVC four-part union. Include brass end, solvent-cement-joint end, rubber O-ring, and union nut.

1. Manufacturers:

   a. Nibco.

2.6 DIELECTRIC FITTINGS

A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.

B. Insulating Material: Suitable for system fluid, pressure, and temperature.

C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F .

1. Manufacturers:

   a. Capitol Manufacturing Co.
   b. Central Plastics Company.
   c. Eclipse.
   d. Epco Sales.
   e. Hart Industries.
   f. Watts.
   g. Zurn Industries.

D. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig working pressure as required to suit system pressures.

1. Manufacturers:

   a. Capitol Manufacturing Co.
   b. Central Plastics Company.
   c. Epco Sales.
   d. Watts.

E. Dielectric-Flange Kits: Companion-flange assembly for field assembly. Include flanges, full-face- or ring-type neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic

washers, and steel backing washers.

1. Manufacturers:

   a. Advance Products & Systems.
   b. Calpico.
   c. Central Plastics Company.
   d. Pipeline Seal and Insulator.

2. Separate companion flanges and steel bolts and nuts shall have 150- or 300-psig minimum working pressure where required to suit system pressures.

F. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F .

1. Manufacturers:

   a. Calpico.
   b. Lochinvar.

G. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 deg F .

1. Manufacturers:

   a. Perfection Corp.
   b. Precision Plumbing Products.
   c. Sioux Chief Manufacturing Co.
   d. Victaulic Company.

2.7 MECHANICAL SLEEVE SEALS

A. Manufacturers:

1. Advance Products & Systems.
2. Flexicraft Pipeseal.
3. Calpico.
4. Metraflex.
5. Pipeline Seal and Insulator.

B. Sealing Elements: EPDM interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.

C. Pressure Plates: Glass reinforced plastic, Stainless steel, or Carbon steel. Include two for each sealing element.

D. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.8 SLEEVES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Advance Products & Systems, Inc.
2. CALPICO, Inc.
3. GPT; an EnPro Industries company.

B. Steel Pipe Sleeves: ASTM A53/A53M, Type E, Grade B, Schedule 40, anti-corrosion coated or zinc coated, with plain ends and integral welded waterstop collar.

C. Galvanized-Steel Sheet Sleeves: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

D. PVC Pipe Sleeves: ASTM D1785, Schedule 40.

E. Molded-PVC Sleeves: With nailing flange for attaching to wooden forms.

F. Molded-PE or -PP Sleeves: Removable, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.

2.9 SLEEVE-SEAL SYSTEMS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Advance Products & Systems.
2. Airex Manufacturing.
3. CALPICO.
4. GPT; an EnPro Industries company.
5. Metraflex Company.
6. Proco Products.

B. Description:
1. Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.
2. Designed to form a hydrostatic seal of 20-psig.
1. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size.
2. Pressure Plates: Stainless steel, Type 316.
3. Connecting Bolts and Nuts: Stainless steel, Type 316, of length required to secure pressure plates to sealing elements.

2.10 SLEEVE-SEAL FITTINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Advance Products & Systems, Inc.
2. CALPICO, Inc.
3. GPT; an EnPro Industries company.

4. Metraflex Company (The).
5. Presealed Systems.
6. Proco Products, Inc.

B. Description:

1. Manufactured plastic, sleeve-type, waterstop assembly, made for imbedding in concrete slab or wall.
2. Plastic or rubber waterstop collar with center opening to match piping OD.

2.11 ESCUTCHEONS

A. Description: Manufactured chrome plated wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.

B. One-Piece, Cast-Brass Type: With polished, chrome-plated finish and setscrew fastener.

C. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with chrome-plated finish and spring-clip fasteners.

D. One-Piece, Stamped-Steel Type: With chrome-plated finish and spring-clip fasteners.

E. Split-Casting Brass Type: With polished, chrome-plated finish and with concealed hinge and setscrew.

F. Split-Plate, Stamped-Steel Type: With chrome-plated finish, concealed hinge, and spring-clip fasteners.

2.12 GROUT

A. Description: Nonshrink, recommended for interior and exterior sealing openings in nonfire-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.

2.13 SILICONE SEALANTS

A. Silicone, S, NS, 25, NT: Single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant, ASTM C920, Type S, Grade NS, Class 25, use NT.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. GE Construction Sealants; Momentive Performance Materials Inc.

b. Pecora Corporation.
c. Permathane®/Acryl-R®; ITW Polymers Sealants North America.
d. Polymeric Systems, Inc.
e. Sherwin-Williams Company (The).
f. The Dow Chemical Company.

2. Sealant shall have a VOC content of 250 g/L or less.
3. 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."
4. 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." Formaldehyde emissions shall not exceed 9 mcg/cu. m or 7 ppb, whichever is less.
5. 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." The building concentration of formaldehyde shall not exceed half of the indoor recommended exposure limit, or 33 mcg/cu. m, and that of acetaldehyde shall not exceed 9 mcg/cu. m.

B. Silicone, S, P, 25, T, NT: Single-component, pourable, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade P, Class 25, Uses T and NT. Grade P Pourable (self-leveling) formulation is for opening in floors and other horizontal surfaces that are not fire rated.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. May National Associates, Inc.; a subsidiary of Sika Corporation.

2. Sealant shall have a VOC content of 250 g/L or less.
3. 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."
4. 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." Formaldehyde emissions shall not exceed 9 mcg/cu. m or 7 ppb, whichever is less.
5. 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." The building concentration of formaldehyde shall not exceed half of the indoor recommended exposure limit, or 33 mcg/cu. m, and that of acetaldehyde shall not exceed 9 mcg/cu. m.

C. Silicone Foam: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Smooth-On.

2. Sealant shall have a VOC content of 250 g/L or less.

3. 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."
4. 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." Formaldehyde emissions shall not exceed 9 mcg/cu. m or 7 ppb, whichever is less.
5. 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." The building concentration of formaldehyde shall not exceed half of the indoor recommended exposure limit, or 33 mcg/cu. m, and that of acetaldehyde shall not exceed 9 mcg/cu. m.

PART 3 - EXECUTION

3.1 MECHANICAL DEMOLITION

A. Refer to Division 01 Section "Cutting and Patching" and Division 02 Sections "Selective Demolition" and “Structure Demolition" for general demolition requirements and procedures.

B. Disconnect, demolish, and remove Fire Protection systems, HVAC systems, Plumbing systems, equipment, and components indicated to be removed.

1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
2. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
3. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
4. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material.
5. Equipment to Be Removed: Disconnect and cap services and remove equipment.
6. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
7. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

C. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

3.2 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Install piping according to the following requirements and Division 21, 22, 23 sections specifying piping systems.

B. 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.

C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms

and service areas.

D. 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.

E. Install piping indicated to be exposed in finished areas as high as possible unless noted otherwise.

F. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

G. Install piping to permit valve servicing. Valves shall be located not more than 24 inches above the suspended ceiling grid.

H. Install piping at indicated slopes.

I. Install piping free of sags and bends. Piping shall be installed level and plumb where piping slopes are not required.

J. Install fittings for changes in direction and branch connections.

K. Install piping to allow application of insulation.

L. Select system components with pressure rating equal to or greater than system operating pressure.

M. Install escutcheons for penetrations of walls, ceilings, and floors:

1. New Piping:

a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
b. Chrome-Plated Piping: One-piece, cast-brass type with polished chrome-plated finish.
c. Piping in High Humidity Areas: One-piece, cast-brass type with polished chrome-plated finish.
d. Insulated Piping: One-piece, stamped-steel type with spring clips.
e. Bare Piping in Finished Spaces: One-piece, stamped-steel type.
f. Bare Piping in Unfinished Service Spaces and Equipment Rooms: Split-plate, stamped-steel type with concealed hinge and set screw.
g. Bare Piping at Floor Penetrations in Equipment Rooms: One-piece, floor-plate type.

N. Sleeves are not required for core-drilled holes.

O. Permanent sleeves are not required for holes formed by removable PE sleeves.

P. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.

Q. Install sleeves for pipes passing through footings and foundation walls, masonry walls, gypsum-board partitions, and concrete floor and roof slabs.

1. Cut sleeves to length for mounting flush with both surfaces of walls.

a. Exception: Extend sleeves installed in floors 2 inches above finished floor level.

Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.

2. Install sleeves in new walls and slabs as new walls and slabs are constructed.
3. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:

    a. Schedule 40 Black Steel Sleeves: For pipes smaller than NPS 12 penetrating interior walls.
    b. 0.375-Inch Wall Black Steel Sleeves: For pipes NPS 12 and larger penetrating interior walls.
    c. Schedule 40 Galvanized Steel Sleeves: For pipes smaller than NPS 12 penetrating floors, and roof slabs.
    d. 0.375-Inch Wall Galvanized Steel Sleeves: For pipes NPS 12 and larger penetrating floors and roof slabs.
    e. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level. Refer to Division 07 Section "Sheet Metal Flashing and Trim" for flashing.

4. Seal sleeves in concrete floors roof slabs and masonry walls with grout.
5. Seal sleeves in plaster/gypsum board partitions with plaster or dry wall compound and caulk with non-hardening silicone sealant to provide airtight installation.
6. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint. Refer to Division 07 Section "Joint Sealants" for materials and installation.
7. Sleeves through floors and walls shall be sized so that the required pipe insulation is continuous through the sleeve.

R. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using 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.

1. Install steel pipe for sleeves smaller than 6 inches in diameter.
2. Install cast-iron "wall pipes" for sleeves 6 inches and larger in diameter.
3. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

S. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 07 Section "Penetration Firestopping" for materials.

T. Verify final equipment locations for roughing-in.

U. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

V. Contractor shall maintain adequate clearances (per the latest edition of the national electric code) above and around any new electrical panels, equipment, and transformers when routing overhead piping.

3.3 PIPING JOINT CONSTRUCTION

A. Threaded joints preferred to soldered joints for domestic water piping systems.

B. Join pipe and fittings according to the following requirements and Division 21, 22, and 23 sections specifying piping systems.

C. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

D. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

E. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

F. 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.

G. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

H. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.

1. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
2. PVC Non-pressure Piping: Join according to ASTM D 2855.

I. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.

J. Plastic Non-pressure Piping Gasketed Joints: Join according to ASTM D 3212.

3.4 PIPING CONNECTIONS

A. Make connections according to the following, unless otherwise indicated:

1. Install unions, in piping NPS 2 and smaller, adjacent to each control valve and at final connection to each piece of equipment.
2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to each control valve and at final connection to each piece of equipment.
3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.5 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to allow maximum possible headroom unless specific mounting heights are indicated or coordination with other services dictates different mounting heights.

B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

C. Install HVAC, Plumbing, and Fire Protection equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.

D. Install equipment to allow right of way for piping installed at required slope.

3.6 ACCESS DOOR INSTALLATION

A. Access doors shall be provided in all pipe chases, soffits, walls, ceilings, and ductwork to give access to valves, dampers, turning vanes, both sides of booster coils in ductwork or VAV terminals, control devices, etc.

B. All access doors shall be within 24 inches of any fire damper.

C. Coordinate the exact location with other trades.

D. Verify the exact quantity, size and location of the required access panels after the installation of systems and equipment requiring access, and prior to the closure of affected ceilings and building assemblies.

3.7 PAINTING

A. Painting of mechanical systems, equipment, and components is specified in Division 09, Section 09 91 00 "Painting."

B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.8 ERECTION OF METAL SUPPORTS AND ANCHORAGES

A. Refer to Division 05, Section 05 00 00 "Metal Fabrications" for structural steel.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor HVAC materials and equipment.

1. Provide all supplementary steel to provide proper drainage for gravity flow systems.

C. Field Welding: Comply with AWS D1.1.

3.9 ERECTION OF WOOD SUPPORTS AND ANCHORAGES

A. Cut, fit, and place wood grounds, nailers, blocking, and anchorages to support, and anchor

mechanical materials and equipment.

B. Select fastener sizes that will not penetrate members if opposite side will be exposed to view or will receive finish materials. Tighten connections between members. Install fasteners without splitting wood members.

C. Attach to substrates as required to support applied loads.

3.10 GROUTING

A. Mix and install grout for mechanical equipment base bearing surfaces, pump and other equipment base plates, and anchors.

B. Clean surfaces that will come into contact with grout.

C. Provide forms as required for placement of grout.

D. Avoid air entrapment during placement of grout.

E. Place grout, completely filling equipment bases.

F. Place grout on concrete bases and provide smooth bearing surface for equipment.

G. Place grout around anchors.

H. Cure placed grout.

END OF SECTION 20 05 00

SECTION 20 05 16 - EXPANSION FITTINGS AND LOOPS FOR 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.

B. Division 20, Common Work Results for Mechanical, requirements apply to this section.

1.2 SUMMARY

A. Section Includes:

1. Flexible-hose packless expansion joints.
2. Metal-bellows packless expansion joints.
3. Grooved-joint expansion joints.
4. Pipe loops and swing connections.
5. Alignment guides and anchors.

B. Related Sections include the following:

1. Division 20, Section 20 05 48 Section "Vibration Controls" for vibration isolation devices.

1.3 DEFINITIONS

A. BR: Butyl rubber.

B. Buna-N: Nitrile rubber.

C. CR: Chlorosulfonated polyethylene synthetic rubber.

D. CSM: Chlorosulfonyl-polyethylene rubber.

E. EPDM: Ethylene-propylene-diene terpolymer rubber.

F. NR: Natural rubber.

G. PTFE: Polytetrafluoroethylene plastic.

1.4 PERFORMANCE REQUIREMENTS

A. Compatibility: Products shall be suitable for piping system fluids, materials, working pressures, and temperatures.

B. Capability: Products shall absorb 200 percent of maximum axial movement between anchors.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Delegated-Design Submittal: For each anchor and alignment guide 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. Design Calculations: Calculate requirements for thermal expansion of piping systems and for selecting and designing expansion joints, loops, and bends.
2. Anchor Details: Detail fabrication of each anchor indicated. Show dimensions and methods of assembly and attachment to building structure.
3. Alignment Guide Details: Detail field assembly and attachment to building structure.
4. Schedule: Indicate type, manufacturer's number, size, material, pressure rating, end connections, and location for each expansion joint.

C. Welding certificates.

D. Product Certificates: For each type of pipe expansion joint, signed by product manufacturer.

E. Maintenance Data: For pipe expansion joints to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to the following:

1. Steel Shapes and Plates: AWS D1.1, "Structural Welding Code - Steel."
2. Welding to Piping: ASME Boiler and Pressure Vessel Code: Section IX.

PART 2 - PRODUCTS

2.1 EXPANSION JOINTS

A. Flexible-Hose Packless Expansion Joints:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Flex Pression Ltd.
b. Flex-Hose Co.
c. Flexicraft Industries.
d. Mason Industries.
e. Metraflex Company.
f. Unisource Manufacturing.

2. Description: Manufactured assembly with inlet and outlet elbow fittings and two flexible-metal-hose legs joined by long-radius, 180-degree return bend or center section of flexible hose.
3. Flexible Hose: Corrugated-metal inner hoses and braided outer sheaths.
4. Expansion Joints for Copper Tubing NPS 2 and Smaller: Copper-alloy fittings with solder-joint end connections.

a. Bronze hoses and single-braid bronze sheaths with 450 psig at 70 deg F and 340 psig at 450 deg F ratings.
b. Bronze hoses and double-braid bronze sheaths with 700 psig at 70 deg F and 500 psig at 450 deg F ratings.

5. Expansion Joints for Copper Tubing NPS 2-1/2 to NPS 4: Copper-alloy fittings with threaded end connections.

a. Stainless-steel hoses and single-braid, stainless-steel sheaths with 300 psig at 70 deg F and 225 psig at 450 deg F ratings.
b. Stainless-steel hoses and double-braid, stainless-steel sheaths with 420 psig at 70 deg F and 315 psig at 450 deg F ratings.

6. Expansion Joints for Steel Piping NPS 2 and Smaller: Stainless-steel fittings with threaded end connections.

a. Stainless-steel hoses and single-braid, stainless-steel sheaths with 450 psig at 70 deg F and 325 psig at 600 deg F ratings.
b. Stainless-steel hoses and double-braid, stainless-steel sheaths with 700 psig at 70 deg F and 515 psig at 600 deg F ratings.

7. Expansion Joints for Steel Piping NPS 2-1/2 to NPS 6: Stainless-steel fittings with flanged end connections.

a. Stainless-steel hoses and single-braid, stainless-steel sheaths with 200 psig at 70 deg F and 145 psig at 600 deg F ratings.
b. Stainless-steel hoses and double-braid, stainless-steel sheaths with 275 psig at 70 deg F and 200 psig at 600 deg F ratings.

8. Expansion Joints for Steel Piping NPS 8 to NPS 12: Stainless-steel fittings with flanged end connections.

a. Stainless-steel hoses and single-braid, stainless-steel sheaths with 125 psig at 70 deg F and 90 psig at 600 deg F ratings.
b. Stainless-steel hoses and double-braid, stainless-steel sheaths with 165 psig at 70 deg F and 120 psig at 600 deg F ratings.

B. Metal-Bellows Packless Expansion Joints:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Adsco Manufacturing.
b. American BOA.
c. Badger Industries.
d. Expansion Joint Systems.
e. Flex Pression Ltd.
f. Flex-Hose Co.
g. Flex-Weld.
h. Flexicraft Industries.
i. Flo Fab.
j. Hyspan Precision Products.
k. Mason Industries.
l. Metraflex Company.

m. Proco Products.
n. Senior Flexonics Pathway.
o. Tozen Corporation.
p. U.S. Bellows.
q. Unaflex.
r. Unisource Manufacturing.
s. Universal Metal Hose.
t. Wahlco Metroflex.

2. Standards: ASTM F 1120 and EJMA's "Standards of the Expansion Joint Manufacturers Association, Inc."
3. Type: Circular, corrugated bellows with external tie rods.
4. Minimum Pressure Rating: 200 psig unless otherwise indicated.
5. Configuration: Single- or double-joint with base class(es) unless otherwise indicated.
6. Expansion Joints for Copper Tubing: Single- or multi-ply phosphor-bronze bellows, copper pipe ends, and brass shrouds.

   a. End Connections for Copper Tubing NPS 2 and Smaller: Solder joint or threaded.
   b. End Connections for Copper Tubing NPS 2-1/2 to NPS 4: Solder joint or threaded.
   c. End Connections for Copper Tubing NPS 5 and Larger: Flanged.

7. Expansion Joints for Steel Piping: Single- or multi-ply stainless-steel bellows, steel pipe ends, and carbon-steel shroud.

   a. End Connections for Steel Pipe NPS 2 and Smaller: Threaded.
   b. End Connections for Steel Pipe NPS 2-1/2 and Larger: Flanged or welded.

C. Grooved-Joint Expansion Joints:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Anvil International.
   b. Shurjoint Piping Products.
   c. Victaulic Company.

2. Description: Factory-assembled expansion joint made of several grooved-end pipe nipples, couplings, and grooved joints.
3. Standard: AWWA C606, for grooved joints.
4. Nipples: Galvanized, ASTM A 53/A 53M, Schedule 40, Type E or S, steel pipe with grooved ends.
5. Couplings: Five, flexible type for steel-pipe dimensions. Include ferrous housing sections, EPDM gasket suitable for cold and hot water, and bolts and nuts.

2.2 ALIGNMENT GUIDES AND ANCHORS

A. Alignment Guides:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Adsco Manufacturing.
   b. Advanced Thermal Systems.
   c. Flex-Hose Co.

d. Flex-Weld.
e. Flexicraft Industries.
f. Hyspan Precision Products.
g. Mason Industries.
h. Metraflex Company.
i. Senior Flexonics Pathway.
j. U.S. Bellows.
k. Unisource Manufacturing.

2. Description: Steel, factory-fabricated alignment guide, with bolted two-section outer cylinder and base for attaching to structure; with two-section guiding spider for bolting to pipe.

B. Anchor Materials:

1. Steel Shapes and Plates: ASTM A 36/A 36M.
2. Bolts and Nuts: ASME B18.10 or ASTM A 183, steel hex head.
3. Washers: ASTM F 844, steel, plain, flat washers.
4. Mechanical Fasteners: Insert-wedge-type stud with expansion plug anchor for use in hardened portland cement concrete, with tension and shear capacities appropriate for application.

   a. Stud: Threaded, zinc-coated carbon steel.
   b. Expansion Plug: Zinc-coated steel.
   c. Washer and Nut: Zinc-coated steel.

5. Chemical Fasteners: Insert-type-stud, bonding-system anchor for use with hardened portland cement concrete, with tension and shear capacities appropriate for application.

   a. Bonding Material: ASTM C 881/C 881M, Type IV, Grade 3, two-component epoxy resin suitable for surface temperature of hardened concrete where fastener is to be installed.
   b. Stud: ASTM A 307, zinc-coated carbon steel with continuous thread on stud unless otherwise indicated.
   c. Washer and Nut: Zinc-coated steel.

6. Concrete: Portland cement mix, 3000 psi minimum. Comply with requirements in Division 03, Section 03 30 00 "Cast-in-Place Concrete" for formwork, reinforcement, and concrete.
7. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink, nonmetallic grout; suitable for interior and exterior applications.

   a. Properties: Nonstaining, noncorrosive, and nongaseous.
   b. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 EXPANSION-JOINT INSTALLATION

A. Install expansion joints of sizes matching sizes of piping in which they are installed.

B. Install metal-bellows expansion joints according to EJMA's "Standards of the Expansion Joint Manufacturers Association, Inc."

C. Install grooved-joint expansion joints to grooved-end steel piping.

3.2 PIPE BEND AND LOOP INSTALLATION

A. Install pipe loops cold-sprung in tension or compression as required to partly absorb tension or compression produced during anticipated change in temperature.

B. Connect risers and branch connections to mains with at least five pipe fittings including tee in main.

C. Connect risers and branch connections to terminal units with at least four pipe fittings including tee in riser.

D. Connect mains and branch connections to terminal units with at least four pipe fittings including tee in main.

3.3 ALIGNMENT-GUIDE AND ANCHOR INSTALLATION

A. Install alignment guides to guide expansion and to avoid end-loading and torsional stress.

B. Install two guides on each side of pipe expansion fittings and loops. Install guides nearest to expansion joint not more than four pipe diameters from expansion joint.

C. Attach guides to pipe and secure guides to building structure.

D. Install anchors at locations to prevent stresses from exceeding those permitted by ASME B31.9 and to prevent transfer of loading and stresses to connected equipment.

E. Anchor Attachments:

1. Anchor Attachment to Black-Steel Pipe: Attach by welding. Comply with ASME B31.9 and ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
2. Anchor Attachment to Galvanized-Steel Pipe: Attach with pipe hangers. Use MSS SP-69, Type 42, riser clamp welded to anchor.
3. Anchor Attachment to Copper Tubing: Attach with pipe hangers. Use MSS SP-69, Type 24, U-bolts bolted to anchor.

F. Fabricate and install steel anchors by welding steel shapes, plates, and bars. Comply with ASME B31.9 and AWS D1.1/D1.1M.

1. Anchor Attachment to Steel Structural Members: Attach by welding.
2. Anchor Attachment to Concrete Structural Members: Attach by fasteners. Follow fastener manufacturer's written instructions.

G. Use grout to form flat bearing surfaces for guides and anchors attached to concrete.

H. Construct concrete anchors of poured-in-place concrete of dimensions indicated and include embedded fasteners.

I. Install pipe anchors according to expansion-joint manufacturer's written instructions if expansion joints or compensators are indicated.

J. Use grout to form flat bearing surfaces for expansion fittings, guides, and anchors installed on or in concrete.

END OF SECTION 20 05 16

SECTION 20 05 19 - METERS AND GAGES

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.

B. Division 20, Common Work Results for Mechanical, requirements apply to this section.

1.2 SUMMARY

A. Section Includes:
1. Light-activated thermometers.
2. Thermowells.
3. Dial-type pressure gages.
4. Gage attachments.
5. Test plugs.
6. Sight flow indicators.
7. Venturi flowmeters.

B. Related Sections:

1. Division 21 Section 21 12 00 "Fire-Suppression Standpipes" for fire protection pressure gages.
2. Division 21 Section 21 13 13 "Wet-Pipe Sprinkler Systems"
3. Division 21 Section 21 13 16 "Dry-Pipe Sprinkler Systems" for fire protection pressure gages.
4. Division 22 Section 22 11 16 "Domestic Water Piping" for water meters inside the building.
5. Division 23 Section 23 11 23 Section "Facility Natural-Gas Piping" for gas meters.

1.3 DEFINITIONS

A. CR: Chlorosulfonated polyethylene synthetic rubber.

B. EPDM: Ethylene-propylene-diene terpolymer rubber.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated; include performance curves.

B. Shop Drawings: Schedule for thermometers, gages, and flowmeters indicating manufacturer's number, scale range, and location for each.

C. Product Certificates: For each type of thermometer, gage, and flowmeter signed by product manufacturer.

D. Operation and Maintenance Data: For flowmeters to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

2.1 LIGHT-ACTIVATED THERMOMETERS

A. Direct-Mounted, Light-Activated Thermometers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Flo Fab.
   b. Miljoco Corporation.
   c. Trerice.
   d. Weiss Instruments.
   e. REOTEMP Instrument Corporation.
   f. WIKA Instrument Corporation - USA.
   g. Winters Instruments - U.S.

2. Case: Metal; 7-inch nominal size unless otherwise indicated.
3. Scale(s): Deg F.
4. Case Form: Adjustable angle.
5. Connector: 1-1/4 inches, with ASME B1.1 screw threads.
6. Stem: Aluminum and of length to suit installation.

   a. Design for Thermowell Installation: Bare stem.

7. Display: Digital.
8. Accuracy: Plus or minus 1 deg F.

B. Remote-Mounted, Light-Activated Thermometers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Miljoco Corporation.
   b. Weiss Instruments.
   c. Winters Instruments - U.S.

2. Case: Plastic, for duct mounting.
3. Scale(s): Deg F.
4. Sensor: Bulb and thermister wire.

   a. Design for Air-Duct Installation: With ventilated shroud.

5. Display: Digital.
6. Accuracy: Plus or minus 1 deg F.

2.2 DUCT-THERMOMETER MOUNTING BRACKETS

A. Description: Flanged bracket with screw holes, for attachment to air duct and made to hold thermometer stem.

2.3 THERMOWELLS

A. Thermowells:

1. Standard: ASME B40.200.
2. Description: Pressure-tight, socket-type fitting made for insertion into piping tee fitting.
3. Material for Use with Copper Tubing: CNR or CUNI.
4. Material for Use with Steel Piping: CRES or CSA.
5. Type: Stepped shank unless straight or tapered shank is indicated.
6. External Threads: NPS 1/2, NPS 3/4, or NPS 1, ASME B1.20.1 pipe threads.
7. Internal Threads: 1/2, 3/4, and 1 inch, with ASME B1.1 screw threads.
8. Bore: Diameter required to match thermometer bulb or stem.
9. Insertion Length: Length required to match thermometer bulb or stem.
10. Lagging Extension: Include on thermowells for insulated piping and tubing.
11. Bushings: For converting size of thermowell's internal screw thread to size of thermometer connection.

B. Heat-Transfer Medium: Mixture of graphite and glycerin.

C. Manufacturers: Same as manufacturer of thermometer being used.

2.4 PRESSURE GAGES

A. Direct-Mounted, Liquid-Filled, Metal-Case, Dial-Type Pressure Gages:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. AMETEK.
   b. Ashcroft.
   c. Flo Fab.
   d. Miljoco Corporation.
   e. REOTEMP Instrument Corporation.
   f. Trerice.
   g. Watts.
   h. Weiss Instruments.
   i. WIKA Instrument Corporation - USA.
   j. Winters Instruments - U.S.

2. Standard: ASME B40.100.
3. Case: Indicating type(s); cast aluminum; 4-1/2-inch nominal diameter.
4. Pressure-Element Assembly: Bourdon tube unless otherwise indicated.
5. Pressure Connection: Brass, with NPS 1/4 or NPS 1/2, ASME B1.20.1 pipe threads and bottom-outlet type unless back-outlet type is indicated.
6. Movement: Mechanical, with link to pressure element and connection to pointer.

7. Dial: Nonreflective aluminum with permanently etched scale markings graduated in psi.
8. Pointer: Dark-colored metal.
9. Window: Glass or plastic.
10. Ring: Cast aluminum or Stainless steel.
11. Vacuum-Pressure Range: 30-in. Hg of vacuum to 15 psig of pressure.
12. Range for Fluids under Pressure: Two times operating pressure.
13. Accuracy: Grade A, plus or minus 1 percent of middle half of scale range.

2.5 GAGE ATTACHMENTS

A. Snubbers: ASME B40.100, brass; with NPS 1/4 or NPS 1/2, ASME B1.20.1 pipe threads and porous-metal piston-type surge-dampening device. Include extension for use on insulated piping.

B. Siphons: Loop-shaped section of stainless-steel pipe with NPS 1/4 or NPS 1/2 pipe threads.

C. Valves: Brass or stainless-steel needle, with NPS 1/4 or NPS 1/2, ASME B1.20.1 pipe threads.

2.6 TEST PLUGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Flow Design.
2. Peterson Equipment Co.
3. Miljoco Corporation.
4. Trerice.
5. Watts.
6. Weiss Instruments.

B. Description: Test-station fitting made for insertion into piping tee fitting.

C. Body: Corrosion-resistant brass or stainless steel with core inserts and gasketed and threaded cap. Include extended stem on units to be installed in insulated piping.

D. Thread Size: NPS 1/4 or NPS 1/2, ASME B1.20.1 pipe thread.

E. Minimum Pressure and Temperature Rating: 500 psig at 200 deg F.

F. Core Inserts: One or two self-sealing rubber valves.

1. Insert material for air, water, oil, or gas service at 20 to 200 deg F shall be CR.
2. Insert material for air or water service at minus 30 to plus 275 deg F shall be EPDM.

2.7 SIGHT FLOW INDICATORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Dwyer Instruments.
2. Emerson Process Management.
3. Ernst Co.

4. Ernst Flow Industries.
5. Penberthy.

B. Description: Piping inline-installation device for visual verification of flow.

C. Construction: Bronze or stainless-steel body, with sight glass and ball, flapper, or paddle wheel indicator, and threaded or flanged ends.

D. Minimum Pressure Rating: 125 psig.

E. Minimum Temperature Rating: 200 deg F.

F. End Connections for NPS 2 and Smaller: Threaded.

G. End Connections for NPS 2-1/2 and Larger: Flanged.

2.8 FLOWMETERS

A. Venturi Flowmeters:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. ABB.
   b. Gerand Engineering Co.
   c. Hyspan Precision Products.
   d. Preso Meters; a division of Racine Federated.
   e. S. A. Armstrong Limited.

2. Description: Flowmeter with calibrated flow-measuring element, hoses or tubing, fittings, valves, indicator, and conversion chart.
3. Flow Range: Sensor and indicator shall cover operating range of equipment or system served.
4. Sensor: Venturi-type, calibrated, flow-measuring element; for installation in piping.

   a. Design: Differential-pressure-type measurement for water.
   b. Construction: Bronze, brass, or factory-primed steel, with brass fittings and attached tag with flow conversion data.
   c. Minimum Pressure Rating: 250 psig.
   d. Minimum Temperature Rating: 250 deg F.
   e. End Connections for NPS 2 and Smaller: Threaded.
   f. End Connections for NPS 2-1/2 and Larger: Flanged or welded.
   g. Flow Range: Flow-measuring element and flowmeter shall cover operating range of equipment or system served.

5. Permanent Indicators: Meter suitable for wall or bracket mounting, calibrated for connected flowmeter element, and having 6-inch diameter, or equivalent, dial with fittings and copper tubing for connecting to flowmeter element.

   a. Scale: Gallons per minute.
   b. Accuracy: Plus or minus 1 percent through entire scale range.

6. Display: Visual instantaneous rate of flow.

7. Conversion Chart: Flow rate data compatible with sensor.
8. Operating Instructions: Include complete instructions with each flowmeter.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install thermowells with socket extending one-third of pipe diameter and in vertical position in piping tees.

B. Install thermowells of sizes required to match thermometer connectors. Include bushings if required to match sizes.

C. Install thermowells with extension on insulated piping.

D. Fill thermowells with heat-transfer medium.

E. Install direct-mounted thermometers in thermowells and adjust vertical and tilted positions.

F. Install direct-mounted pressure gages in piping tees with pressure gage located on pipe at the most readable position.

G. Install valve and snubber in piping for each pressure gage for fluids.

H. Install test plugs in piping tees.

I. Install flow indicators in piping systems in accessible positions for easy viewing.

J. Assemble and install connections, tubing, and accessories between flow-measuring elements and flowmeters according to manufacturer's written instructions.

K. Install flowmeter elements in accessible positions in piping systems.

L. Install wafer-orifice flowmeter elements between pipe flanges.

M. Install differential-pressure-type flowmeter elements, with at least minimum straight lengths of pipe, upstream and downstream from element according to manufacturer's written instructions.

N. Install permanent indicators on walls or brackets in accessible and readable positions.

O. Install differential-pressure-type flowmeter elements with at least minimum straight lengths of pipe upstream and downstream from element as prescribed by manufacturer's written instructions.

P. Install flowmeters at discharge of hydronic system pumps and at inlet of hydronic air coils.

Q. Install thermometers in the following locations:

1. HVAC Systems:
   a. Outside-, return-, supply-air ducts.

3.2 CONNECTIONS

A. Install meters and gages adjacent to machines and equipment to allow service and maintenance of meters, gages, machines, and equipment.

B. Connect flowmeter-system elements to meters.

C. Connect flowmeter transmitters to meters.

3.3 ADJUSTING

A. After installation, calibrate meters according to manufacturer's written instructions.

B. Adjust faces of meters and gages to proper angle for best visibility.

3.4 THERMOMETER SCHEDULE

A. Thermometers at outside-, return-, supply-air ducts shall be the following:

1. Remote-mounted, light-activated type.

B. Thermometer stems shall be of length to match thermowell insertion length.

3.5 THERMOMETER SCALE-RANGE SCHEDULE

A. Scale Range for Heating, Hot-Water Piping: 30 to 240 deg F.

B. Scale Range for Air Ducts: 0 to 150 deg F.

3.6 PRESSURE-GAGE SCHEDULE

A. Pressure gages at discharge of each hydronic pressure-reducing valve shall be the following:

1. Liquid-filled, direct-mounted, metal case.
2. Test plug with EDPM self-sealing rubber inserts.

3.7 PRESSURE-GAGE SCALE-RANGE SCHEDULE

A. Scale Range for Heating, Hot-Water Piping: 0 to 160 psi.

3.8 FLOWMETER SCHEDULE

A. Flowmeters for Heating, Hot-Water Piping: Venturi type.

END OF SECTION 20 05 19

SECTION 20 05 23 - GENERAL-DUTY VALVES FOR 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.

B. Division 20, Common Work Results for Mechanical, requirements apply to this section.

1.2 SUMMARY

A. Section Includes:

1. Bronze ball valves.
2. Drain Valves.

B. Related Sections:

1. Division 20 Section 20 05 53 "Mechanical Identification" for valve tags and schedules.
2. Division 23 Section 23 21 16 "Hydronic Piping Specialties" for valves applicable only to this piping.

1.3 DEFINITIONS

A. ASME: American Society of Mechanical Engineers.

B. ASTM: American Society for Testing and Materials.

C. AWWA: American Water Works Association.

D. CWP: Cold working pressure.

E. EPDM: Ethylene propylene copolymer rubber.

F. MSS: Manufacturers Standardization Society for the Valve and Fittings Industry Inc.

G. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.

H. NRS: Nonrising stem.

I. OS&Y: Outside screw and yoke.

J. PTFE: Polytetrafluoroethylene plastic.

K. RS: Rising stem.

L. TFE: Tetrafluorethylene plastic.

1.4 SUBMITTALS

A. Product Data: For each type of valve indicated.

1.5 QUALITY ASSURANCE

A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.

B. ASME Compliance:

1. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
2. ASME B31.1 for power piping valves.
3. ASME B31.9 for building services piping valves.

C. NSF Compliance: NSF 61 and NSF 372 for valve materials for potable-water service.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:

1. Protect internal parts against rust and corrosion.
2. Protect threads, flange faces, grooves, and weld ends.
3. Set gate and globe valves closed to prevent rattling.
4. Set ball valves open to minimize exposure of functional surfaces.
5. Set butterfly valves closed or slightly open.
6. Block check valves in either closed or open position.

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 handwheels or stems as lifting or rigging points.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

A. Refer to valve schedule articles for applications of valves.

B. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

C. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP class or CWP ratings may be substituted.

D. Bronze valves shall be made with dezincification-resistant materials. Bronze valves made with copper alloy (brass) containing more than 15 percent zinc are not permitted.

E. Valve Sizes: Same as upstream piping unless otherwise indicated.

F. Valve Actuator Types:

1. Handwheel: For valves other than quarter-turn types.
2. Handlever: For quarter-turn valves NPS 6 and smaller.

G. Valves in Insulated Piping: With 2-inch stem extensions and the following features:

1. Ball Valves: With extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
2. Butterfly Valves: With extended neck.

H. Valve-End Connections:

1. Valve solder-joint end connections are not recommended for valves in HVAC piping. Soldering and brazing methods used to achieve required pressure-temperature ratings may damage internal valve parts. Special installation requirements for soldered valves may make threaded valves more cost-effective.
2. Solder Joint: With sockets according to ASME B16.18.

a. Caution: Disassemble valves when soldering, as recommended by the manufacturer, to prevent damage to internal parts.

3. Threaded: With threads according to ASME B1.20.1.

I. Valve Bypass and Drain Connections: MSS SP-45.

2.2 BRONZE BALL VALVES

A. Two-Piece, Full-Port, Bronze Ball Valves with Stainless-Steel Trim:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Conbraco Industries.; Apollo Valves.
b. Crane Co.; Crane Valve Group; Crane Valves.
c. Hammond Valve.
d. Lance Valves.
e. Milwaukee Valve Company.
f. Nibco.
g. Watts.

2. Description:

a. Standard: MSS SP-110.
b. SWP Rating: 150 psig.
c. CWP Rating: 600 psig.
d. Body Design: Two piece.

e. Body Material: Bronze.
f. Ends: Threaded.
g. Seats: PTFE.
h. Stem: Stainless steel.
i. Ball: Stainless steel, vented.
j. Port: Full.

B. Three-Piece, Full-Port, Bronze Ball Valves with Stainless-Steel Trim:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Conbraco Industries; Apollo Valves.
b. Hammond Valve.
c. Milwaukee Valve Company.
d. Nibco.

2. Description:

a. Standard: MSS SP-110.
b. SWP Rating: 150 psig.
c. CWP Rating: 600 psig.
d. Body Design: Three piece.
e. Body Material: Bronze.
f. Ends: Threaded.
g. Seats: PTFE.
h. Stem: Stainless steel.
i. Ball: Stainless steel, vented.
j. Port: Full.

2.3 DRAIN VALVES

A. Ball-Valve-Type, Hose-End Drain Valves:

1. Bronze ball valve as specified in this Section.
2. Outlet: Threaded, short nipple with garden-hose thread complying with ASME B1.20.7 and cap with brass chain.

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.

3.3 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.4 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. If valve applications are not indicated, use the following:

1. Shutoff Service: Ball, butterfly, or gate valves.
2. Throttling Service: Globe, ball, or butterfly valves.

B. Select valves, except wafer types, with the following end connections:

1. For Copper Tubing, NPS 2 and Smaller: Threaded ends except where solder-joint valve-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.

C. General duty and specialty valves for fire protection systems are specified within the various Division 21 specification sections. For Division 22 and 23 piping systems, comply with the following subparagraphs for general duty valves. For specialty valves in Divisions 22 and 23, refer to individual Division 22 and 23 specification sections.

3.5 HEATING-WATER VALVE SCHEDULE

A. Pipe NPS 2 and Smaller:

1. Bronze Valves: May be provided with solder-joint ends instead of threaded ends.
2. Bronze Ball Valves: Class 150, stainless steel trim.

END OF SECTION 20 05 23

SECTION 20 05 29 - HANGERS AND SUPPORTS

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.

B. Division 20, Common Work Results for Mechanical, requirements apply to this section.

1.2 SUMMARY

A. This Section includes the following hangers and supports for fire protection system, plumbing system, and HVAC system piping and equipment:

1. Steel pipe hangers and supports.
2. Trapeze pipe hangers.
3. Non-metallic pipe hangers and supports.
4. Metal framing systems.
5. Non-metallic strut systems
6. Fastener systems.
7. Pipe stands.
8. Pipe positioning systems.
9. Equipment supports.

B. Related Sections include the following:

1. Division 05, Section 05 00 00 "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.
2. Division 20, Section 20 05 48 "Vibration Controls" for vibration isolation devices.
3. Division 23, Section 23 31 13 "Metal Ducts" for duct hangers and supports.

1.3 DEFINITIONS

A. ASCE: American Society of Civil Engineers.

B. ASME: American Society of Mechanical Engineers.

C. ASTM: American Society for Testing and Materials.

D. AWS: American Welding Society.

E. IAPMO: International Association of Plumbing and Mechanical Officials.

F. MFMA: Metal Framing Manufacturers Association.

G. MSS: Manufacturers Standardization Society for the Valve and Fittings Industry Inc.

H. SSPC: Steel Structures Painting Council now the Society for Protective Coatings.

I. Terminology: As defined in MSS SP-90, "Guidelines on Terminology for Pipe Hangers and Supports."

1.4 DELEGATED DESIGN PERFORMANCE REQUIREMENTS

A. The Contractor is responsible for the design of the system including the structural integrity and connections to the primary structure, including all connections and secondary supports and secondary support framing. Structural elements in the building have been designed for the anticipated vertical loads. The design responsibility of the Contractor applies to all miscellaneous metals that are found to be necessary to support the piping systems and equipment.

B. Any miscellaneous steel support framing that is determined to be necessary based on the Contractors design, including but not limited to braces, added reinforcing, and or ties shall be designed and supplied by the Contractor.

C. Design supports for individual pipes 2-1/2” and larger, all spring support assemblies, multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, pipe insulation, and test water.

D. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

1.5 SUBMITTALS

A. Product Data: For the following:

1. Steel pipe hangers and supports.
2. Non-metallic pipe hangers and supports.
3. Thermal-hanger shield inserts.

B. Shop Drawings: Show fabrication and installation details and include calculations stamped by a structural engineer licensed to perform work in the State of Michigan for the following:

1. Trapeze pipe hangers. Include Product Data for components.
2. Metal framing systems. Include Product Data for components.
3. Non-metallic strut systems. Include Product Data for components.
4. Pipe stands. Include Product Data for components.
5. Equipment supports.

C. Welding certificates.

D. Delegated Design Submittals

1. Submit stamped structural system calculations and shop drawings clearly indicating imposed loads on the primary structure stamped by a Structural Engineer licensed in the State of Texas.
2. All framing and connections designed by the contractor shall not result in eccentric loads being applied to the primary structure nor lateral loads being applied to the bottom flange of steel beams. The Contractor’s design shall verify that the connections do not result in adverse local connection stresses occurring within the primary structure.

1.6 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to the following:

1. AWS D1.1, "Structural Welding Code--Steel."
2. AWS D1.2, "Structural Welding Code--Aluminum."
3. AWS D1.3, "Structural Welding Code--Sheet Steel."
4. AWS D1.4, "Structural Welding Code--Reinforcing Steel."
5. ASME Boiler and Pressure Vessel Code: Section IX.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 STEEL PIPE HANGERS AND SUPPORTS

A. Description: MSS SP-58, Types 1 through 58, factory-fabricated components. Refer to Part 3 "Hanger and Support Applications" Article for where to use specific hanger and support types.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. AAA Technology & Specialties Co., Inc.
2. Anvil International.
3. Bergen-Power Pipe Supports.
4. B-Line Systems, Inc.; a division of Cooper Industries.
5. Carpenter & Paterson, Inc.
6. Empire Industries, Inc.
7. ERICO/Michigan Hanger Co.
8. Globe Pipe Hanger Products, Inc.
9. Grinnell Corp.
10. GS Metals Corp.
11. National Pipe Hanger Corporation.
12. PHD Manufacturing, Inc.
13. PHS Industries, Inc.
14. Piping Technology & Products, Inc.
15. Tolco Inc.

C. Galvanized, Metallic Coatings: Pregalvanized or hot dipped.

D. Non-metallic Coatings: Plastic coating, jacket, or liner.

E. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion for support of bearing surface of piping.

2.3 TRAPEZE PIPE HANGERS

A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural-steel shapes with MSS SP-58 hanger rods, nuts, saddles, and U-bolts.

2.4 NON-METALLIC PIPE HANGERS

A. Clevis-Type, Fiberglass Pipe Hangers: Similar to MSS Type 1, steel pipe hanger except hanger is made of fiberglass and continuous-thread rod and nuts are made of stainless steel.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Anvil International.
   b. B-Line Systems, Inc.; a division of Cooper Industries.
   c. Champion Fiberglass, Inc.
   d. Cope, T. J., Inc.; Tyco International, Ltd.
   e. Seasafe, Inc.
   f. Unistrut Corp.; Tyco International, Ltd.
   g. Wesanco, Inc.

B. Strap-Type, Fiberglass Pipe Hangers: Made of fiberglass loop with stainless-steel continuous-thread rod, nuts, and support hook.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Plasti-Fab, Inc.

2.5 METAL FRAMING SYSTEMS

A. Description: MFMA-3, shop- or field-fabricated pipe-support assembly made of steel or stainless steel channels and other components with appropriate finish based on location of use.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Anvil International.
2. B-Line Systems, Inc.; a division of Cooper Industries.
3. ERICO/Michigan Hanger Co.; ERISTRUT Div.
4. GS Metals Corp.
5. Power-Strut Div.; Tyco International, Ltd.
6. Thomas & Betts Corporation.
7. Tolco Inc.
8. Unistrut Corp.; Tyco International, Ltd.

C. Coatings: Manufacturer's standard finish, unless bare metal or galvanized surfaces are indicated.

D. Non-metallic Coatings: Plastic coating, jacket, or liner.

2.6 NON-METALLIC STRUT SYSTEMS

A. Description: Shop- or field-fabricated pipe-support assembly, similar to MFMA-3, made of fiberglass channels and other components.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Anvil International.
2. B-Line Systems, Inc.; a division of Cooper Industries.
3. Champion Fiberglass, Inc.
4. Cope, T. J., Inc.; Tyco International Ltd.
5. Seasafe, Inc.

2.7 THERMAL-HANGER SHIELD INSERTS

A. Description: 100-psig- minimum, compressive-strength insulation insert encased in sheet metal shield.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Carpenter & Paterson, Inc.
2. ERICO/Michigan Hanger Co.
3. PHS Industries, Inc.
4. Pipe Shields, Inc., a subsidiary of Piping Technology & Products, Inc.
5. Rilco Manufacturing Company, Inc.
6. Value Engineered Products, Inc.

C. Insulation-Insert Material for Cold Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate or ASTM C 552, Type II cellular glass with vapor barrier.

D. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate or ASTM C 552, Type II cellular glass.

E. Insulation-Insert Material for Closed Cell Foam Insulated Piping: As manufactured by Klo-Sure or approved equal.

F. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

G. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

H. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.8 FASTENER SYSTEMS

A. Mechanical-Expansion Anchors: Insert-wedge-type stainless steel, for use in hardened Portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. B-Line Systems, Inc.; a division of Cooper Industries.
    b. Empire Industries, Inc.
    c. Hilti, Inc.
    d. ITW Ramset/Red Head.
    e. MKT Fastening, LLC.
    f. Powers Fasteners.

2.9 PIPE STANDS

A. Pipe Stands, General: Shop or field-fabricated assemblies made of manufactured corrosion-resistant components to support roof-mounted piping, ductwork and equipment.

B. Compact Pipe Stand: One-piece, injection molded high density, high impact polypropylene base unit with integral-rod-roller, pipe clamps, or V-shaped cradle to support pipe, for roof installation without membrane penetration.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. ERICO/Michigan Hanger Co.
    b. MIRO Industries.
    c. Portable Pipe Hangers.

C. Low-Type, Single-Pipe Stand: One-piece, injection molded high density, high impact polypropylene base unit with plastic roller, for roof installation without membrane penetration.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. ERICO/Michigan Hanger Co.
    b. MIRO Industries.
    c. Portable Pipe Hangers.

D. High-Type, Single-Pipe Stand: Assembly of base, vertical and horizontal members, and pipe support, for roof installation without membrane penetration.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. ERICO/Michigan Hanger Co.
    b. MIRO Industries.
    c. Portable Pipe Hangers.

2. Base: Injection molded high density, high impact polypropylene base.
3. Vertical Members: Two or more cadmium-plated-steel or stainless-steel, continuous-thread rods.
4. Horizontal Member: Cadmium-plated-steel or stainless-steel rod with plastic or stainless-steel, roller-type pipe support.

E. High-Type, Multiple-Pipe Stand: Assembly of bases, vertical and horizontal members, and pipe supports, for roof installation without membrane penetration.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. ERICO/Michigan Hanger Co.
   b. MIRO Industries.
   c. Portable Pipe Hangers.

2. Bases: One or more injection molded high density, high impact polypropylene bases.
3. Vertical Members: Two or more protective-coated-steel channels.
4. Horizontal Member: Protective-coated-steel channel.
5. Pipe Supports: Galvanized-steel, clevis-type pipe hangers.

F. Curb-Mounting-Type Pipe Stands: Shop- or field-fabricated pipe support made from hot dip galvanized components including structural-steel shape, continuous-thread rods, and rollers for mounting on permanent stationary roof curb.

2.10 PIPE POSITIONING SYSTEMS

A. Description: IAPMO PS 42, system of metal brackets, clips, and straps for positioning piping in pipe spaces for plumbing fixtures for commercial applications.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. C & S Mfg. Corp.
2. HOLDRITE Corp.; Hubbard Enterprises.
3. Samco Stamping, Inc.
4. Sioux Chief Manufacturing Co.

2.11 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural-steel or stainless steel shapes with appropriate finish based on location of use.

2.12 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

B. Stainless Steel: ASTM A 304, stainless steel plates, shapes, and bars.

C. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and non-metallic 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 APPLICATIONS

A. Specific hanger and support requirements are specified 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 non-metallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use padded hangers for piping that is subject to scratching.

F. Holes shall not be drilled or punched in beams and supporting members. Do not support piping from roof deck, other piping, ducts, or equipment.

G. Hangers and supports shall also be provided at every change in direction and within 12 inches of any pipe fitting and valves.

H. Pipe hangers in fan rooms and in mechanical equipment rooms shall be provided with spring hangers with elastomeric inserts to eliminate noise transmission between piping and the building structure. Refer to Division 20 “Vibration Controls.”

I. Hanger components shall not be used for purposes other than for which they were designed.

J. Vertical runs of piping not subject to appreciable expansion shall be supported by approved wrought steel clamps or collars, securely clamped to the risers. Where required, spring supports and guides shall be provided.

K. Where negligible movement of pipe occurs at hanger locations, rod hangers may be used for suspended lines. For piping supported from below, braces, brackets or structural cross members may be used.

L. If the vertical angle of the hanger is greater than 4 degrees, a traveling device shall be provided for horizontal movement. For piping supported from below, rollers or roll carriages shall be used.

M. Where significant vertical movement of the pipe occurs at the hanger location, a resilient support shall be used. Spring cushion hangers may be used where vertical movement does not exceed 1/4 inches.

N. Pipe attachments for insulated pipe shall be outside the insulation. Insulation protection shields or high density insulation inserts shall be provided to protect the insulation.

O. 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.

2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of 120 to 450 deg F pipes, NPS 4 to NPS 16, requiring up to 4 inches of insulation.
3. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes, NPS 3/4 to NPS 24, requiring clamp flexibility and up to 4 inches of insulation.
4. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes, NPS 1/2 to NPS 24, if little or no insulation is required.
5. 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.
6. Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated stationary pipes, NPS 3/4 to NPS 8.
7. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 8.
8. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 8.
9. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 2.
10. Split Pipe-Ring with or without Turnbuckle-Adjustment Hangers (MSS Type 11): For suspension of noninsulated stationary pipes, NPS 3/8 to NPS 8.
11. Extension Hinged or 2-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated stationary pipes, NPS 3/8 to NPS 3.
12. U-Bolts (MSS Type 24): For support of heavy pipes, NPS 1/2 to NPS 30.
13. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
14. Pipe Saddle Supports (MSS Type 36): For support of pipes, NPS 4 to NPS 36, with steel pipe base stanchion support and cast-iron floor flange.
15. Pipe Stanchion Saddles (MSS Type 37): For support of pipes, NPS 4 to NPS 36, with steel pipe base stanchion support and cast-iron floor flange and with U-bolt to retain pipe.
16. Adjustable, Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes, NPS 2-1/2 to NPS 36, if vertical adjustment is required, with steel pipe base stanchion support and cast-iron floor flange.
17. Single Pipe Rolls (MSS Type 41): For suspension of pipes, NPS 1 to NPS 30, from 2 rods if longitudinal movement caused by expansion and contraction might occur.
18. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes, NPS 2-1/2 to NPS 20, from single rod if horizontal movement caused by expansion and contraction might occur.
19. 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 not necessary.
20. 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 not necessary.
21. 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.

P. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers, NPS 3/4 to NPS 20.
2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers, NPS 3/4 to NPS 20, if longer ends are required for riser clamps.

Q. 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.

R. Building Attachments: Use of “C” clamps and beam clamps of “C” pattern and any modification thereof for pipe sizes 2-1/2 inches and larger is prohibited 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. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
3. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
4. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
5. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
6. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
7. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
8. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
9. Malleable Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
10. 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..

11. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
12. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
13. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.

S. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

T. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Restraint-Control Devices (MSS Type 47): Where indicated to control piping movement.
2. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches.

3. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41 roll hanger with springs.
4. Spring Sway Braces (MSS Type 50): To retard sway, shock, vibration, or thermal expansion in piping systems.
5. Variable-Spring Hangers (MSS Type 51): Preset to indicated load and limit variability factor to 25 percent to absorb expansion and contraction of piping system from hanger.
6. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to absorb expansion and contraction of piping system from base support.
7. Variable-Spring Trapeze Hangers (MSS Type 53): Preset to indicated load and limit variability factor to 25 percent to absorb expansion and contraction of piping system from trapeze support.
8. Constant Supports: For critical piping stress and if necessary to avoid transfer of stress from one support to another support, critical terminal, or connected equipment. Include auxiliary stops for erection, hydrostatic test, and load-adjustment capability. These supports include the following types:

    a. Horizontal (MSS Type 54): Mounted horizontally.
    b. Vertical (MSS Type 55): Mounted vertically.
    c. Trapeze (MSS Type 56): Two vertical-type supports and one trapeze member.

U. Comply with MSS SP-69 for trapeze pipe hanger selections and applications that are not specified in piping system Sections.

V. Comply with MFMA-102 for metal framing system selections and applications that are not specified in piping system Sections.

W. Use mechanical-expansion anchors instead of building attachments where required in concrete construction.

X. Use pipe positioning systems (Sioux Chief or approved equal) in pipe spaces behind plumbing fixtures to support supply and waste piping for plumbing fixtures.

3.2 HANGER AND SUPPORT INSTALLATION

A. Provide necessary piping and equipment supporting elements including building structure attachments, supplementary steel, hanger rods, stanchions and fixtures, vertical pipe attachments, horizontal pipe attachments, anchors, guides, spring supports in accordance with the referenced codes, standards, and requirements specified. Support piping and equipment from building structure, not from roof deck, floor slab, or other pipes, ducts, or equipment.

B. Steel 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 building structure.

C. 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 above for individual pipe hangers.
2. Field fabricate from ASTM A 36/A 36M, steel shapes selected for loads being supported. Weld steel according to AWS D1.1.

D. Non-metallic Pipe Hanger Installation: Comply with applicable portions of MSS SP-69 and MSS SP-89. Install hangers and attachments as required to properly support piping from building structure.

E. Metal Framing System Installation: Arrange for grouping of parallel runs of piping and support together on field-assembled metal framing systems.

F. Non-metallic Strut System Installation: Arrange for grouping of parallel runs of piping and support together on field-assembled fiberglass struts.

G. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

H. Fastener System Installation:

1. If approved for use by a Delegate Structural Engineer, install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

I. Pipe Stand Installation:

1. Pipe Stand Types except Curb-Mounting Type: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane. Bases shall have sufficient footprint direct contact area to limit loading on roof membrane to be within roofing manufacturer's limitations so as to not void the roofing warranty.
2. Curb-Mounting-Type Pipe Stands: Assemble components or fabricate pipe stand and mount on permanent, stationary roof curb. Refer to Division 07 Section "Roof Accessories" for curbs.

J. Pipe Positioning System Installation: Install support devices to make rigid supply and waste piping connections to each plumbing fixture. Refer to Division 22 Section “Plumbing Fixtures” for plumbing fixtures.

K. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.

L. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

M. Install hangers and supports to allow controlled thermal movement (expansion and contraction) 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.

N. Install lateral bracing with pipe hangers and supports to prevent swaying.

O. 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.

P. Load Distribution: Install hangers and supports so piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

Q. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.1 (for power piping) and ASME B31.9 (for building services piping) are not exceeded.

R. Insulated Piping: Comply with the following:

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 according to ASME B31.1 for power piping and 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 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.

5. Pipes NPS 8 and Larger: Include wood inserts.
6. Insert Material: Length at least as long as protective shield.
7. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.3 SUPPLEMENTARY STEEL

A. Where it is necessary to frame structural members between existing structural steel members or where structural steel members are used in lieu of commercially rated supports, install such supplementary steel in accordance with American Institute of Steel Construction Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings. Connection to the existing steel shall be with clamps unless otherwise approved by the Engineer.

3.4 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 smooth bearing surface.

C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.5 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 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 contours of welded surfaces match adjacent contours.

3.6 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.

3.7 PAINTING

A. Touch Up: 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. Touch Up: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 09 Section "Painting."

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 20 05 29

SECTION 20 05 53 – MECHANICAL IDENTIFICATION

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.

B. Division 20, Common Work Results for Mechanical, requirements apply to this section.

1.2 SUMMARY

A. Section Includes:

1. Equipment labels.
2. Pipe labels.
3. Valve tags.
4. Ceiling tags.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: For color, letter style, and graphic representation required for each identification material and device.

C. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.

D. Valve numbering scheme.

E. Valve Schedules: For each piping system to include in maintenance manuals.

1.4 COORDINATION

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.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, provide products by one of the following:

1. Brady Co.
2. Bramer.
3. Craftmark.
4. Emed.
5. Marking Services, Inc.
6. Seton Name Plate Corp.

2.2 EQUIPMENT LABELS

A. Metal Labels for Equipment:

1. Material and Thickness: Aluminum, 0.032-inch minimum thickness, with predrilled or stamped holes for attachment hardware.
2. Letter Color: Black.
3. Minimum Label Size: Length and width may vary depending on required content, but not less than 2-1/2 by 3/4 inch.
4. 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-fourths the size of principal lettering.
5. QR Coded: Equipment label to be QR coded to allow maintenance staff the ability to view digital operations and maintenance manuals, as well as record and track maintenance information.
6. Fasteners: Stainless-steel rivets or self-tapping screws.

B. Plastic Labels for Equipment:

1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, with predrilled holes for attachment hardware.
2. Letter Color: Black.
3. Background Color: Yellow, unless specified otherwise in application schedule or as requested by Owner.
4. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
5. Minimum Label Size: Length and width may vary depending on required 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-fourths the size of principal lettering.
7. QR Coded: Equipment label to be QR coded to allow maintenance staff the ability to view digital operations and maintenance manuals, as well as record and track maintenance information.
8. Fasteners: Stainless-steel rivets or self-tapping screws.

C. Label Content: Include equipment's Drawing designation or unique equipment designation and/or equipment number and equipment QR code. Equipment designation and/or equipment number shall be coordinated with the Engineer and Architect prior to procurement and placement of label.

D. 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), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.3 PIPE LABELS

A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.

B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.

C. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, 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: At least 1-1/2 inches high.

2.4 VALVE TAGS

A. 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 minimum thickness, and having predrilled or stamped holes for attachment hardware.
2. Fasteners: Brass wire-link or beaded chain or S-hook.

B. 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.

2.5 CEILING TAGS

A. Ceiling Tags:

1. Material and Thickness: Multilayer, multicolor, plastic tag for mechanical engraving, 1/8 inch thick, with predrilled holes for attachment hardware.
2. Letter Color: Black.
3. Background Color: White to match the color of the ceiling grid.
4. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
5. Minimum Tag Size: Length may vary depending on required content, but not less than 2-1/2 by 3/4 inch.
6. Minimum Letter Size: 1/2 inch.
7. Fasteners: Stainless-steel rivets or self-tapping screws.

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 EQUIPMENT LABEL INSTALLATION

A. Install or permanently fasten labels on each major item of mechanical equipment.

B. Locate equipment labels where they will be directly visible by the individual servicing the equipment.

3.3 PIPE LABEL INSTALLATION

A. Piping Color-Coding: Painting of piping is specified in Division 09 Section "Painting."

B. 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. Pipe Label Color Schedule:

1. Fire Protection:

a. Background Color: Red.
b. Letter Color: White.

2. Domestic Hot and Cold Water Piping:

a. Background Color: Green.
b. Letter Color: White.

3. Sanitary Waste Piping:

a. Background Color: Orange.
b. Letter Color: Black.

4. Hydronic Heating Water Piping:

a. Exposed, jacketed piping.
   1) Background Color: Clear.
   2) Letter Color: White.

b. Concealed, unjacketed piping.
   1) Background Color: Green.
   2) Letter Color: White.

3.4 VALVE-TAG INSTALLATION

A. Install tags on control devices in piping systems only. Update current valve schedule to include all new valves..

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. Fire Protection: 1-1/2 inches, round.
   b. Domestic Cold Water: 1-1/2 inches, round.
   c. Domestic Hot Water: 1-1/2 inches, round.
   d. Hydronic Heating Water: 1-1/2 inches, round.

2. Valve-Tag Color:

   a. Fire Protection: Red.
   b. Domestic Cold Water: Green.
   c. Domestic Hot Water: Green.
   d. Hydronic Heating Water: Green

3. Letter Color:

   a. Fire Protection: White.
   b. Domestic Cold Water: White.
   c. Domestic Hot Water: White.
   d. Hydronic Heating Water: White.

3.5 CEILING TAG INSTALLATION

A. Install ceiling tag on ceiling grid immediately adjacent to ceiling tile that will provide the most direct access to the mechanical equipment or valve that the ceiling tag is used to identify.

B. Label each tag based on the type of mechanical equipment or valve that is tag is used to identify, ie: “VAV”, “EXH FAN”, “CHWV”, “HHWV”, “DWV”, etc.

C. Ceiling Tag Color Schedule:

1. Background: White.
2. Letter Color: Black.

END OF SECTION 20 05 53

SECTION 20 05 93 - TESTING, ADJUSTING, AND BALANCING

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.

B. Division 20, Common Work Results for Mechanical, requirements apply to this section.

1.2 SUMMARY

A. This Section includes TAB to produce design objectives for the following:

1. Air Systems:

   a. Multi-zone variable-air-volume systems.

2. Hydronic Piping Systems:

   a. Constant-flow systems.
   b. Variable-flow systems.
3. Verifying that automatic control devices are functioning properly.
4. Reporting results of activities and procedures specified in this Section.

1.3 TAB CONTRACTOR

A. UNT will provide air balancing outside of the general contract. UNT Air Balancing contractor must be provided with plans and specifications at the plan review phases. Comments from Air Balancing contractor should be addressed in the same manner s owner’s comments.

1.4 DEFINITIONS

A. Adjust: To regulate fluid flow rate and air patterns at the terminal equipment, such as to reduce fan speed or adjust a damper.

B. Balance: To proportion flows within the distribution system, including submains, branches, and terminals, according to indicated quantities.

C. Barrier or Boundary: Construction, either vertical or horizontal, such as walls, floors, and ceilings that are designed and constructed to restrict the movement of airflow, smoke, odors, and other pollutants.

D. Draft: A current of air, when referring to localized effect caused by one or more factors of high air velocity, low ambient temperature, or direction of airflow, whereby more heat is withdrawn from a person's skin than is normally dissipated.

E. NC: Noise criteria.

F. Procedure: An approach to and execution of a sequence of work operations to yield repeatable results.

G. RC: Room criteria.

H. Report Forms: Test data sheets for recording test data in logical order.

I. Static Head: The pressure due to the weight of the fluid above the point of measurement. In a closed system, static head is equal on both sides of the pump.

J. Suction Head: The height of fluid surface above the centerline of the pump on the suction side.

K. System Effect: A phenomenon that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.

L. System Effect Factors: Allowances used to calculate a reduction of the performance ratings of a fan when installed under conditions different from those presented when the fan was performance tested.

M. TAB: Testing, adjusting, and balancing.

N. Terminal: A point where the controlled medium, such as fluid or energy, enters or leaves the distribution system.

O. Test: A procedure to determine quantitative performance of systems or equipment.

P. Testing, Adjusting, and Balancing (TAB) Firm: The entity responsible for performing and reporting TAB procedures.

1.5 SUBMITTALS

A. Qualification Data: Within 30 days from Contractor's Notice to Proceed, submit 2 copies of evidence that TAB firm and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article.

B. Contract Documents Examination Report: Within 30 days from Contractor's Notice to Proceed, submit 2 copies of the Contract Documents review report as specified in Part 3.

C. Strategies and Procedures Plan: Within 30 days from Contractor's Notice to Proceed, submit 2 copies of TAB strategies and step-by-step procedures as specified in Part 3 "Preparation" Article. Include a complete set of report forms intended for use on this Project.

D. Certified TAB Reports: Submit two copies of reports prepared, as specified in this Section, on approved forms certified by TAB firm.

E. Sample Report Forms: Submit two sets of sample TAB report forms.

F. Warranties specified in this Section.

1.6 QUALITY ASSURANCE

A. TAB Firm Qualifications: Engage a TAB firm certified by AABC, NEBB, or TABB.

B. TAB Conference: Meet with Owner's and Architect's representatives on approval of TAB strategies and procedures plan to develop a mutual understanding of the details. Ensure the participation of TAB team members, equipment manufacturers' authorized service representatives, HVAC controls installers, and other support personnel. Provide seven days' advance notice of scheduled meeting time and location.

1. Agenda Items: Include at least the following:

a. Submittal distribution requirements.
b. The Contract Documents examination report.
c. TAB plan.
d. Work schedule and Project-site access requirements.
e. Coordination and cooperation of trades and subcontractors.
f. Coordination of documentation and communication flow.

C. Certification of TAB Reports: Certify TAB field data reports. This certification includes the following:

1. Review field data reports to validate accuracy of data and to prepare certified TAB reports.
2. Certify that TAB team complied with approved TAB plan and the procedures specified and referenced in this Specification.

D. TAB Report Forms: Use standard forms from AABC's "National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems." or NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems." TABB "Contractors Certification Manual."

E. Instrumentation Type, Quantity, and Accuracy: As described in AABC's "National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems", or NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems," Section II, "Required Instrumentation for NEBB Certification."

F. Instrumentation Calibration: Calibrate instruments at least every six months or more frequently if required by instrument manufacturer.

1. Keep an updated record of instrument calibration that indicates date of calibration and the name of party performing instrument calibration.

G. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 7.2.2 - "Air Balancing."

H. ASHRAE/IESNA 90.1 Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.7.2.3 - "System Balancing."

1.7 PROJECT CONDITIONS

A. 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.

1.8 COORDINATION

A. Coordinate the efforts of factory-authorized service representatives for systems and equipment, HVAC controls installers, and other mechanics to operate HVAC systems and equipment to support and assist TAB activities.

B. Notice: Provide seven days' advance notice for each test. Include scheduled test dates and times.

C. Perform TAB after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.

1.9 WARRANTY

A. National Project Performance Guarantee: Provide a guarantee on AABC's "National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems" forms stating that AABC will assist in completing requirements of the Contract Documents if TAB firm fails to comply with the Contract Documents. Guarantee includes the following provisions:

1. The certified TAB firm has tested and balanced systems according to the Contract Documents.
2. Systems are balanced to optimum performance capabilities within design and installation limits.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 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.

1. Contract Documents are defined in the General and Supplementary Conditions of Contract.
2. Verify that balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers, are required by the Contract Documents. Verify that quantities and locations of these balancing devices are accessible and appropriate for effective balancing and for efficient system and equipment operation.

B. Examine approved submittal data of systems and equipment.

C. Examine Project Record Documents described in Division 01 Section "Project Record Documents."

D. Examine design data, including system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about system and equipment controls.

E. Examine equipment performance data including fan and pump curves. 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 those presented when the equipment was performance tested at the factory. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," Sections 7 through 10; or in SMACNA's "HVAC Systems--Duct Design," Sections 5 and 6. Compare this data with the design data and installed conditions.

F. Examine system and equipment installations to verify that they are complete and that testing, cleaning, adjusting, and commissioning specified in individual Sections have been performed.

G. Examine system and equipment test reports.

H. Examine system and equipment installations to verify that indicated balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers, are properly installed, and that their locations are accessible and appropriate for effective balancing and for efficient system and equipment operation.

I. Examine systems for functional deficiencies that cannot be corrected by adjusting and balancing.

J. Examine equipment to ensure that clean filters have been installed, bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.

K. Examine terminal units, such as variable-air-volume boxes, to verify that they are accessible and their controls are connected and functioning.

L. Examine plenum ceilings used for supply air to verify that they are airtight. Verify that pipe penetrations and other holes are sealed.

M. Examine strainers for clean screens and proper perforations.

N. Examine three-way valves for proper installation for their intended function of diverting or mixing fluid flows.

O. Examine heat-transfer coils for correct piping connections and for clean and straight fins.

P. Examine system pumps to ensure absence of entrained air in the suction piping.

Q. Examine equipment for installation and for properly operating safety interlocks and controls.

R. Examine automatic temperature system components to verify the following:

1. Dampers, valves, and other controlled devices are operated by the intended controller.
2. Dampers and valves are in the position indicated by the controller.

3. Integrity of valves and dampers for free and full operation and for tightness of fully closed and fully open positions. This includes dampers in multizone units, mixing boxes, and variable-air-volume terminals.
4. Automatic modulating and shutoff valves, including two-way valves and three-way mixing and diverting valves, are properly connected.
5. Thermostats and humidistats are located to avoid adverse effects of sunlight, drafts, and cold walls.
6. Sensors are located to sense only the intended conditions.
7. Sequence of operation for control modes is according to the Contract Documents.
8. Controller set points are set at indicated values.
9. Interlocked systems are operating.
10. Changeover from heating to cooling mode occurs according to indicated values.

S. 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.

3.2 PREPARATION

A. Prepare a TAB plan that includes strategies and step-by-step procedures.

B. Complete system readiness checks and prepare system readiness reports. Verify the following:

1. Permanent electrical power wiring is complete.
2. Hydronic systems are filled, clean, and free of air.
3. Automatic temperature-control systems are operational.
4. Equipment and duct access doors are securely closed.
5. Balance, smoke, and fire dampers are open.
6. Isolating and balancing valves are open and control valves are operational.
7. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.
8. Windows and doors can be closed so indicated conditions for system operations can be met.

3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

A. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems" or NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" and this Section.

1. Comply with requirements in ASHRAE 62.1, Section 7.2.2 - "Air Balancing."

B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary to allow adequate performance of procedures. After testing and balancing, close probe holes and patch insulation with new materials identical to those removed. Restore vapor barrier and finish according to insulation Specifications for this Project.

C. Mark equipment and balancing device settings with paint or other suitable, permanent identification material, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, to show final settings.

D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.4 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck 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 outside-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. Check dampers for proper position to achieve desired airflow path.

H. Check for airflow blockages.

I. Check for proper sealing of air-handling unit components.

J. Check for proper sealing of air duct system.

3.5 PROCEDURES FOR MULTI-ZONE VARIABLE-AIR-VOLUME SYSTEMS

A. Compensating for Diversity: When the total airflow of all terminal units is more than the indicated airflow of the fan, place a selected number of terminal units at a maximum set-point airflow condition until the total airflow of the terminal units equals the indicated airflow of the fan. Select the reduced airflow terminal units so they are distributed evenly among the branch ducts.

B. Pressure-Independent, Variable-Air-Volume Systems: After the fan systems have been adjusted, adjust the variable-air-volume systems as follows:

1. Set outside-air dampers at minimum, and return- and exhaust-air dampers at a position that simulates full-cooling load.
2. Select the terminal unit that is most critical to the supply-fan airflow and static pressure. Measure static pressure. Adjust system static pressure so the entering static pressure for the critical terminal unit is not less than the sum of terminal-unit manufacturer's recommended minimum inlet static pressure plus the static pressure needed to overcome terminal-unit discharge system losses.
3. Measure total system airflow. Adjust to within indicated airflow.
4. Set terminal units at maximum airflow and adjust controller or regulator to deliver the designed maximum airflow. Use terminal-unit manufacturer's written instructions to make this adjustment. When total airflow is correct, balance the air outlets downstream from terminal units as described for constant-volume air systems.

5. Set terminal units at minimum airflow and adjust controller or regulator to deliver the designed minimum airflow. Check air outlets for a proportional reduction in airflow as described for constant-volume air systems.

    a. If air outlets are out of balance at minimum airflow, report the condition but leave outlets balanced for maximum airflow.

6. Remeasure the return airflow to the fan while operating at maximum return airflow and minimum outside airflow. Adjust the fan and balance the return-air ducts and inlets as described for constant-volume air systems.
7. Measure static pressure at the most critical terminal unit and adjust the static-pressure controller at the main supply-air sensing station to ensure that adequate static pressure is maintained at the most critical unit.
8. Record the final fan performance data.

3.6 GENERAL PROCEDURES FOR HYDRONIC SYSTEMS

A. Prepare test reports with pertinent design data and number in sequence starting at pump to end of system. Check the sum of branch-circuit flows against approved pump flow rate. Correct variations that exceed plus or minus 5 percent.

B. Prepare schematic diagrams of systems' "as-built" piping layouts.

C. Prepare hydronic systems for testing and balancing according to the following, in addition to the general preparation procedures specified above:

1. Open all manual valves for maximum flow.
2. Check expansion tank liquid level.
3. Check makeup-water-station pressure gage for adequate pressure for highest vent.
4. Check flow-control valves for specified sequence of operation and set at indicated flow.
5. Set differential-pressure control valves at the specified differential pressure. Do not set at fully closed position when pump is positive-displacement type unless several terminal valves are kept open.
6. Set system controls so automatic valves are wide open to heat exchangers.
7. Check pump-motor load. If motor is overloaded, throttle main flow-balancing device so motor nameplate rating is not exceeded.
8. Check air vents for a forceful liquid flow exiting from vents when manually operated.

3.7 PROCEDURES FOR HYDRONIC SYSTEMS

A. Measure water flow at pumps. Use the following procedures, except for positive-displacement pumps:

1. Verify impeller size by operating the pump with the discharge valve closed. Read pressure differential across the pump. Convert pressure to head and correct for differences in gage heights. Note the point on manufacturer's pump curve at zero flow and verify that the pump has the intended impeller size.
2. Check system resistance. With all valves open, read pressure differential across the pump and mark pump manufacturer's head-capacity curve. Adjust pump discharge valve until indicated water flow is achieved.
3. Verify pump-motor brake horsepower. Calculate the intended brake horsepower for the system based on pump manufacturer's performance data. Compare calculated brake

horsepower with nameplate data on the pump motor. Report conditions where actual amperage exceeds motor nameplate amperage.

4. Report flow rates that are not within plus or minus 5 percent of design.

B. Set calibrated balancing valves, if installed, at calculated presettings.

C. Measure flow at all stations and adjust, where necessary, to obtain first balance.

1. System components that have Cv rating or an accurately cataloged flow-pressure-drop relationship may be used as a flow-indicating device.

D. Measure flow at main balancing station and set main balancing device to achieve flow that is 5 percent greater than indicated flow.

E. Adjust balancing stations to within specified tolerances of indicated flow rate as follows:

1. Determine the balancing station with the highest percentage over indicated flow.
2. Adjust each station in turn, beginning with the station with the highest percentage over indicated flow and proceeding to the station with the lowest percentage over indicated flow.
3. Record settings and mark balancing devices.

F. Measure pump flow rate and make final measurements of pump amperage, voltage, rpm, pump heads, and systems' pressures and temperatures including outdoor-air temperature.

G. Measure the differential-pressure control valve settings existing at the conclusions of balancing.

3.8 PROCEDURES FOR TEMPERATURE MEASUREMENTS

A. During TAB, report the need for adjustment in temperature regulation within the automatic temperature-control system.

B. Measure indoor wet- and dry-bulb temperatures every other hour for a period of two successive eight-hour days, in each separately controlled zone, to prove correctness of final temperature settings. Measure when the building or zone is occupied.

C. Measure outside-air, wet- and dry-bulb temperatures.

3.9 TEMPERATURE-CONTROL VERIFICATION

A. Verify that controllers are calibrated and commissioned.

B. Check transmitter and controller locations and note conditions that would adversely affect control functions.

C. Record controller settings and note variances between set points and actual measurements.

D. Check the operation of limiting controllers (i.e., high- and low-temperature controllers).

E. Check free travel and proper operation of control devices such as damper and valve operators.

F. Check the sequence of operation of control devices. Note air pressures and device positions and correlate with airflow and water flow measurements. Note the speed of response to input changes.

G. Check the interaction of electrically operated switch transducers.

H. Check the interaction of interlock and lockout systems.

I. Check main control supply-air pressure and observe compressor and dryer operations.

J. Record voltages of power supply and controller output. Determine whether the system operates on a grounded or nongrounded power supply.

K. Note operation of electric actuators using spring return for proper fail-safe operations.

3.10 TOLERANCES

A. Set HVAC system airflow and water flow rates within the following tolerances:

1. Air Outlets and Inlets: -5% to +5%.
2. Heating-Water Flow Rate: 0 to +10%.

3.11 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: As Work progresses, prepare 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.

3.12 FINAL REPORT

A. General: Typewritten, or computer printout in letter-quality font, on standard bond paper, in three-ring binder, tabulated and divided into sections by tested and balanced systems.

B. Include a certification sheet in front of binder signed and sealed by the certified testing and balancing engineer.

1. Include a list of instruments used for procedures, along with proof of calibration.

C. Final Report Contents: In addition to certified field report data, include the following:

1. Field test reports prepared by system and equipment installers.
2. Other information relative to equipment performance, but do not include Shop Drawings and Product Data.

D. General Report Data: In addition to form titles and entries, include the following data in the final report, as applicable:

1. Title page.
2. Name and address of TAB firm.
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 firm 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, type size, and fittings.
14. Notes to explain why certain final data in the body of reports varies from indicated values.
15. Test conditions for fans and pump performance forms including the following:

    a. Settings for outside-, 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.

E. System Diagrams: Include schematic layouts of air and hydronic distribution systems and domestic hot water recirculation systems. Present each system with single-line diagram and include the following as applicable:

1. Quantities of outside, 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.

F. Air-Handling Unit Test Reports: For air-handling units with coils, include the following:

1. Unit Data: Include the following:

    a. Unit identification.
    b. Location.
    c. Make and type.
    d. Model number and unit size.

e. Manufacturer's serial number.
f. Unit arrangement and class.
g. Discharge arrangement.
h. Sheave make, size in inches, and bore.
i. Sheave dimensions, center-to-center, and amount of adjustments in inches.
j. Number of belts, make, and size.
k. Number of filters, type, and size.

2. Motor Data:

a. Make and frame type and size.
b. Horsepower and rpm.
c. Volts, phase, and hertz.
d. Full-load amperage and service factor.
e. Sheave make, size in inches, and bore.
f. Sheave dimensions, center-to-center, and amount of adjustments in inches.

3. Test Data (Indicated and Actual Values):

a. Total airflow rate in cfm.
b. Total system static pressure in inches wg.
c. Fan rpm.
d. Discharge static pressure in inches wg.
e. Filter static-pressure differential in inches wg.
f. Preheat coil static-pressure differential in inches wg.
g. Cooling coil static-pressure differential in inches wg.
h. Heating coil static-pressure differential in inches wg.
i. Outside airflow in cfm.
j. Return airflow in cfm.
k. Outside-air damper position.
l. Return-air damper position.

G. Apparatus-Coil Test Reports:

1. Coil Data:

a. System identification.
b. Location.
c. Coil type.
d. Number of rows.
e. Fin spacing in fins per inch o.c.
f. Make and model number.
g. Face area in sq. ft..
h. Tube size in NPS.
i. Tube and fin materials.
j. Circuiting arrangement.

2. Test Data (Indicated and Actual Values):

a. Airflow rate in cfm.
b. Average face velocity in fpm.
c. Air pressure drop in inches wg.
d. Outside-air, wet- and dry-bulb temperatures in deg F.
e. Return-air, wet- and dry-bulb temperatures in deg F.

f. Entering-air, wet- and dry-bulb temperatures in deg F.
g. Leaving-air, wet- and dry-bulb temperatures in deg F.
h. Water flow rate in gpm.
i. Water pressure differential in feet of head or psig.
j. Entering-water temperature in deg F.
k. Leaving-water temperature in deg F.
l. Refrigerant expansion valve and refrigerant types.
m. Refrigerant suction pressure in psig.
n. Refrigerant suction temperature in deg F.

H. Gas- and Oil-Fired Heat Apparatus Test Reports: In addition to manufacturer's factory startup equipment reports, include the following:

1. Unit Data:

a. System identification.
b. Location.
c. Make and type.
d. Model number and unit size.
e. Manufacturer's serial number.
f. Fuel type in input data.
g. Output capacity in Btuh.
h. Ignition type.
i. Burner-control types.
j. Motor horsepower and rpm.
k. Motor volts, phase, and hertz.
l. Motor full-load amperage and service factor.
m. Sheave make, size in inches, and bore.
n. Sheave dimensions, center-to-center, and amount of adjustments in inches.

2. Test Data (Indicated and Actual Values):

a. Total airflow rate in cfm.
b. Entering-air temperature in deg F.
c. Leaving-air temperature in deg F.
d. Air temperature differential in deg F.
e. Entering-air static pressure in inches wg.
f. Leaving-air static pressure in inches wg.
g. Air static-pressure differential in inches wg.
h. Low-fire fuel input in Btuh.
i. High-fire fuel input in Btuh.
j. Manifold pressure in psig.
k. High-temperature-limit setting in deg F.
l. Operating set point in Btuh.
m. Motor voltage at each connection.
n. Motor amperage for each phase.
o. Heating value of fuel in Btuh.

I. Fan Test Reports: For supply fans, include the following:

1. Fan Data:

a. System identification.
b. Location.

c. Make and type.
d. Model number and size.
e. Manufacturer's serial number.
f. Arrangement and class.
g. Sheave make, size in inches, and bore.
h. Sheave dimensions, center-to-center, and amount of adjustments in inches.

2. Motor Data:

a. Make and frame type and size.
b. Horsepower and rpm.
c. Volts, phase, and hertz.
d. Full-load amperage and service factor.
e. Sheave make, size in inches, and bore.
f. Sheave dimensions, center-to-center, and amount of adjustments in inches.
g. Number of belts, make, and size.

3. Test Data (Indicated and Actual Values):

a. Total airflow rate in cfm.
b. Total system static pressure in inches wg.
c. Fan rpm.
d. Discharge static pressure in inches wg.
e. Suction static pressure in inches wg.

J. Round 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.

K. Air-Terminal-Device Reports:

1. Unit Data:

a. System and air-handling unit identification.
b. Location and zone.
c. Test apparatus used.
d. Area served.
e. Air-terminal-device make.
f. Air-terminal-device number from system diagram.
g. Air-terminal-device type and model number.
h. Air-terminal-device size.

i. Air-terminal-device 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.

L. System-Coil Reports: For reheat coils and water coils of terminal units, include the following:

1. Unit Data:

a. System and air-handling unit identification.
b. Location and zone.
c. Room or riser served.
d. Coil make and size.
e. Flowmeter type.

2. Test Data (Indicated and Actual Values):

a. Airflow rate in cfm.
b. Entering-water temperature in deg F.
c. Leaving-water temperature in deg F.
d. Water pressure drop in feet of head or psig.
e. Entering-air temperature in deg F.
f. Leaving-air temperature in deg F.

M. Pump Test Reports: Calculate impeller size by plotting the shutoff head on pump curves and include the following:

1. Unit Data:

a. Unit identification.
b. Location.
c. Service.
d. Make and size.
e. Model and serial numbers.
f. Water flow rate in gpm.
g. Water pressure differential in feet of head or psig.
h. Required net positive suction head in feet of head or psig.
i. Pump rpm.
j. Impeller diameter in inches.
k. Motor make and frame size.
l. Motor horsepower and rpm.
m. Voltage at each connection.
n. Amperage for each phase.
o. Full-load amperage and service factor.
p. Seal type.

2. Test Data (Indicated and Actual Values):

a. Static head in feet of head or psig.
b. Pump shutoff pressure in feet of head or psig.
c. Actual impeller size in inches.
d. Full-open flow rate in gpm.
e. Full-open pressure in feet of head or psig.
f. Final discharge pressure in feet of head or psig.
g. Final suction pressure in feet of head or psig.
h. Final total pressure in feet of head or psig.
i. Final water flow rate in gpm.
j. Voltage at each connection.
k. Amperage for each phase.

N. Boiler Test Reports:

1. Unit Data:

a. Unit identification.
b. Location.
c. Service.
d. Make and type.
e. Model and serial numbers.
f. Fuel type and input in Btuh.
g. Number of passes.
h. Ignition type.
i. Burner-control types.
j. Voltage at each connection.
k. Amperage for each phase.

2. Test Data (Indicated and Actual Values):

a. Operating pressure in psig.
b. Operating temperature in deg F.
c. Entering-water temperature in deg F.
d. Leaving-water temperature in deg F.
e. Number of safety valves and sizes in NPS.
f. Safety valve settings in psig.
g. High-limit setting in psig.
h. Operating-control setting.
i. High-fire set point.
j. Low-fire set point.
k. Voltage at each connection.
l. Amperage for each phase.
m. Draft fan voltage at each connection.
n. Draft fan amperage for each phase.
o. Manifold pressure in psig.

O. Instrument Calibration Reports:

1. Report Data:

a. Instrument type and make.
b. Serial number.
c. Application.
d. Dates of use.

e. Dates of calibration.

3.13 INSPECTIONS

A. Initial Inspection:

1. After testing and balancing are complete, operate each system and randomly check measurements to verify that the system is operating according to the final test and balance readings documented in the Final Report.
2. Randomly check the following for each system:

   a. Measure airflow of at least 10 percent of air outlets.
   b. Measure water flow of at least 5 percent of terminals.
   c. Measure room temperature at each thermostat/temperature sensor. Compare the reading to the set point.
   d. Verify that balancing devices are marked with final balance position.
   e. Note deviations to the Contract Documents in the Final Report.

B. Final Inspection:

1. After initial inspection is complete and evidence by random checks verifies that testing and balancing are complete and accurately documented in the final report, request that a final inspection be made by Owner and/or Architect.
2. TAB firm test and balance engineer shall conduct the inspection in the presence of Owner and/or Architect.
3. Owner and/or Architect may randomly select measurements documented in the final report to be rechecked. The 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.
4. If the 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."
5. 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.
6. TAB firm shall recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes and resubmit the final report.
7. Request a second final inspection. If the second final inspection also fails, Owner shall contract the services of another TAB firm to complete the testing and balancing in accordance with the Contract Documents and deduct the cost of the services from the final payment.

3.14 ADDITIONAL TESTS

A. Within 90 days of completing TAB, perform additional testing and balancing 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 testing, inspecting, and adjusting during near-peak summer and winter conditions.

END OF SECTION 20 05 93

SECTION 20 07 00 - MECHANICAL 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.

B. Division 20, Common Work Results for Mechanical, requirements apply to this section.

1.2 SUMMARY

A. Section Includes:

1. Insulation Materials:
   a. Mineral fiber.
2. Adhesives.
3. Mastics.
4. Sealants.
5. Tapes.
6. Securements.
7. Corner angles.
8. Protective shielding guards

B. Related Sections:
1. Division 23 Section 23 31 13 "Metal Ducts" for duct liners.

1.3 DEFINITIONS

A. ASHRAE/IESNA: American Society of Heating, Refrigeration, Air Conditioning Engineers/Illuminating Engineering Society of North America.

B. ASTM: American Society for Testing and Materials.

C. CFC: Chlorinated Fluorocarbon.

D. HCFC: Hydrogenated Chlorofluorocarbon.

E. NPS: Nominal Pipe Size.

F. VOC: Volatile Organic Compound.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, thickness, and jackets (both factory and field applied, if any).

B. Shop Drawings:

1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
2. Detail attachment and covering of heat tracing inside insulation.
3. Detail insulation application at pipe expansion joints for each type of insulation.
4. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
5. Detail removable insulation at piping specialties, equipment connections, and access panels.
6. Detail application of field-applied jackets.
7. Detail application at linkages of control devices.
8. Detail field application for each equipment type.

C. Qualification Data: For qualified Installer.

D. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.

E. Field quality-control reports.

1.5 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.

1.6 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.

1.7 COORDINATION

A. Coordinate size and location of supports, hangers, and insulation shields specified in Division 20, Section 20 05 29 "Hangers and Supports."

B. Coordinate clearance requirements with piping Installer for piping insulation application, duct Installer for duct insulation application, and equipment Installer for equipment insulation application. Before preparing piping and 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.

1.8 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 Part 3 schedule articles for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

D. 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.

1. Products: Subject to compliance with requirements, provide one of the following:

a. CertainTeed Corp.; SoftTouch Duct Wrap.
b. Johns Manville; Microlite.
c. Knauf Insulation; Friendly Feel Duct Wrap.
d. Manson Insulation Inc.; Alley Wrap.
e. Owens Corning; SOFTR All-Service Duct Wrap.

E. 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 FSK jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. CertainTeed Corp.; CertaPro Commercial Board.
   b. Fibrex Insulations Inc.; FBX.
   c. Johns Manville; 800 Series Spin-Glas.
   d. Knauf Insulation; Insulation Board.
   e. Manson Insulation Inc.; AK Board.
   f. Owens Corning; Fiberglas 700 Series.

F. Mineral-Fiber, Preformed Pipe Insulation:

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Fibrex Insulations Inc.; Coreplus 1200.
   b. Johns Manville; Micro-Lok.
   c. Knauf Insulation; 1000-Degree Pipe Insulation.
   d. Manson Insulation Inc.; Alley-K.
   e. Owens Corning; Fiberglas Pipe Insulation.

2. Type I, 850 deg F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ-SSL. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

G. Mineral-Fiber, Pipe and Tank Insulation: Mineral or glass fibers bonded with a thermosetting resin. Semirigid board material with factory-applied ASJ complying with ASTM C 1393, Type II or Type IIIA Category 2, or with properties similar to ASTM C 612, Type IB. Nominal density is 2.5 lb./cu. ft. or more. Thermal conductivity (k-value) at 100 deg F is 0.29 Btu x in./h x sq. ft. x deg F or less. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. CertainTeed Corp.; CrimpWrap.
   b. Johns Manville; MicroFlex.
   c. Knauf Insulation; Pipe and Tank Insulation.
   d. Manson Insulation Inc.; AK Flex.
   e. Owens Corning; Fiberglas Pipe and Tank Insulation.

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. Products: Subject to compliance with requirements, provide one of 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."

2.3 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-C-19565C, Type II.

1. For indoor applications, use mastics that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Vapor-Barrier Mastic: Water based; suitable for indoor and outdoor use on below ambient services.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-80/30-90.
b. Vimasco Corporation; 749.

2. Water-Vapor Permeance: ASTM E 96, Procedure B, 0.013 perm at 43-mil dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F.
4. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
5. Color: White.

C. Breather Mastic: Water based; suitable for indoor and outdoor use on above ambient services.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-10.
b. Eagle Bridges - Marathon Industries; 550.
c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 46-50.
d. Mon-Eco Industries, Inc.; 55-50.
e. Vimasco Corporation; WC-1/WC-5.

2. Water-Vapor Permeance: ASTM F 1249, 1.8 perms at 0.0625-inch dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F.
4. Solids Content: 60 percent by volume and 66 percent by weight.
5. 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. For indoor applications, use lagging adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2. Products: Subject to compliance with requirements, provide one of the following:

   a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-50 AHV2.
   b. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-36.
   c. Vimasco Corporation; 713 and 714.

3. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over duct, equipment, and pipe insulation.
4. Service Temperature Range: 0 to plus 180 deg F.
5. Color: White.

2.5 SEALANTS

A. Joint Sealants:

1. Joint Sealants for Polyisocyanurate Products: Subject to compliance with requirements, provide one of 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."

2.6 TAPES

A. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. ABI, Ideal Tape Division; 488 AWF.
   b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0800.
   c. Compac Corporation; 120.
   d. Venture Tape; 3520 CW.

2. Width: 2 inches.
3. Thickness: 3.7 mils.
4. Adhesion: 100 ounces force/inch in width.
5. Elongation: 5 percent.
6. Tensile Strength: 34 lbf/inch in width.

2.7 SECUREMENTS

A. Bands:

1. Products: Subject to compliance with requirements, provide one of the following:

   a. ITW Insulation Systems; Gerrard Strapping and Seals.
   b. RPR Products, Inc.; Insul-Mate Strapping, Seals, and Springs

2. Stainless Steel: ASTM A 167 or ASTM A 240/A 240M, Type 304 or Type 316; 0.015 inch thick, 1/2 inch wide with wing or closed seal.
3. Aluminum: ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 1/2 inch wide with wing or closed seal.
4. Springs: Twin spring set constructed of stainless steel with ends flat and slotted to accept metal bands. Spring size determined by manufacturer for application.

B. Insulation Pins and Hangers:

1. Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.106-inch- diameter shank, length to suit depth of insulation indicated.

   a. Products: Subject to compliance with requirements, provide one of the following:

      1) AGM Industries, Inc.; CWP-1.
      2) GEMCO; CD.
      3) Midwest Fasteners, Inc.; CD.
      4) Nelson Stud Welding; TPA, TPC, and TPS.

2. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.106-inch- diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch galvanized carbon-steel washer.

   a. Products: Subject to compliance with requirements, provide one of the following:

      1) AGM Industries, Inc.; CHP-1.
      2) GEMCO; Cupped Head Weld Pin.
      3) Midwest Fasteners, Inc.; Cupped Head.
      4) Nelson Stud Welding; CHP.

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. Products: Subject to compliance with requirements, provide one of the following:

1) AGM Industries, Inc.; Tactoo Perforated Base Insul-Hangers.
2) GEMCO; Perforated Base.
3) Midwest Fasteners, Inc.; Spindle.

b. Baseplate: Perforated, galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
c. Spindle: Copper- or zinc-coated, low carbon steel, fully annealed, 0.106-inch-diameter shank, length to suit depth of insulation indicated.
d. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.

4. Nonmetal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate fastened 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. Products: Subject to compliance with requirements, provide one of the following:

1) GEMCO; Nylon Hangers.
2) Midwest Fasteners, Inc.; Nylon Insulation Hangers.

b. Baseplate: Perforated, nylon sheet, 0.030 inch thick by 1-1/2 inches in diameter.
c. Spindle: Nylon, 0.106-inch- diameter shank, length to suit depth of insulation indicated, up to 2-1/2 inches.
d. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.

5. Self-Sticking-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. Products: Subject to compliance with requirements, provide one of the following:

1) AGM Industries, Inc.; Tactoo Self-Adhering Insul-Hangers.
2) GEMCO; Peel & Press.
3) Midwest Fasteners, Inc.; Self Stick.

b. Baseplate: Galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
c. Spindle: Copper- or zinc-coated, low carbon steel, fully annealed, 0.106-inch-diameter shank, length to suit depth of insulation indicated.
d. Adhesive-backed base with a peel-off protective cover.

6. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick, galvanized-steel or 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. Products: Subject to compliance with requirements, provide one of the following:

1) AGM Industries, Inc.; RC-150.
2) GEMCO; R-150.
3) Midwest Fasteners, Inc.; WA-150.
4) Nelson Stud Welding; Speed Clips.

b. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in exposed locations.

7. Nonmetal Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch-thick nylon sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.

a. Products: Subject to compliance with requirements, provide one of the following:

1) GEMCO.
2) Midwest Fasteners, Inc.

C. Staples: Outward-clinching insulation staples, nominal 3/4-inch- wide, stainless steel or Monel.

D. Wire: 0.062-inch soft-annealed, stainless steel or 0.062-inch soft-annealed, galvanized steel.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. C & F Wire.

2.8 CORNER ANGLES

A. PVC Corner Angles: 30 mils thick, minimum 1 by 1 inch, PVC according to ASTM D 1784, Class 16354-C. White or color-coded to match adjacent surface.

B. 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.

C. Stainless-Steel Corner Angles: 0.024 inch thick, minimum 1 by 1 inch, stainless steel according to ASTM A 167 or ASTM A 240/A 240M, Type 304 or 316.

2.9 PROTECTIVE SHIELDING GUARDS

A. Protective Shielding Pipe Covers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Truebro; a brand of IPS Corporation.
b. 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:

1. Manufacturers: Subject to compliance with requirements, provide products by one of 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 and other conditions affecting performance of insulation application.

1. Verify that systems and equipment to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation (Conditioned Spaces): Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Surface Preparation (Unconditioned Spaces and Exposed to Weather): 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.
2. 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 equipment, ducts and fittings, and piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of equipment, duct system, and 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 as recommended by insulation material manufacturer to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to duct and 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. Manholes.
5. Handholes.
6. Cleanouts.

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: Install insulation continuously through penetrations of fire-rated walls and partitions. 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 Division 07, Section 07 84 13 "Penetration Firestopping" and fire-resistive joint sealers.

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.
8. 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. Label the outside insulation jacket of each union with the word "UNION." Match size and color of pipe labels.

C. Provide protective shielding guards on exposed piping serving barrier free sinks and lavatories.

D. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes, vessels, and equipment. 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.

E. 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 MINERAL-FIBER INSULATION INSTALLATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of preformed pipe 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 surfaces, secure laps with outward clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets on below ambient surfaces, do not staple longitudinal tabs but 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 Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

C. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

D. 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 1 edge and 1 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 2 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-inch- wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.

E. 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 1 edge and 1 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 2 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-inch- wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.

3.7 FINISHES

A. Duct, Equipment, and Pipe Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Division 09 painting sections.

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 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Perform tests and inspections.

C. Tests and Inspections:

1. Inspect ductwork, randomly selected by Owner or Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to one location for each duct system defined in the "Duct Insulation Schedule, General" Article.
2. Inspect field-insulated equipment, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to one location for each type of equipment defined in the "Equipment Insulation Schedule" Article. For large equipment, remove only a portion adequate to determine compliance.
3. Inspect pipe, fittings, strainers, and valves, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three locations of straight pipe, three locations of threaded fittings, three locations of welded fittings, two locations of threaded strainers, two locations of welded strainers, three locations of threaded valves, and three locations of flanged valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.

D. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.9 DUCT INSULATION SCHEDULE, GENERAL

A. Plenums and Ducts Requiring Insulation:

1. Indoor, concealed supply and outdoor air.
2. Indoor, exposed supply and outdoor air.
3. Indoor, concealed return located in nonconditioned space.
4. Indoor, exposed return located in nonconditioned space.
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. Factory-insulated flexible ducts.
2. Factory-insulated plenums and casings.
3. Flexible connectors.
4. Vibration-control devices.
5. Factory-insulated access panels and doors.

3.10 INDOOR DUCT AND PLENUM INSULATION SCHEDULE

A. Concealed, round, supply-air/return-air/relief-air/outdoor-air duct insulation shall be the following:

1. Mineral-Fiber Blanket: 2.25 inches thick and 0.75-lb./cu. ft. nominal density.

B. Concealed, rectangular, supply-air/return-air/relief-air/outdoor-air duct insulation shall be the following:

1. Mineral-Fiber Blanket: 2.25 inches thick and 0.75-lb./cu. ft. nominal density.

C. Concealed, rectangular, exhaust-air duct insulation between isolation damper and penetration of building exterior shall be the following:

1. Mineral-Fiber Blanket: 2.25 inches thick and 0.75-lb./cu. ft. nominal density.

D. Concealed, supply-air/return-air/relief-air/outdoor-air plenum insulation shall be the following:

1. Mineral-Fiber Blanket: 2.25 inches thick and 0.75-lb./cu. ft. nominal density.

E. Concealed, exhaust-air plenum insulation shall be the following:

1. Mineral-Fiber Blanket: 2.25 inches thick and 0.75-lb./cu. ft. nominal density.

F. Exposed, rectangular, supply-air/return-air/outdoor-air duct insulation shall be the following:

1. Mineral-Fiber Board: 2 inches thick and 3-lb./cu. ft. nominal density. Where exposed, rectangular, supply-air/return-air/outdoor-air duct is found in areas other than mechanical rooms, duct liner shall be utilized. Refer to Division 23 Section 23 31 13 "Metal Ducts" for duct liners.

G. Exposed, rectangular, exhaust-air duct insulation shall be the following:

1. Mineral-Fiber Board: 2 inches thick and 3-lb./cu. ft. nominal density.

H. Exposed, supply-air plenum insulation shall be the following:

1. Mineral-Fiber Board: 2 inches thick and 3-lb./cu. ft. nominal density.

I. Exposed, return-air plenum insulation shall be the following:

1. Mineral-Fiber Board: 2 inches thick and 3-lb./cu. ft. nominal density.

J. Exposed, exhaust-air plenum insulation shall be the following:

1. Mineral-Fiber Board: 2 inches thick and 3-lb./cu. ft. nominal density.

3.11 EQUIPMENT INSULATION SCHEDULE

A. Insulate any uninsulated portions of a vav box, including the hydronic heating coil. Insulation shall match adjacent ductwork insulation.

3.12 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.

3.13 INDOOR PIPING INSULATION SCHEDULE

A. Domestic Cold Water and Non Potable Cold Water:

1. All Pipe Sizes: Insulation shall be the following:

a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.

B. Domestic Hot and Recirculated Hot Water:

1. All Pipe Sizes: Insulation shall be the following:

a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.

C. Sanitary Waste Piping, Where Heat Tracing Is Installed:

1. All Pipe Sizes: Insulation shall be the following:

a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1-1/2 inches thick.

D. Heating-Hot-Water Supply and Return, 200 Deg F and below:

1. All Pipe Sizes: Insulation shall be the following:

a. Mineral-Fiber, Preformed Pipe, Type I: 2 inches thick.

END OF SECTION 20 07 00

SECTION 23 09 00 - 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.

B. Division 20, Section 20 05 00 “Common Work Results for Mechanical”, requirements apply to this section.

A. Division 20, Section 20 08 00 “Commissioning of Mechanical”, applies to this section and will require the mechanical contractors’ participation in the commissioning process.

B. Division 26, Section 26 05 00 “Common Work Results for Electrical” requirements apply to this section and requires contractor participation in the Above Ceiling Coordination Program.

1.2 DEFINITIONS

A. BAS: Building Automation System

B. DDC: Direct Digital Control

C. EMS: Energy Management System consisting of BAS (typically with a PC and support software), DDC controllers, and networking software/hardware/wiring.

D. I/O: Input/output

E. LonWorks: A control network technology platform for designing and implementing interoperable control devices and networks licensed by Echelon Corp.

F. MS/TP: Master-slave/token-passing network for BACnet

G. PC: Personal computer

H. PID: Proportional plus integral plus derivative

1.3 SUMMARY

A. This Section includes control equipment for HVAC systems and components, including control components for terminal heating and cooling units not supplied with factory-wired controls.

1. Provide interface to existing BAS via LonWorks as shown in the contract documents and described herein.
2. Provide DDC System as shown in the contract documents and described herein.
3. Sequences modified as a result of start-up, checkout, fine tuning, and/or commissioning shall be resubmitted to the Architect for record.

B. Related Sections include the following:
   1. Division 23, Section 20 05 19 "Meters and Gages" for measuring equipment that relates to this Section.
   2. Division 26, Section 26 09 36 "Lighting Controls" for requirements that relate to this Section.

1.4 SYSTEM PERFORMANCE

A. Comply with the following performance requirements:

   1. Graphic Display: Display graphic with minimum 30 dynamic points with current data within 5 seconds.
   2. Graphic Refresh: Update graphic with minimum 30 dynamic points with current data within 2 seconds.
   3. Object Command: Reaction time of less than two seconds between operator command of a binary object and device reaction.
   4. Object Scan: Transmit change of state and change of analog values to control units or workstation within six seconds.
   5. Alarm Response Time: Annunciate alarm at workstation within 15 seconds. Multiple workstations must receive alarms within five seconds of each other.
   6. Program Execution Frequency: Run capability of applications as often as five seconds, but selected consistent with mechanical process under control.
   7. Performance: Programmable controllers shall execute DDC PID control loops, and scan and update process values and outputs at least once per second.
   8. Reporting Accuracy and Stability of Control: Report values and maintain measured variables within tolerances as follows:

      1) Water Temperature: Plus or minus 1-degree F.
      2) Water Flow: Plus or minus 5 percent of full scale.
      3) Water Pressure: Plus or minus 2 percent of full scale.
      4) Space Temperature: Plus or minus 1-degree F.
      5) Ducted Air Temperature: Plus or minus 1-degree F.
      6) Outside Air Temperature: Plus or minus 2-degrees F.
      7) Averaging Air Temperature: Plus or minus 2-degrees F.
      8) Dew Point Temperature: Plus or minus 2.7-degrees F.
      9) Temperature Differential: Plus or minus 0.27-degrees F.
      10) Relative Humidity: Plus or minus 5-percent relative humidity (% RH).
      11) Airflow (Pressurized Spaces): Plus or minus 2-percent of full scale (% FS).
      12) Airflow (Measuring Stations): Plus or minus 3-% FS.
      13) Airflow (Terminal): Plus or minus 5-% FS.
      14) Air Pressure (Space): Plus or minus 0.0005-inches wg.
      15) Air Pressure (Ducts): Plus or minus 0.02-inches wg.
      16) Carbon Monoxide: Plus or minus 1-part per million (ppm) CO.
      17) Carbon Dioxide: Plus or minus 50-ppm CO2.
      18) Electrical: Plus or minus 2-percent of reading (volts/amps/watts).

1.5 SEQUENCE OF OPERATION

A. Sequences of Operation should match existing sequences and comply with owner standards.

1.6 SUBMITTALS

A. Product Data: Include manufacturer's technical literature for each control device. Indicate dimensions, capacities, performance characteristics, electrical characteristics, finishes for materials, and installation and startup instructions for each type of product indicated.

1. Building Automation System: Include technical data for operator workstation, operating system software, color graphics; editors for graphics, point database, and programming; software licensing, software updates during construction, and other third-party applications.
2. DDC System Hardware: Bill of materials of equipment indicating quantity, manufacturer, and model number. Include technical data for remote operator's terminal, operator display menus, interface equipment to BAS, DDC Controllers, Unitary Controllers, Application Specific Controllers (e.g. Air Terminal Controller), transducers/transmitters, sensors, control dampers, damper actuators, control valves, valve actuators, relays/switches, auxiliary control panels.
3. Controlled Systems: Instrumentation list with element name, type of device, manufacturer, model number, and product data. Include written description of sequence of operation including schematic diagram.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

1. Bill of materials of equipment indicating quantity, manufacturer, and model number.
2. Schematic flow diagrams showing fans, pumps, coils, dampers, valves, and control devices.
3. Wiring Diagrams: Power, signal, and control wiring.
4. Details of control panel faces, including controls, instruments, and labeling.
5. Written description of sequence of operation.
6. Schedule of dampers including size, leakage, and flow characteristics.

    a. Coordinate dampers sizes with sheet metal and/or mechanical contractor before submitting.

7. Schedule of valves including flow characteristics.
8. Schedule of Terminal Equipment Controllers; e.g. air terminals, unit ventilators, etc.
9. DDC System Hardware:

    a. Wiring diagrams for control units with termination numbers.
    b. Schematic diagrams and floor plans for field sensors and control hardware.
    c. Schematic diagrams for control, communication, and power wiring, showing trunk data conductors and wiring between operator workstation and control unit locations.

10. Control System Software: List of color graphics indicating monitored systems, data (connected and calculated) point addresses, output schedule, and operator notations.
11. Controlled Systems:

    a. Schematic diagrams of each controlled system with control points labeled and control elements graphically shown, with wiring.
    b. Scaled drawings showing mounting, routing, and wiring of elements including bases and special construction.
    c. Written description of sequence of operation including schematic diagram.

d. Points list.

C. Data Communications Protocol Certificates: Certify that each proposed DDC system component complies with LonWorks.

D. Samples for Initial Selection: For each color required, of each type of thermostat or sensor cover with factory-applied color finishes.

E. Samples for Verification: For each color required, of each type of thermostat or sensor cover.

F. Software and Firmware Operational Documentation: Include the following:

1. Software operating and upgrade manuals
2. Program Software Backup: On a DVD (CD-ROM) complete with data files
3. Device address list
4. Printout of software application and graphic screens
5. Software licenses required by and installed for DDC workstations and control systems

G. Software Upgrade Kit: For Owner to use in modifying software to suit future systems revisions or monitoring and control revisions.

H. Qualification Data:

1. Manufacturer's product line being submitted shall be in full production for at least two years.
2. Installer shall be factory trained and authorized in the installation, startup, check-out and commissioning of the manufacturer's product line being submitted. Installer's field personnel shall have at least three years' experience in the installation of DDC-style temperature control systems.

I. Field quality control test reports

J. Installing contractor's commissioning reports

K. Operation and Maintenance Data: For HVAC instrumentation and control system to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:

1. Maintenance instructions and list of spare parts for each type of control device and the compressed air station.
2. Interconnection wiring diagrams with identified and numbered system components and devices.
3. Keyboard illustrations and step-by-step procedures indexed for each operator function.
4. Inspection period, cleaning methods, recommended cleaning materials, and calibration tolerances.
5. Calibration records and list of set points.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Automatic control system manufacturer's authorized representative who is trained and approved for installation of system components required for this Project.

1. All contractor controls personnel working on the project must have documented knowledge and a minimum of 2 years of DDC experience specifically with the control systems being installed in the project.
2. The on-site installer must have demonstrated ability to control all project HVAC equipment using contractor installed, LonWorks-compliant components in compliance with the project requirements.
3. The contractor shall provide qualified on-site support for front-end graphics installation and commissioning.

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.

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.

1.9 COORDINATION

A. Coordinate location of thermostats, humidistats, DDC control sensors, and other exposed control sensors with plans and room details before installation.

B. Coordinate equipment with Division 28 Section "Intrusion Detection" to achieve compatibility with equipment that interfaces with that system.

C. Coordinate equipment with Division 28 Section "Access Control" to achieve compatibility with equipment that interfaces with that system.

D. Coordinate equipment with Division 27 Section "Clock Systems" to achieve compatibility with equipment that interfaces with that system.

E. Coordinate equipment with Division 28 Section "PLC Electronic Detention Monitoring and Control Systems" to achieve compatibility with equipment that interfaces with that system.

F. Coordinate equipment with Division 26 Section "Network Lighting Controls" to achieve compatibility with equipment that interfaces with that system.

G. Coordinate equipment with Division 28 Section "Fire Detection and Alarm" to achieve compatibility with equipment that interfaces with that system.

H. Coordinate supply of conditioned electrical branch circuits for control units and operator workstation.

I. Coordinate equipment with Division 26 Section "Electrical Power Monitoring and Control" to achieve compatibility of communication interfaces.

J. Coordinate equipment with Division 26 Section "Panelboards" to achieve compatibility with starter coils and annunciation devices.

K. Coordinate equipment with Division 26 Section "Motor-Control Centers" to achieve compatibility with motor starters and annunciation devices.

L. Coordinate installation of control dampers, smoke dampers, HVAC equipment isolation dampers, and pipe-mounted sensors and instruments with the mechanical and/or plumbing contractor.

M. Coordinate installation of duct, space, outdoor, or building static pressure sensors with the finished surfaces, installing contractor and the Architect prior to installation.

N. Coordinate installation of any exterior wall or roof-mounted sensors, instruments, photocells, or controllers required for the temperature control system with the General Contractor and the Architect prior to installation.

O. Coordinate the color selection process of any sensor or device intended to be mounted on finished surfaces with the Architect prior to installation.

1.10 WARRANTY

A. The control system shall be guaranteed for a period of two years after final approval by the Owner. The guarantee shall be provided for a completely installed system, including all components, parts, and assemblies of the control system. The guarantee shall cover parts, materials, and labor to locate and correct any defects in materials or workmanship.

B. The Contractor shall initiate the warranty period by formally transmitting to the Owner commencement notification of the period for the system and devices accepted. The warranty period begins when these devices are formally accepted by the Owner (refer to ACCEPTANCE PROCEDURE below).

C. Contact information shall be provided for quick service engineering assistance concerning hardware and software problems. There shall be provisions made for getting manufacturer certified diagnostic and repair personnel on the scene quickly should the need arise. There shall also be a software expert familiar with the software of this machine who can be easily contacted.

D. This system shall be inspected by the control system Contractor for a four-hour period once each quarter during the warranty period to run diagnostic tests and also provide maintenance instructions to the operating personnel.

E. The control system Contractor shall give the Owner 24 hours prior notification of each maintenance trip during the contract guarantee period. In addition, the Contractor shall furnish the Owner and Engineer a written record of each maintenance trip, number of employees present, time involved and work accomplished.

F. Owner shall be able to make changes to database, when prior database is stored on disk in case of error in change, without affecting or voiding warranty.

1.11 MAINTENANCE

A. The control system Contractor shall provide and maintain on site working spare parts for the control system during the warranty period including DDC Controllers, power supplies, modules, sensors, floor level (subnet) devices, transformers, etc. The owner will be custodian of these spare parts and shall be authorized to utilize them in performing first level maintenance. The control contractor Contractor shall refurbish/replace spare parts in exchange for failed items.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 CONTROL SYSTEM

A. BAS and DDC Manufacturers:

1. **Schneider Electric.** Existing building utilizes the Schneider Electric building automation control and monitoring system. Contractor shall verify existing control system prior to bid. All new work must integrate seamlessly into existing Schneider Electric system, reusing existing hardware as feasible. All new components must be by Schneider Electric and installed by a Schneider Electric authorized controls contractor.

B. Control system shall consist of sensors, indicators, dampers, damper actuators, valves, valve actuators, final control elements, interface equipment, other apparatuses and 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.

C. Control system shall include the following:
1. Building clock control system specified in Division 27 Section "Clock Systems"
2. Building lighting control system specified in Division 26 Section "Network Lighting Controls"
3. Fire alarm system specified in Division 28 Section "Fire Detection and Alarm"
4. Interface to manufacturer-provided equipment controllers, specified in other Division 23 Sections.
5. Direct interface means to third-party controllers via DDC sub-LAN specified herein and/or LonTalk; as required by the installing contractor for a complete and operational system.
6. Proprietary “gateway products” as shown on control drawings to provide fully functional sub-system control/point monitoring.

2.3 BAS EQUIPMENT

A. Coordinate closely with Owner’s IT staff to ensure that the current user workstations meet all the necessary requirements to utilize all required control system software, access web-based control system, and perform all required operations.

1. BAS Application Software (at a minimum, the following shall be currently available or available when upgrade is complete):
   a. I/O capability from operator station.
   b. System security for each operator via software password and access levels.

c. Automatic system diagnostics; monitor system and report failures.
d. Field DDC database creation (editing) and support.
e. Automatic and manual database save and restore.
f. Automatic and manual database transfer to field panels.
g. Dynamic color graphic displays.
h. Up to 10 screen displays at once.
i. Custom graphics generation (editing) and graphics library of HVAC equipment and symbols.
j. Ability to print color graphic on a color printer.
k. DDC program creation (editing) and support.
l. Automatic and manual database save and restore.
m. Automatic and manual database transfer to field panels.
n. Time of Day Program (Scheduling).
o. Includes override scheduling and holiday scheduling.
p. Automatic and manual database save and restore.
q. Automatic and manual database transfer to field panels.
r. Alarm processing, messages, and reactions.
s. Trend logs retrievable in spreadsheets and database programs.
t. Alarm and event processing.
u. Alarms shall “break-though” and provide audible annunciation (may be turned off).
v. Object and property status and control.
w. Automatic restart of field equipment on restoration of power.
x. Data collection, reports, and logs.
y. Current values of all objects.
z. Current alarm summary.
aa. Disabled objects.
bb. Alarm lockout objects.
cc. Logs.
dd. Custom report development.
ee. Utility and weather reports.
ff. Workstation application editors for controllers and schedules.

2. Custom Application Software:
   a. English language oriented.
   b. Full-screen character editor/programming environment.
   c. Allow development of independently executing program modules with debugging/simulation capability.
   d. Support conditional statements.
   e. Support floating-point arithmetic with mathematic functions.
   f. Contains predefined time variables.

B. Direct Digital Control (DDC) Units: Modular, comprising processor board with programmable, nonvolatile, random-access memory; local operator access and display panel; integral interface equipment; and backup power source.
   1. Units monitor or control each I/O point; process information; execute commands from other control units, devices, and operator stations; and download from or upload to operator workstation or diagnostic terminal unit.
   2. Stand-alone mode control functions operate regardless of network status. Functions include the following:
      a. Global communications.
      b. Discrete/digital, analog, and pulse I/O.
      c. Monitoring, controlling, or addressing data points.
      d. Software applications, scheduling, and alarm processing.
      e. Testing and developing control algorithms without disrupting field hardware and controlled environment.
   3. Standard Application Programs:

a. Electric Control Programs: Demand limiting, duty cycling, automatic time scheduling, start/stop time optimization.
b. HVAC Control Programs: Night setback/setup, on-off control with differential sequencing, staggered start, equipment lead/lag sequencing, anti-short cycling control, PID control, DDC with fine loop tuning, optimal run time, supply air reset, static pressure reset, and dry bulb/enthalpy economizer.
c. Programming Application Features: Include trend point; alarm processing and messaging; weekly, monthly, and annual scheduling; energy calculations; run time totalization; and security access.
d. Remote communications.
e. Maintenance management.
f. Units of Measure: Inch-pound and SI (metric).

4. Local operator interface provides for download from or upload to operator workstation or diagnostic terminal unit.
5. Enclosure:
   a. Indoor - Dustproof rated for operation at 32- to 120-degrees F.
6. I/O Interface: Hardwired inputs and outputs may tie into system through controllers. Protect points so that shorting will cause no damage to controllers.
   a. Binary Inputs: Allow monitoring of on-off signals without external power.
   b. Pulse Accumulation Inputs: Accept up to 10 pulses per second.
   c. Analog Inputs: Allow monitoring of low-voltage (0- to 10-V dc), current (4- to 20-mA), or resistance signals.
   d. Binary Outputs: Provide on-off or pulsed low-voltage signal, selectable for normally open or normally closed operation.
   e. Analog Outputs: Provide modulating signal, either low voltage (0- to 10-V dc) or current (4- to 20-mA) or resistance (0- to 135-ohms).
   f. Tri-State Outputs: Provide two coordinated binary outputs for control of three-point, floating-type electronic actuators.
   g. Universal I/O's: Provide software selectable binary or analog outputs.
7. Power Supplies: Transformers with Class 2 current-limiting type or overcurrent protection; limit connected loads to 80 percent of rated capacity. DC power supply shall match output current and voltage requirements and be full-wave rectifier type with the following:
   a. Output ripple of 5.0 mV maximum peak-to-peak.
   b. Combined 1 percent line and load regulation with 100-microsecond response time for 50 percent load changes.
   c. Built-in overvoltage and overcurrent protection and be able to withstand 150 percent overload for at least 3 seconds without failure.
8. Power Line Filtering: Internal or external transient voltage and surge suppression for workstations or controllers with the following:
   a. Minimum dielectric strength of 1000-V.
   b. Maximum response time of 10 nanoseconds.
   c. Minimum transverse-mode noise attenuation of 65-dB.
   d. Minimum common-mode noise attenuation of 150-dB at 40- to 100-Hz.

2.4 LOCAL CONTROL UNITS

A. Modular, comprising processor board with electronically programmable, non-volatile, read-only memory; and backup power source.

B. Units monitor or control each I/O point, process information, and download from or upload to operator workstation or diagnostic terminal unit.

C. All other controller attributes match the DDC controller.

D. Stand-alone mode control functions operate regardless of network status. Functions include the following:

1. Global communications.
2. Discrete/digital, analog, and pulse I/O.
3. Monitoring, controlling, or addressing data points.

E. Local operator interface provides for download from or upload to operator workstation or diagnostic terminal unit.

F. Enclosure:

1. Indoor - Dustproof rated for operation at 32- to 120-degrees F.

2.5 UNITARY CONTROLLERS

A. Unitized, capable of stand-alone operation with sufficient memory to support its operating system, database, and programming requirements, and with sufficient I/O capacity for the application.

1. Configuration: Local keypad and display; diagnostic LEDs for power, communication, and processor; wiring termination to terminal strip or card connected with ribbon cable; memory with bios; and 72-hour battery backup.
2. I/O Interface: Hardwired inputs and outputs into system through controller
3. Operating System: Manage I/O communication to allow distributed controllers to share real and virtual object information and allow central monitoring and alarms. Perform scheduling with real-time clock.
4. Perform automatic controller diagnostics; monitor controller and report failures.
5. ASHRAE 135 Compliance: Communicate using read (execute and initiate) and write (execute and initiate) property services defined in ASHRAE 135. Reside on network using MS/TP data-link/physical layer protocol and have service communication port for connection to diagnostic terminal unit.
6. Enclosure:

a. Indoor - Dustproof rated for operation at 32- to 120-degrees F.
b. Outdoor - Weatherproof rated for operation at minus 10- to 150-degrees F.

B. Air Terminal Unit Equipment Controllers (TEC)

1. Variable Air Volume (VAV) and Constant Air Volume (CAV). CAV are indicated when minimum and maximum design cfms are scheduled the same.
2. Modular construction, comprising processor board with programmable, nonvolatile, random access memory; and integral interface equipment.
3. Units execute commands from DDC control units and download from or upload to diagnostic terminal unit.
4. Controllers shall operate in stand-alone mode and control functions operate regardless of LonWorks status. Functions include the following:

a. LonWorks communications
b. Discrete digital input/outputs and analog input/out
c. Hardware for sensing air flow from flow measuring device
d. Monitoring and controlling points
e. HVAC software application programs that are application specific (e.g. VAV) and alarm processing
f. Terminal port for program selection, addressing, air balance, and firmware updates.

5. Application Specific Programs:

    a. VAV and CAV air terminal control algorithms as needed to perform the sequences on the drawings.

6. Units of Measure: Inch-Pound
7. Remote communications to DDC Controllers.
8. I/O Interface: Hardwired inputs and outputs may tie into system through controllers. Protect points so that shorting will cause no damage to controllers.

    a. Binary Inputs: Allow monitoring of on-off signals without external power.
    b. Pulse Accumulation Inputs: Accept up to 10 pulses per second.
    c. Analog Inputs: Allow monitoring of low-voltage (0- to 10-V dc), current (4- to 20-mA), or resistance signals.
    d. Binary Outputs: Provide on-off or pulsed low-voltage signal, selectable for normally open or normally closed operation with three-position (on-off-auto) override switches and status lights.
    e. Analog Outputs: Provide modulating signal, low voltage (0- to 10-V dc) or current (4- to 20-mA); with status lights, two-position (auto-manual) switch, and manually adjustable potentiometer or selector switch.
    f. Tri-State Outputs: Provide two coordinated binary outputs for control of three-point, floating-type electronic actuators.
    g. Universal I/O's (optional as needed): Provide software selectable binary or analog outputs.
    h. Airflow probed connections for sensing airflow through terminal.

9. Power Supply: Class 2 transformers located in DDC Auxiliary Panel shall provide 24 VAC (current-limited) with fuse protection to TEC's.
10. Power Line Filtering: Transient voltage and surge suppression for controllers.
11. Enclosure:

    a. Indoor – Dust-proof rated for operation at 32- to 120-degrees F.

2.6 ALARM PANELS

A. Unitized cabinet with suitable brackets for wall or floor mounting. Fabricated 0.06-inch- thick, furniture-quality steel or extruded-aluminum alloy, totally enclosed, with hinged doors and keyed lock and with manufacturer's standard shop-painted finish. Provide common keying for all panels.

B. Indicating light for each alarm point, single horn, acknowledge switch, and test switch, mounted on hinged cover.

    1. Alarm Condition: Indicating light flashes and horn sounds.
    2. Acknowledge Switch: Horn is silent and indicating light is steady.
    3. Second Alarm: Horn sounds and indicating light is steady.
    4. Alarm Condition Cleared: System is reset and indicating light is extinguished.
    5. Contacts in alarm panel allow remote monitoring by independent alarm company.

2.7 ANALOG CONTROLLERS

A. Step Controllers: 6- or 10-stage type, with heavy-duty switching rated to handle loads and operated by electric motor.

B. Electric, Outdoor-Reset Controllers: Remote-bulb or bimetal rod-and-tube type, proportioning action with adjustable throttling range, adjustable setpoint, scale range minus 10- to 70-degrees F, and single- or double-pole contacts.

C. Electronic Controllers: Wheatstone-bridge-amplifier type, in steel enclosure with provision for remote-resistance readjustment. Identify adjustments on controllers, including proportional band and authority.

1. Single controllers can be integral with control motor if provided with accessible control readjustment potentiometer.

D. Fan Speed Controllers: Solid-state model providing field-adjustable proportional control of motor speed from maximum to minimum of 55 percent and on-off action below minimum fan speed. To bring motor up to minimum speed rapidly, controller shall briefly apply full voltage when starting motor. Equip with filtered circuit to eliminate radio interference.

2.8 TIME CLOCKS

A. Manufacturers:

1. ATC-Diversified Electronics.
2. Grasslin Controls Corporation.
3. Paragon Electric Co.
4. Precision Multiple Controls.
5. SSAC Inc.
6. TCS/Basys Controls.
7. Theben AG - Lumilite Control Technology.
8. Time Mark Corporation.

B. Seven-day, programming-switch timer with synchronous timing motor and seven-day dial; continuously charged, nickel-cadmium-battery-driven, eight-hour, power-failure carryover; multiple-switch trippers; minimum of two and maximum of eight signals per day with two normally open and two normally closed output contacts.

C. Solid-state, programmable time control with 8 separate programs each with up to 100 on-off operations; 1-second resolution; lithium battery backup; keyboard interface and manual override; individual on-off-auto switches for each program; 365-day calendar with 20 programmable holidays; choice of fail-safe operation for each program; system fault alarm; and communications package allowing networking of time controls and programming from PC.

2.9 ELECTRONIC SENSORS

A. DESCRIPTION

1. Vibration and corrosion resistant, for wall, immersion, or duct mounting as required.
2. All sensors provided with a guard or cover shall submit color samples to the Architect before ordering sensors.

B. ROOM TEMPERATURE, RELATIVE HUMIDITY, AND CARBON DIOXIDE SENSORS

1. Wiring requirement: Twisted, shielded-pair cable or pre-manufactured cables with terminations matched to the controller.

2. Room Sensor Cover Construction: Manufacturer's standard locking covers. Include the following with those listed above.

    a. Electronic display: LCD
    b. Housing: Metal or Plastic.
    c. Color: Submit color selection to Architect prior to ordering.
    d. Orientation: Vertical.
    e. Setpoint Adjustment: Exposed. Provide plus or minus 2.0-degrees F
    f. Setpoint Indication: Exposed.
    g. Pushbutton for override: Required.

3. Sensor Accuracy:

    a. Temperature: Plus or minus 0.5-degrees F at calibration point.
    b. Relative Humidity: Plus or minus 2% RH at calibration point.
    c. Carbon Dioxide: Plus or minus 50-ppm CO_2 at calibration point.

4. Sensor Range:

    a. Temperature: 32- to 104-degrees F
    b. Relative Humidity: 5- to 95-% RH.
    c. Carbon Dioxide: 0- to 2000-ppm

5. Room sensor accessories include the following:

    a. Insulating Base: For sensors located on exterior walls and cold surfaces.
    b. Guard: Locking, solid metal, ventilated.

C. THERMISTORS

1. Manufacturers:

    a. MINCO.
    b. MAMAC Systems.
    c. RDF Corporation.

2. Sensor type and accuracy:

    a. Negative temperature coefficient (NTC) sensor with 10K-ohms or less resistance.

3. Wiring requirement: Twisted, shielded-pair cable.
4. Accuracy: Plus or minus 0.5-degrees F at calibration point.
5. Wiring requirement: Twisted, shielded-pair cable.
6. Insertion Elements in Ducts: Single point, 8-inches or 18-inches long depending on width of duct; use where not affected by temperature stratification or where ducts are smaller than 9-sq. ft..
7. Averaging Elements in Ducts: 36- inches long, flexible; 72- inches long, flexible; or 18-inches long, rigid; use where prone to temperature stratification or where ducts are larger than 10-sq. ft..
8. Insertion Elements for Liquids: Brass well (for copper, brass, or plastic pipe) with minimum insertion length of 2-1/2-inches. Stainless steel well for ferrous pipe.
9. Outside Air Sensors: Watertight inlet fitting, shielded from direct sunlight.
10. Room Security Sensors: Stainless-steel cover plate with insulated back and security screws.

D. RTD AND TRANSMITTERS

1. Manufacturers:

   a. MINCO.
   b. MAMAC Systems.
   c. RDF Corporation.

2. Sensor element:

   a. Platinum.
   b. Nickel.

3. Accuracy: Plus or minus 0.5-degrees F at calibration point.
4. Wiring requirement: Twisted, shielded-pair cable.
5. Insertion Elements in Ducts: : Single point, 8-inches or 18-inches long depending on width of duct; use where not affected by temperature stratification or where ducts are smaller than 9-sq. ft..
6. Averaging Elements in Ducts: 36- inches long, flexible; 72- inches long, flexible; or 18-inches long, rigid; use where prone to temperature stratification or where ducts are larger than 9-sq. ft.; length as required.
7. Insertion Elements for Liquids: Brass well (for copper or brass pipe) with minimum insertion length of 2-1/2-inches. Stainless steel well for ferrous pipe.
8. Outside Air Sensors: Watertight, electrical inlet fitting; sensors are shielded from direct sunlight.
9. Room Security Sensors: Stainless-steel cover plate with insulated back and security screws.
10. Transmitter output shall be 4- to 20-mA, nominal 24-V dc. Output impedance must meet DDC input requirements.

E. HUMIDITY SENSORS

1. Manufacturers:

   a. General Electric. (General Eastern Instruments)
   b. MAMAC Systems.
   c. ROTRONIC Instrument Corp.
   d. TCS/Basys Controls.
   e. Vaisala.

2. Sensor: Bulk polymer sensor element
3. Accuracy: 2% RH with linear output.
4. Wiring requirement: Twisted, shielded-pair cable.
5. Duct Sensor Range: 5- to 95-% RH with element guard and mounting plate.
6. Outside Air Sensor Range: 5- to 95-% RH with mounting enclosure/sunshield, suitable for operation at outdoor temperatures of minus 22- to 185-degrees F**.**
7. Transmitter output shall be 4- to 20-mA, nominal 24-V dc. Output impedance must meet DDC input requirements.

F. PRESSURE TRANSMITTERS/TRANSDUCERS

1. Manufacturers:

   a. BEC Controls.
   b. General Electric. (General Eastern Instruments)

c. MAMAC Systems.
d. Rotronic Instrument Corp.
e. Setra Systems.
f. TCS/Basys Controls.
g. Vaisala.

2. Sensors: Appropriate sensing chamber for medium being sensed.
3. Wiring requirement: twisted, shielded-pair cable for wiring unless specified otherwise by the manufacturer.
4. Air Static Pressure Transmitter: Non-directional sensor with suitable range for expected input, and temperature compensated.

   a. Accuracy: 2-% full scale with repeatability of 0.5 percent.
   b. Output: 4- to 20-mA. Output impedance must meet input requirements.
   c. Building Static Pressure Range: Minus 0.05- to 0.05-inches wg.
   d. Duct Static Pressure Range: 0- to 2.5-inches wg.

5. Hydronic Pressure Transducers: Stainless steel diaphragm construction, suitable for service; minimum 150-psig operating pressure; linear output.

   a. Accuracy: 2-% FS scale reading with repeatability of 0.5-% FS
   b. Output: 4- to 20-mA, nominal 24-V dc. Output impedance must meet input requirements.
   c. Range: 0- to 60-psig.

6. Hydronic Differential Pressure Transducers: Stainless steel diaphragm construction, suitable for service; minimum 150-psig operating pressure and tested to 300-psig; linear output. Provide 3-valve manifold with instrument.

   a. Accuracy: 1-% FS overall accuracy: includes sensor accuracy, linearity, hysteresis, and non-repeatability.
   b. Output: 4- to 20-mA, nominal 24-V dc, loop- powered. Output impedance must meet DDC input requirements.
   c. Range: 0- to 60-psig.

7. Air Differential Pressure Switch: Snap acting, pilot-duty rated contact, and with suitable scale range and setting adjustment.

   a. SPDT or DPDT, dry contact style device
   b. Range: Adjustable from 1- to 10- inches wg
   c. Differential: Adjustable from 2-psig to 10-psig

8. Air Differential Pressure Switch: Snap acting, pilot-duty rated contact, and with suitable scale range and setting adjustment.

   a. SPDT or DPDT, dry contact style device
   b. Range: Adjustable from 1- to 10- inches wg (249- to 2490-Pa)
   c. Differential: Adjustable from 0.1- to 0.25-inches wg (25- to 62-Pa)

2.10 STATUS SENSORS AND DEVICES - ELECTRIC

A. Status Input for Fan: Differential pressure switch with pilot-duty rated contacts and adjustable range of 0- to 5-inch wg.

1. Manufacturers:

    a. Cleveland Controls.

B. Status Input for Pump: Liquid differential pressure switch with pilot-duty rated contacts and adjustable pressure range of 20- to 60-psigand differential pressure range of 5- to 30-psig, SPDT contacts pilot-duty rated or for application, ¼" female NPT pipe connections.

1. Manufacturers:

    a. United Electric Controls.

C. Sensing Inputs for Electric Motors:

1. Manufacturers:

    a. American Aerospace Controls.

2. Current Transformer/Transmitter: Comply with ISA 50.00.01, current-sensing, fixed- or split-core transformers with self-powered transmitter, adjustable and suitable for 175 percent of rated motor current and 1 percent full-scale accuracy, for AC or DC applications.
3. Voltage Transformer/Transmitter (100- to 600-V AC): Comply with ISA 50.00.01, single-loop, self-powered transmitter, adjustable, with suitable range and 1 percent full-scale accuracy, for AC or DC applications.
4. Power Monitor: 3-phase type with disconnect/shorting switch assembly, listed voltage and current transformers, with pulse kilowatt hour output and 4- to 20-mA kW output, with maximum 2 percent error at 1.0 power factor and 2.5 percent error at 0.5 power factor, for AC and DC applications.

D. Current Switch: Self-powered, current-sensing, split-core, solid-state devices with adjustable trip current and indicating LED, selected to match motor current and DDC input requirements.

1. Manufacturers:

    a. Nielsen-Kuljian.
    b. Veris Industries.

E. Electronic Valve/Damper Position Indicator: Visual scale indicating percent of travel and 2- to 10-V dc, feedback signal.

1. Manufacturer's

    a. DDC equipment manufacturer's recommended product

F. Water Flow Switch: Bellows-actuated mercury or snap-acting type with pilot-duty rating, stainless-steel or bronze paddle, with appropriate range and differential adjustment, in NEMA 250, Type 1 enclosure.

1. Manufacturers:

    a. Xylem.
    b. I.T.M. Instruments.

G. Liquid Leak Detectors

1. Liquid detectors shall utilize microchip technology for detection of conductive liquids through one of the following types of sensors: gold-plated probes, self-adhesive sensor tape with copper electrodes and durable cotton cover, or rope type sensor. Detectors shall be selected based on the best use for the application. Power requirement shall be 11-27 VAC or VDC and have a green LED normal operation indicator. Unit shall have a SPDT pilot duty low voltage alarm contact. Unit shall be waterproof and rustproof. A red LED shall indicate the presence of liquid. Unit shall have an adjustable setpoint.
2. Approved Manufacturers:

    a. R. E. Technologies.
    b. Dorlen Products. (Water Alert)

H. Control Relay: Monitors or controls AC or DC motors or other equipment (as required), with cover, with visual indicator when energized, and two SPDT contacts rated 120/250 VAC at 8 Amps.

1. Manufacturers:

    a. Dayton.
    b. Omron.
    c. Functional Devices.

I. Damper End Switch (limit switch): Fully encapsulated, mercury-type, damper end switch with two contacts per switch; one for interlock wiring and one for DDC input.

1. Manufacturers:

    a. KELE Controls part number TS-470-2.

2.11 OCCUPANCY, DAYLIGHTING, AND PHOTO-ELECTRIC SENSORS

A. Refer to Division 26 Section "Lighting Control Devices" for equipment that relates to this Section.

2.12 DUCT-MOUNTED AIRFLOW STATION

A. Manufacturers:

1. Air Monitor Corporation.
2. Dietrich-Standard.

B. Combination of air straightener and multiport, self-averaging, Pitot-tube station and/or airflow measuring arrays.

C. Casing: Galvanized-steel frame.

D. Flow Straightener: Aluminum honeycomb, 3/4-inch parallel cell, 3 inches deep.

E. Sensing Manifold: Copper manifold with bullet-nosed static pressure sensors positioned on equal area basis.

2.13 FLOW METERS

A. Liquid Differential Pressure Transducers: (flow only)

1. Manufacturers:

   a. Tobar.
   b. ITT Barton.
   c. Dietrich – Standard.
   d. ABB.
   e. Siemens.
   f. Rosemont/Fischer.
   g. Honeywell.

2. Each differential pressure transducer shall be selected and calibrated for operations between 0- and 125-% of the normal differential pressure and up to 150-psig line pressure. The calibration point shall be rounded upward to the nearest 10-inches wg (for spans less than 200-inches wg) or to the nearest 5-psig for larger spans. Calibration date shall be included on an embossed tag attached to each transmitter.
3. The accuracy, including linearity, hysteresis and repeatability, of the transducer for measuring differential pressure shall be better than 0.25-% of the span stated above throughout a minimum of a 6:1 turndown. Turndown ratio shall be based on the actual flow span.
4. The transducer shall not be damaged by pressures of up to 500-psig on either side of the transducer and all wetted parts shall be inert in the presence of up to 50-% concentration of ethylene or propylene glycol in water.
5. Provide a drain valve for each side of the pressure chamber. Furnish and install mounting brackets appropriate for the installation location.
6. Span and zero shall be individually adjustable.
7. Shall be 2-wire and 4- to 20-mA output.

B. Liquid Differential Pressure Transducers: (pressure only)

1. Manufacturers:

   a. Tobar.
   b. ITT Barton.
   c. Dietrich – Standard.
   d. ABB.
   e. Siemens.

2. Each differential pressure transducer shall be selected and calibrated for operations between 0- and 200-% of the normal differential pressure. The calibration point shall be rounded upward to the nearest 10-inches wg (for spans less than 200-inches wg) or to the nearest 5-psig for larger spans. Calibration date shall be included on an embossed tag attached to each transducer.
3. The accuracy, including linearity, hysteresis and repeatability, of the transducer for measuring differential pressure shall be better than 2-% of the span stated above throughout a minimum of a 4:1 turndown. Turndown ratio shall be based on the actual differential span.
4. The transducer shall not be damaged by pressures of up to 500-psig on either side of the transducer and all wetted parts shall be inert in the presence of up to 50-% concentration of ethylene or propylene glycol in water.
5. Provide a drain valve for each side of the pressure chamber. Furnish and install mounting brackets appropriate for the installation location.

6. Span and zero shall be individually adjustable.
7. Shall be 2-wire and 4- to 20-mA output.

C. Indication Gauges for Liquid Pressure Transducers:

1. Manufacturers:

   a. Beckman.
   b. Moore.
   c. Testoterm.
   d. Dwyer.

2. Each transducer shall come with an indicating gauge that reads in GPM for flow measurement or inches water column (in. wg) for pressure sensing. The gauge shall be analog differential pressure type piped in parallel to the transducer.
3. The analog pressure gauge shall be selected and calibrated for the same span as the transducer it serves.
4. The accuracy, including linearity, hysteresis and repeatability, of the gauge for measuring differential pressure shall be better than 3% of the span stated above throughout its span. Calibration data shall be included on an embossed tag attached to each gauge.
5. The gauge shall not be damaged by pressures of up to 500-psig on either side of the gauge and all wetted parts shall be inert in the presence of up to 50-% concentration of ethylene or propylene glycol in water.
6. Scale shall be a minimum of 4.5-inches long. Furnish and install two bleed fittings for each gauge and mounting brackets appropriate for the installation location.
7. Gauges shall be field mounted. Provide a phenolic identification tag for each gauge and indicator.

D. Liquid Flow Sensors: (differential pressure type)

1. Manufacturers:

   a. Preso.
   b. Gerand.
   c. Dietrich-Standard (Annubar Diamond II).

2. Unidirectional sensors shall be of the venturi-type or velocity pressure type. They shall be constructed of stainless steel, sized to the system's range of flow, and have an accuracy of 0.5-%.
3. Bi-directional sensors shall be of the velocity pressure type. They shall be constructed of stainless steel, sized to the system's range of flow, and have an accuracy of 0.5-%.

E. Three Valve Manifold for Liquid Pressure Transducers:

1. Manufacturers:

   a. D/A Manufacturing.

2. Provide a three-valve manifold for each transducer. Pressures of up to 500-psig shall not damage the manifold. All wetted parts shall be inert in the presence of up to a 50% concentration of ethylene or propylene glycol in water.
3. The manifold shall be designed for direct mounting on the transducer it serves and utilizes two quarter-turn valves to provide zeroing, blocking and normal service modes.

F. Liquid Flow Meters: (Electro-Magnetic Type)

1. Manufacturers (Water):

   a. ABB .
   b. Siemens.
   c. EMCO.
   d. Rosemount.
   e. Krohne.

2. The meter system shall consist of a primary flow sensor and transmitter. The flow sensor shall be equipped with 150-lb. flanges. The meter system shall be installed with all necessary grounding components and gaskets per manufacturer's instructions. The meter shall be capable of bi-directional operation. The meter shall be sized appropriately for the range of flow for the system. The electrodes shall be stainless steel or Hasteloy C. The transmitter shall be provided with a remote mounting bracket, cable, integral LCD display, NEMA 4X housing, and shall indicate flow rate, totalize flow, and shall have an isolated 2-wire 4-20 mA linear output signal and a pulsed output signal for totalization. The transmitter shall be capable of being field calibrated and reprogrammed from the outside housing via magnetic probe or integral keypad menu switching. Unit electronics shall have noise immunity. The primary flow sensor and transmitter shall be mounted in accessible locations. Unit shall have the capability to maintain flow total in non-volatile memory. The flow meter shall be provided with a 1-year warranty and application non-degraded performance guarantee. The flow meter and transmitter as a unit shall have the following minimum characteristics:

   a. Flow meter Liner:
   b. Heating hot water, domestic hot water, and other water systems operating at or above 110-degrees F: Teflon
   c. Chilled water, domestic cold water, and other water systems operating below 110-degrees F: Polyurethane
   d. Accuracy:
   e. At 1- to 33-feet per second velocity: plus or minus 0.5-% of rate.
   f. At 0.3-feet per second velocity: ±2% of rate.
   g. Each unit shall be factory calibrated for the specified flow and shall be calibrated in both directions if the application is bi-directional. Calibration shall be a minimum of three point. Specific performance test data shall be furnished with the meter.
   h. Each meter shall provide two analog 4- to 20-mA signals or a single 4-to 20-mA signal and a digital contact closure on reverse flow.

3. Provide a phenolic tag for each transmitter to identify service and meter ID number (i.e. CHILLED WATER FLOW, FM-1, etc.).

2.14 THERMOSTATS

A. Manufacturers:

   1. Erie Controls.
   2. Danfoss Inc.
   3. Heat-Timer Corporation.
   4. Sauter Controls Corporation.
   5. Tekmar Control Systems.
   6. Theben AG - Lumilite Control Technology.

B. Combination Thermostat and Fan Switches: Line-voltage thermostat with push-button or lever-operated fan switch.

1. Label switches "FAN ON-OFF" or "FAN HIGH-LOW-OFF" or "FAN HIGH-MED-LOW-OFF".
2. Mount on single electric switch box.

C. Electric, solid-state, microcomputer-based room thermostat with remote sensor.

1. Automatic switching from heating to cooling
2. Preferential rate control to minimize overshoot and deviation from setpoint
3. Capable of providing four separate temperatures per day
4. Instant override of setpoint for continuous or timed period from 1 hour to 31 days.
5. Short-cycle protection.
6. Programming based on every day of week.
7. Selection features include degree F or degree C display**,** 12- or 24-hour clock, keyboard disable, remote sensor, and fan on-auto.
8. Battery replacement without program loss.
9. Thermostat display features include the following:

    a. Time of the day
    b. Actual room temperature
    c. Programmed temperature setpoints
    d. Programmed time for occupied/unoccupied
    e. Duration of timed override
    f. Day of week
    g. System mode indications include "heating," "off," "fan auto," and "fan on."

D. Low-Voltage, On-Off Thermostats: NEMA DC 3, 24-V, bimetal-operated, mercury-switch type, with adjustable or fixed anticipation heater, concealed setpoint adjustment, 55- to 85-degrees F setpoint range, and 2-degrees F maximum differential.

E. 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 setpoint adjustment, 55- to 85-degrees F setpoint range, and 2-degrees F maximum differential.

1. Electric Heating Thermostats: Equip with off position on dial wired to break ungrounded conductors.
2. Selector Switch: Integral, manual, On-Off-Auto.

F. 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.

1. Bulbs in water lines with separate wells of same material as bulb.
2. Bulbs in air ducts with flanges and shields.
3. Averaging Elements: Copper tubing with either single- or multiple-unit elements, extended to cover full width of duct or unit; adequately supported.
4. Scale settings and differential settings are clearly visible and adjustable from front of instrument.
5. On-Off Thermostat: With precision snap switches and with electrical ratings required by application.
6. Modulating Thermostats: Construct so complete potentiometer coil and wiper assembly is removable for inspection or replacement without disturbing calibration of instrument.

G. Fire-Protection Thermostats: Listed and labeled by an nationally recognized testing laboratory (NRTL) acceptable to authority's having jurisdiction; with fixed or adjustable settings to operate at not less than 75-degrees F above normal maximum operating temperature, and the following:

1. Reset: Manual only
2. Reset: Automatic, with control circuit arranged to require manual reset at central control panel; with pilot light and reset switch on panel labeled to indicate operation.

H. Immersion Thermostat: Remote-bulb or bimetal rod-and-tube type, proportioning action with adjustable throttling range and adjustable setpoint.

I. Airstream Thermostats: Two-pipe, fully proportional, single-temperature type; with adjustable setpoint in middle of range, adjustable throttling range, plug-in test fitting or permanent pressure gage, remote bulb, bimetal rod and tube, or averaging element.

J. Electric, Low-Limit, Duct Thermostat (Freezestat): Snap-acting, single-pole, single-throw, manual-reset-only switch, that trips when the air temperature sensed across any 12-inches of capillary length is equal to or below setpoint, concealed setpoint adjustment for low and high setting, and provides 15- to 55-degrees F setpoint range and fixed differential.

1. Bulb Length: Minimum 20-feet.
2. Quantity: One thermostat for every 20-sq. ft. of coil surface.

K. Electric, High-Limit Duct Thermostat: Snap-acting, single-pole, single-throw, manual- or automatic- reset switch that trips if temperature sensed across any 12-inches of bulb length is equal to or above setpoint.

1. Bulb Length: Minimum 20-feet.
2. Quantity: One thermostat for every 20-sq. ft. of coil surface.

L. Heating/Cooling Valve-Top Thermostats: Proportional acting for proportional flow, with molded-rubber diaphragm, remote-bulb liquid-filled element, direct and reverse acting at minimum shutoff pressure of 25-psig, and cast housing with position indicator and adjusting knob.

2.15 ACTUATORS

A. Electric Motors: Size to operate with sufficient reserve power to provide smooth modulating action or two-position action.

1. Comply with requirements in Division 23 Section "Common Motor Requirements for HVAC Equipment."
2. Motor characteristics such as NEMA designation, temperature rating, service factor, enclosure type, and efficiency are specified in Division 23 Section "Common Motor Requirements for HVAC Equipment." If different characteristics are required, insert additional subparagraphs below to suit Project.
3. Permanent Split-Capacitor or Shaded-Pole Type: Gear trains completely oil immersed and sealed. Equip spring-return motors with integral spiral-spring mechanism in housings designed for easy removal for service or adjustment of limit switches, auxiliary switches, or feedback potentiometer.
4. Non-spring Return motors for valves larger than NPS 2-1/2: Size for running torque of 150-in. x lbf. and breakaway torque of 300-in. x lbf..
5. Spring-Return motors for valves larger than NPS 2-1/2: Size for running and breakaway torque of 150-in. x lbf..
6. Non-spring Return motors for dampers larger than 25 Sq. Ft.: Size for running torque of 150-in. x lbf. and breakaway torque of 300-in. x lbf..
7. Spring-Return motors for dampers larger than 25-Sq. Ft.: Size for running and breakaway torque of 150-in. x lbf..

B. Electronic Actuators: Direct-coupled type designed for minimum 60,000 full-stroke cycles at rated torque.

1. Manufacturers:

   a. Belimo Aircontrols (USA).

2. Valves: Size for torque required for valve close off at maximum pump differential pressure.
3. Dampers: Size for running torque calculated as follows:

   a. Parallel-Blade Damper with Edge Seals: 7-inch-lb/sq. ft. of damper cross-sectional area.
   b. Opposed-Blade Damper with Edge Seals: 5-inch-lb/sq. ft. of damper cross-sectional area.
   c. Parallel-Blade Damper without Edge Seals: 4-inch-lb/sq. ft. of damper cross-sectional area.
   d. Opposed-Blade Damper without Edge Seals: 3-inch-lb/sq. ft. of damper cross-sectional area.
   e. Dampers with 2- to 3-inches wg of Pressure Drop or Face Velocities of 1000- to 2500-fpm: Increase running torque by 1.5.
   f. Dampers with 3- to 4-inches wg of Pressure Drop or Face Velocities of 2500- to 3000-fpm: Increase running torque by 2.0.

4. Coupling: V-bolt and V-shaped, toothed cradle.
5. Overload Protection: Electronic overload or digital rotation-sensing circuitry.
6. Fail-Safe Operation: Mechanical, spring-return mechanism. Provide external, manual, gear release on non-spring-return actuators.
7. Manual Operation: Provided for all valve actuators.
8. Power Requirements (Two-Position Spring Return): 24-V ac.
9. Power Requirements (Modulating): Maximum 10 VA at 24-V ac or 8 W at 24-V dc.
10. Proportional Signal: 2- to 10-V dc or 4 to 20 mA, and 2- to 10-V dc position feedback signal.
11. Temperature Rating: Minus 22- to 122-degrees F.
12. Run Time:
    a. Dampers: 12 seconds.
    b. Valves: 30 seconds.

2.16 CONTROL VALVES

A. Manufacturers (unless noted otherwise below):

1. Erie Controls.
2. TAC Inc. (Schneider Electric).
3. Magnatrol Valve Corporation.
4. Neles-Jamesbury.

B. Control Valves - General:

1. Factory fabricated, of type, body material, and pressure class based on maximum pressure and temperature rating of piping system, unless otherwise indicated.

C. Control Valve Piping –General:

1. Brass- and bronze-body valves shall be piped with copper/brass/bronze pipe using copper/brass/bronze piping fittings. When piping connects to ferrous piping connections, dielectrics must be used.
2. Steel- and iron-body control valves shall be piped with ferrous piping using ferrous pipe fittings. When piping connects to non-ferrous piping connections, dielectrics must be used.

D. Standard valves are also available for Class 250, 250 psig and up to 350 F operating conditions. Coordinate with mechanical system engineer.

E. Hydronic Globe Control Valves shall have the following characteristics:

1. NPS 2 and Smaller: Class 125 bronze body, bronze trim, rising stem, renewable composition disc, screwed ends, with back-seating capacity, and repackable under pressure.
2. NPS 2-1/2 and Larger: Class 125 iron body, bronze trim, rising stem, plug-type disc, flanged ends, and renewable seat and disc.
3. Internal Construction: Replaceable plugs and stainless steel or brass seats.

    a. Single-Seated Valves: Cage trim provides seating and guiding surfaces for plug on top and bottom.
    b. Double-Seated Valves: Balanced plug; cage trim provides seating and guiding surfaces for plugs on top and bottom.
4. Sizing: 3-psig maximum pressure drop at design flow rate or the following:

    a. Two-Position: Line size or one size smaller.
    b. Two-Way Modulating: Either the value specified above or twice the load pressure drop, whichever is more.
    c. Three-Way Modulating: Twice the load pressure drop, but not more than value specified above.

5. Flow Characteristics: Two-way valves shall have equal percentage characteristics; three-way valves shall have linear characteristics.
6. Close-Off (Differential) Pressure Rating: Combination of actuator and trim shall provide minimum close-off pressure rating of 150 percent of total system (pump) head for two-way valves and 100 percent of pressure differential across valve or 100 percent of total system (pump) head.

F. Butterfly Control Valves shall have the following characteristics:

1. Manufacturers:

    a. DeZurik.
    b. Keystone.
    c. Centerline (Crane).

2. Rating: 150-psig maximum pressure differential, ASTM A 126 cast-iron or ASTM A 536 ductile-iron body and bonnet, extended neck, stainless-steel stem, field-replaceable EPDM or Buna N sleeve and stem seals.
3. Butterfly valves are acceptable for piping or equipment isolation use. For modulating service, do not allow the valve to go over 60% open under control to the load.
4. Body Style: Lug.
5. Disc Type: Aluminum-bronze.
6. Sizing: 3-psig maximum pressure drop at design flow rate or the following:

    a. Two-Position (isolation): 1-psig or less at design flow rate.

b. Two-Way Modulating: Either the value specified above or twice the load water pressure drop, whichever is more.
c. Three-Way Modulating: Twice the load water pressure drop, but not more than value specified above.

G. Terminal Unit Control Valves shall have the following characteristics:

1. Rating: NPS 2 and smaller, bronze body, bronze trim, rising stem, two or three ports as indicated, renewable composition disc, sweat and threaded ends, with back-seating capacity, and repackable under pressure.
2. Class 125 for service at 125-psig and 250-degrees F operating conditions.
3. Sizing: 3-psig maximum pressure drop at design flow rate for hydronic valves and able to close against pump shutoff head.
4. Flow Characteristics:

a. Hydronic Valves: Two-way valves shall have equal percentage characteristics; three-way valves shall have linear characteristics.

H. Pressure-Independent Characterized Control Valves (PICCV) shall have the following characteristics:

1. Manufacturers:

a. Belimo.

2. NPS 1-1/4 and Smaller: Pressure rated at 400-psig body; 200-psig close-off pressure.
3. Internal Construction: Internal construction: chrome plated brass ball and stem (stainless steel stem also acceptable), characterizing disc shall be brass or Tefzel and replaceable, diaphragm for small valves shall be Nomex or silicone, for larger valves polyester-reinforced silicone. End fittings shall be threaded (female NPT).
4. Service: Chilled or heating hot water and glycol (up to 60% solution).
5. Rating: Class 125 for service at 125-psig and 250-degrees F operating conditions.
6. Sizing: 3-psig maximum pressure drop at design flow rate, to close against pump shutoff head.
7. Flow Characteristics: Two-way valves shall have equal percentage characteristics; three-way valves shall have linear characteristics.
8. Provide spring-return actuators where noted on drawings or in schedules.

I. Characterized Ball Valves shall have the following characteristics:

1. Manufacturers:

a. Johnson Controls.
b. Siemens Building Technologies.
c. Honeywell International.

2. Service: Chilled water or heating hot water. Full port ball valves shall be used only for pipe isolation service. Modulating service valves shall be characterized port valves.
3. Internal construction: chrome or stainless steel-plated brass ball with stainless steel stem and trim, characterizing disc shall be plastic and replaceable.
4. Rating: Class 125 for service at 125-psig and 250-degrees F operating conditions.
5. Sizing: 3-psig maximum pressure drop at design flow rate; close off pressure no less than 130 psig.
6. Flow Characteristics: Two-way valves shall have equal percentage characteristics; three-way valves shall have linear characteristics.

7. Provide spring-return actuators where noted on drawings or in schedules.

2.17 DAMPERS

A. Manufacturers:

1. American Warming and Ventilating.
2. Mestek.
3. TAMCO.
4. United Enertech Corp.

B. Dampers: AMCA-rated, parallel or opposed-blade per the design requirements; 0.108-inch-minimum thickness, galvanized-steel or 0.125-inch- minimum 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 or nylon 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 200-degrees F.
3. Edge Seals, Standard Pressure Applications: Closed-cell neoprene or silicone.
4. Edge Seals, Low-Leakage Applications: Use inflatable blade edging or replaceable rubber blade seals.
5. Jamb Seals: spring-loaded, stainless steel, only.
6. Leakage ratings or dampers shall be less than 10 cfm per sq. ft. of damper area, at differential pressure of 4-inches 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 a commercial power supply is available to control units and operator workstation.

B. Verify that emergency power supply is available to control units and operator workstation if required for project.

C. Verify that the UPS is rated for the controller power needs and has been provided.

3.2 INSTALLATION

A. Install software and/or custom programming in DDC 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. Install DDC controller panels in locations noted on plans or coordinate with Architect. Coordinate with Electrical Contractor for power.

D. Install DDC temperature control instruments and devices on all controlled equipment per control plans and provide supply air and control branch air piping as required for a complete installation.

E. DDC control system wiring in conduit, J-hooks, or installed in bridle rings (when allowed) shall:

1. Run conduit runs along building and steel sight-lines (not diagonal or where support is improper).
2. Support all conduit with independent hangers, not from ductwork/piping or from ductwork/piping hangers/trays/supports/Unistrut; and independent of other trade's work.
3. Anchor J-hooks to walls or suspend J-hooks using 1/4-inch minimum diameter threaded rod hangers. Do not support J-hooks from ceiling or equipment hangers. J-hooks shall not impede removal of accessible ceiling tiles.

F. Control wiring in conduit shall:

1. Run conduit runs along building and steel sight lines (not diagonal or where support is not proper).

G. Install temperature control panels in locations noted on plans or coordinate with Architect. Coordinate with Electrical Contractor for power.

H. Install temperature control instruments and devices on all controlled equipment per control plans and provide supply air and control branch air piping as required for a complete installation.

I. Verify location of thermostats, humidistats, and other exposed control sensors with Drawings and room details before installation. Installation height of devices

1. Install averaging elements in ducts and plenums in crossing or zigzag pattern.

J. Install guards on thermostats in the following locations:

1. Building Entrances.
2. Public areas and restrooms.
3. Where indicated on drawings.

K. Install Pressure-Independent Characterized Control Valves (PICCV) to modulate flow through each chilled water coil and hot water coil at each air handling unit.

L. Furnish automatic dampers according to Division 23, Section 23 33 00 "Air Duct Accessories" to installing contractor for installation.

M. Install damper motors on outside of ductwork in warm areas, not in locations exposed to outdoor temperatures.

N. Install labels and nameplates to identify control components according to Division 20, Section 20 05 53 "Mechanical Identification".

O. Furnish hydronic instrument wells, valves, and other accessories according to Division 23, Section 23 21 13 "Hydronic Piping". Provide to installing contractor for installation.

P. Install hydronic and/or gas flow meters and accessories according to this specification and per locations shown on the plans.

Q. Install refrigerant instrument wells, valves, and other accessories according to Division 23, Section 23 23 00 "Refrigerant Piping".

R. Install electronic and fiber-optic cables according to Division 27 Section "Communications Horizontal Cabling."

3.3 ELECTRICAL WIRING AND CONNECTION INSTALLATION

A. Install raceways, boxes, and cabinets according to Division 26 Section "Raceway and Boxes for Electrical Systems."

B. Install building wire and cable according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

C. Route conduit and plenum cables along building and steel lines (not diagonal) and do not hang conduit or bridle rings from ductwork and piping or their support means

D. Install signal and communication cable according to Division 27 Section "Communications Horizontal Cabling."

1. Conceal cable, except in mechanical rooms and areas where other conduit and piping are exposed.
2. Install exposed cable in raceway.
3. Install concealed cable in raceway.
4. Bundle and harness multi-conductor instrument cable in place of single cables where several cables follow a common path.
5. Fasten flexible conductors, bridging cabinets and doors, along hinge side; protect against abrasion. Tie and support conductors.
6. Number-code or color-code conductors for future identification and service of control system, except local individual room control cables.
7. Install wire and cable with sufficient slack and flexible connections to allow for vibration of piping and equipment.

E. Connect manual-reset limit controls independent of manual-control switch positions. Automatic duct heater resets may be connected in interlock circuit of power controllers.

F. Connect hand-off-auto selector switches to override automatic interlock controls when switch is in hand position.

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect test, and adjust field-assembled components and equipment installation, including connections , and to assist in field testing and commissioning. Report results in writing.

B. Perform the following field tests and inspections and prepare test reports:

1. Operational Test: After electrical circuitry has been energized, start units to confirm proper unit operation. Remove and replace malfunctioning units and retest.
2. Test and adjust controls and safeties.
3. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.

4. Test calibration of electronic controllers by disconnecting input sensors and stimulating operation with compatible signal generator.
5. Test each point through its full operating range to verify that safety and operating control setpoints are as required.
6. Test each control loop to verify stable mode of operation and compliance with sequence of operation. Adjust PID actions.
7. Test each system for compliance with sequence of operation.
8. Test software and hardware interlocks.

C. DDC Verification:

1. Verify that instruments are installed before calibration, testing, and loop or leak checks.
2. Check instruments for proper location and accessibility.
3. Check instrument installation for direction of flow, elevation, orientation, insertion depth, and other applicable considerations.
4. Check that insertion instruments are located in the correct section of piping.
5. Check instrument piping for proper fittings, slope, material, and support.
6. Check water flow instruments. Inspect tag number and line and bore size, verify that upstream/downstream dimensions are per manufacturer's requirements, and that instruments are installed correctly.
7. Check airflow instruments. Inspect tag number and ductwork size, verify that upstream/downstream dimensions are per manufacturer's requirements, and that instruments are installed correctly.
8. Check temperature instruments, material, and length of sensing elements.
9. Check control dampers/valves. Verify that proper blade alignment, either parallel or opposed, has been provided. Verify that valves are installed in the correct direction.
10. Check electric-operated dampers/valves. Verify that proper blade alignment, either parallel or opposed, has been provided. Verify that valves are installed in the correct direction. Verify end switches and/or feedback devices are installed properly.
11. Check DDC system as follows:

    1) Verify that DDC controller power supply is from emergency power supply, if applicable.
    2) Verify that wires at control panels are tagged with their service designation and approved tagging system.
    3) Verify that spare I/O capacity has been provided.
    4) Verify that DDC controllers are protected from power supply surges.

D. Replace damaged or malfunctioning controls and equipment and repeat testing procedures.

3.5 ADJUSTING

A. Calibrating and Adjusting:

1. Calibrate installed devices and instruments, whether electric or pneumatic.
2. Make three-point calibration test for both linearity and accuracy for each analog instrument.
3. Calibrate equipment and procedures using manufacturer's written recommendations and instruction manuals. Use test equipment with accuracy at least double that of instrument being calibrated.
4. Control System Inputs and Outputs:

    a. Check analog inputs at 0, 50, and 100 percent of span.
    b. Check analog outputs using milli-ampere meter at 0, 50, and 100 percent output.
    c. Check digital inputs using jumper wire.

d. Check digital outputs using ohmmeter to test for contact making or breaking.
e. Check resistance temperature inputs at 0, 50, and 100 percent of span using a precision-resistant source.

5. Flow:

a. Set differential pressure flow transmitters for 0 and 100 percent values with 3-point calibration accomplished at 50, 90, and 100 percent of span.
b. Manually operate flow switches to verify that they make or break contact.

6. Temperature:

a. Calibrate resistance temperature transmitters at 0, 50, and 100 percent of span using a precision-resistance source.
b. Calibrate temperature switches to make or break contacts.

7. Stroke and adjust control valves and dampers without positioners, following the manufacturer's recommended procedure, so that valve or damper is 100 percent open and closed.
8. Stroke and adjust control valves and dampers with positioners, following manufacturer's recommended procedure, so that valve and damper is 0, 50, and 100 percent closed.
9. Provide diagnostic and test instruments for calibration and adjustment of system.
10. Provide written description of procedures and equipment for calibrating each type of instrument. Submit procedures review and approval before initiating startup procedures.

B. Adjust initial temperature, CO, CO_2, static pressure, humidity, etc., set points.

3.6 GRAPHIC DISPLAY GENERATION

A. Provide the following graphic displays as a minimum at the operator workstations, arranged in logical penetration paths:

1. Overall campus layout which shows all of the buildings on the Owner's campus.
2. Individual building layout or isometric for each building connected to the system.
3. Floor plans for each floor within each building, with display of present values of space conditions sensed by connected space sensors, display of the name of the air handler associated with each space sensor, display of the room number in which the sensor is located and color coding to indicate whether the sensed space condition is within the acceptable range, is too high, or is too low. TC Contractor shall confirm Owner desired room names prior to graphics generation which may differ from the room names indicated on construction documents.

4. Schematic diagram for each HVAC system. Each system schematic display shall include at least the following:

a. Schematic arrangement of ductwork, fans, dampers, coils, valves, piping, pumps, equipment etc.
b. System name.
c. Area served.
d. Present value or status of all inputs, along with present setpoint.
e. Present percent open for each damper, valve, etc. based on commanded position.
f. Reset schedule parameters for all points, where applicable.
g. Present occupancy mode.
h. Present economizer mode, where applicable.

i. Present outside air temperature.
j. Associated space conditions and setpoints, where applicable.
k. Status of application programs (e.g., warm-up, night cycle, duty cycle, etc.).
l. Color coding to indicate normal and abnormal values, alarms, etc.

5. Manual override capability for each on/off or open/closed controlled digital output (for fans, pumps, 2-position dampers and valves, etc.) and each modulating analog output (for dampers, valves, VFD speed modulation type points, etc) shall be provided. Graphic display of output point auto or manual override status shall be provided.

6. Sequence of operation in written (text) format for each HVAC system.
7. Overall BAS system schematic.
8. System management graphic for each network device and/or DDC panel.
9. Provide a separate page for critical alarm summary.

B. Contractor to provide graphics that are fully operational prior to commissioning.

3.7 OWNER TRAINING

A. Engage a factory-authorized service representative to train Owner's maintenance personnel on how to operate, maintain, and adjust HVAC instrumentation and controls.

1. Training shall be provided for a period of 40 hours in 4-hour increments; to be scheduled with the Owner’s representative at least 2-weeks in advance.
2. Provide all training materials needed for a complete training session including but not limited to Operation and Maintenance Manuals, product catalogs, and “record drawings” of the controls installation.
3. Training shall be a combination of classroom (printed material and electronic presentations) and mechanical room (hands-on) instruction.

B. Refer to Division 01 Section "Demonstration and Training."

3.8 ACCEPTANCE PROCEDURE

A. SUBMITTALS data relevant to point index, functions limits, sequences, interlocks, power fail/restarts, logs, software routines and associated parameters, and other pertinent information for the operating system and database shall be forwarded from the control system contractor to the Owner.

B. Approved database will be entered into the central computer, debugged, and down line loaded to Controllers. Prior to on-line operation, a complete demonstration and readout of the computer command shall be performed in the presence of the Owner. In addition, a printout of the database generated for all points, shall be reviewed with the Owner by the control system contractor. Modification to the database shall be made by the control system contractor as directed by the Owner.

C. All points shall be verified prior to "punch-out" for correct and accurate correspondence between the CRT data display and actual field location and equipment operation.

D. Upon successful completion of system generation the Owner shall be requested in writing to inspect and approve the satisfactory operation of the control system, sub-systems, and accessories.

3.9 DEMONSTRATION

A. Engage a factory-authorized service representative of the manufacturer (or manufacturers authorized and trained installation representative) to demonstrate the system's operational status in all modes of control. This shall be arranged for the following:

B. Modify this section to include unique arrangements and Owner's needs. This may vary significantly.

1. Demonstrate system in all modes of operation per Sequence of Operation stated.
2. Where there are multiple devices (VAV box, unit heater, cabinet unit heater, fan coil unit, etc.) installed identically, perform demonstration on 25% of the installed quantity or as required by the Commissioning Agent, in all modes of operation per Sequence of Operation stated.

C. Refer to Division 01 Section "Demonstration and Training."

END OF SECTION 23 09 00

SECTION 23 21 13 - HYDRONIC 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.

B. Division 20, Common Work Results for Mechanical, requirements apply to this section.

1.2 SUMMARY

A. Section includes pipe and fitting materials and joining methods for the following:

1. Copper tube and fittings.
2. Joining materials.
3. Transition fittings.
4. Dielectric fittings.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of the following:

1. Pipe.
2. Fittings.
3. Joining materials.
4. Piping application schedule (specific to the piping materials being used on each system).

B. Shop Drawings: Detail, at 1/4 scale, the piping layout, fabrication of pipe anchors, hangers, supports for multiple pipes, alignment guides, expansion joints and loops, and attachments of the same to the building structure. Detail location of anchors, alignment guides, and expansion joints and loops.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Piping layout, 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. Other building services.
3. Structural members.

B. Qualification Data: For Installer.

C. Welding certificates.

D. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Origination of Piping: All piping shall originate from foundries located inside the United States of America.

B. Steel Support Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

C. Pipe Welding: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code: Section IX.

1. Comply with ASME B31.9, "Building Services Piping," for materials, products, and installation.
2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Hydronic piping components and installation shall be capable of withstanding the following minimum working pressure and temperature unless otherwise indicated:

1. Hot-Water Heating Piping: 125 psig at 200 deg F.
2. Blowdown-Drain Piping: 200 deg F.
3. Air-Vent Piping: 200 deg F.
4. Safety-Valve-Inlet and -Outlet Piping: Equal to the pressure of the piping system to which it is attached.

2.2 COPPER TUBE AND FITTINGS

A. Drawn-Temper Copper Tubing: ASTM B88, Type L.

B. Annealed-Temper Copper Tubing: ASTM B88, Type K.

C. DWV Copper Tubing: ASTM B306, Type DWV.

D. Wrought-Copper Unions: ASME B16.22.

2.3 JOINING MATERIALS

A. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos free, 1/8-inch maximum thickness unless otherwise indicated.

a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.

B. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

C. Solder Filler Metals: ASTM B32, lead-free alloys. Include water-flushable flux according to ASTM B813.

2.4 DIELECTRIC FITTINGS

A. Refer to Division 20, Section 20 05 00 “Common Work Results for Mechanical” for requirements.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

A. Refer to “Piping System Application Schedule” in drawings.

B. Hot-water heating piping, aboveground, NPS 2 and smaller, shall be any of the following:

1. Type L, drawn-temper copper tubing, wrought-copper fittings, and soldered brazed joints.
2. Schedule 40, Grade B, Type 96 steel pipe; Class 125, cast-iron fittings; cast-iron flanges and flange fittings; and threaded joints.

C. Blowdown-Drain Piping: Same materials and joining methods as for piping specified for the service in which blowdown drain is installed.

D. Air-Vent Piping:

1. Inlet: Same as service where installed with metal-to-plastic transition fittings for plastic piping systems according to piping manufacturer's written instructions.
2. Outlet: Type K, annealed-temper copper tubing with soldered or flared joints.

E. Safety-Valve-Inlet and -Outlet Piping for Hot-Water Piping: Same materials and joining methods as for piping specified for the service in which safety valve is installed with metal-to-plastic transition fittings for plastic piping systems according to piping manufacturer's written instructions.

3.2 PIPING INSTALLATIONS

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. 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. Select system components with pressure rating equal to or greater than system operating pressure.

K. Install groups of pipes parallel to each other, spaced to permit applying insulation and servicing of valves.

L. Install drains, consisting of a tee fitting, NPS 3/4 ball valve, and short NPS 3/4 threaded nipple with cap, at low points in piping system mains and elsewhere as required for system drainage.

M. Install piping at a uniform grade of 0.2 percent upward in direction of flow.

N. Reduce pipe sizes using eccentric reducer fitting installed with level side up.

O. Install branch connections to mains using tee fittings in main pipe, with the branch connected to the bottom of the main pipe. For up-feed risers, connect the branch to the top of the main pipe.

P. Install valves according to Division 20, Section 20 05 23 "General-Duty Valves for Piping."

Q. Install unions in piping, NPS 2 and smaller, adjacent to valves, at final connections of equipment, and elsewhere as indicated.

R. Install flanges in piping, NPS 2-1/2 and larger, at final connections of equipment and elsewhere as indicated.

S. Install shutoff valve immediately upstream of each dielectric fitting.

T. Comply with requirements in Division 20, Section 20 05 16 "Expansion Fittings and Loops for Piping" for installation of expansion loops, expansion joints, anchors, and pipe alignment guides.

U. Comply with requirements in Division 20, Section 20 05 53 "Mechanical Identification" for identifying piping.

V. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Division 20, Section 20 05 00 “Common Work Results for Mechanical”.

W. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Division 20, Section 20 05 00 “Common Work Results for Mechanical”.

X. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Division 20, Section 20 05 00 “Common Work Results for Mechanical”.

3.3 DIELECTRIC FITTING INSTALLATION

A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

B. Dielectric Fittings for NPS 2 and Smaller: Use dielectric nipples or unions.

C. Dielectric Fittings for NPS 2-1/2 to NPS 4: Use dielectric flanges, flange kits, or nipples.

D. Dielectric Fittings for NPS 5 and Larger: Use dielectric flange kits.

3.4 HANGERS AND SUPPORTS

A. Comply with requirements in Division 20, Section 20 05 29 "Hangers and Supports" for hanger, support, and anchor devices. Comply with the following requirements for maximum spacing of supports.

B. Comply with requirements in Division 20, Section 20 05 48 "Vibration Controls" for vibration isolation requirements.

C. Install the following pipe attachments:

1. Adjustable steel clevis hangers for individual horizontal piping less than 20 feet long.
2. Adjustable roller hangers and spring hangers for individual horizontal piping 20 feet or longer.
3. Pipe Roller: MSS SP-58, Type 44 for multiple horizontal piping 20 feet or longer, supported on a trapeze.
4. Spring hangers to support vertical runs.
5. Provide copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.

D. Install hangers for drawn-temper copper piping with the following maximum spacing and minimum rod sizes:

1. NPS 3/4: Maximum span, 5 feet; minimum rod size, 1/4 inch.
2. NPS 1: Maximum span, 6 feet; minimum rod size, 1/4 inch.
3. NPS 1-1/4Maximum span, 7 feet; minimum rod size, 3/8 inch.
4. NPS 1-1/2: Maximum span, 8 feet; minimum rod size, 3/8 inch.
5. NPS 2: Maximum span, 8 feet; minimum rod size, 3/8 inch.
6. NPS 2-1/2: Maximum span, 9 feet; minimum rod size, 3/8 inch.
7. NPS 3 and Larger: Maximum span, 10 feet; minimum rod size, 3/8 inch.

E. Support vertical runs at roof, at each floor, and at 10-foot intervals between floors.

3.5 PIPE 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 pipe and fittings before assembly.

C. Soldered Joints: Apply ASTM B813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B32.

D. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8/A5.8M.

E. 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.

F. Welded Joints: Construct joints according to AWS D10.12M/D10.12, using qualified processes and welding operators according to "Quality Assurance" Article.

G. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

3.6 TERMINAL EQUIPMENT CONNECTIONS

A. Sizes for supply and return piping connections shall be the same as or larger than equipment connections.

B. Install control valves in accessible locations close to connected equipment.

C. Install bypass piping with globe valve around control valve. If parallel control valves are installed, only one bypass is required.

D. Install ports for pressure gages and thermometers at coil inlet and outlet connections. Comply with requirements in Division 20, Section 20 05 19 "Meters and Gages."

3.7 FIELD QUALITY CONTROL

A. Prepare hydronic piping according to ASME B31.9 and as follows:

1. Leave joints, including welds, uninsulated and exposed for examination during test.
2. Provide temporary restraints for expansion joints that cannot sustain reactions due to test pressure. If temporary restraints are impractical, isolate expansion joints from testing.
3. Flush hydronic piping systems with clean water; then remove and clean or replace strainer screens.
4. Isolate equipment from piping. If a valve is used to isolate equipment, its closure shall be capable of sealing against test pressure without damage to valve. Install blinds in flanged joints to isolate equipment.
5. Install safety valve, set at a pressure no more than one-third higher than test pressure, to protect against damage by expanding liquid or other source of overpressure during test.

B. Perform the following tests on hydronic piping:

1. Use ambient temperature water as a testing medium unless there is risk of damage due to freezing. Another liquid that is safe for workers and compatible with piping may be used.
2. While filling system, use vents installed at high points of system to release air. Use drains installed at low points for complete draining of test liquid.

3. Isolate expansion tanks and determine that hydronic system is full of water.
4. Subject piping system to hydrostatic test pressure that is not less than 1.5 times the system's working pressure. Test pressure shall not exceed maximum pressure for any vessel, pump, valve, or other component in system under test. Verify that stress due to pressure at bottom of vertical runs does not exceed 90 percent of specified minimum yield strength or 1.7 times the "SE" value in Appendix A in ASME B31.9, "Building Services Piping."
5. After hydrostatic test pressure has been applied for at least 2.5 hours, examine piping, joints, and connections for leakage. Eliminate leaks by tightening, repairing, or replacing components, and repeat hydrostatic test until there are no leaks.
6. Prepare written report of testing.

C. Perform the following before operating the system:

1. Open manual valves fully.
2. Inspect pumps for proper rotation.
3. Set makeup pressure-reducing valves for required system pressure.
4. Inspect air vents at high points of system and determine if all are installed and operating freely (automatic type), or bleed air completely (manual type).
5. Set temperature controls so all coils are calling for full flow.
6. Inspect and set operating temperatures of hydronic equipment, such as boilers, chillers, cooling towers, to specified values.
7. Verify lubrication of motors and bearings.

END OF SECTION 23 21 13

SECTION 23 21 16 - HYDRONIC PIPING SPECIALTIES

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.

B. Division 20, Common Work Results for Mechanical, requirements apply to this section.

1.2 SUMMARY

A. Section includes special-duty valves and specialties for the following:

1. Hydronic specialty valves.
2. Air-control devices.
3. Strainers.
4. Connectors.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of the following:

1. Include construction details and material descriptions for hydronic piping specialties.
2. Include rated capacities, operating characteristics, and furnished specialties and accessories.
3. Include flow and pressure drop curves based on manufacturer's testing for calibrated-orifice balancing valves and automatic flow-control valves.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For hydronic piping specialties to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Hydronic piping components and installation shall be capable of withstanding the following minimum working pressure and temperature unless otherwise indicated:

1. Hot-Water Heating Piping: 125 psig at 200 deg F.
2. Blowdown-Drain Piping: 200 deg F.
3. Air-Vent Piping: 200 deg F.

4. Safety-Valve-Inlet and -Outlet Piping: Equal to the pressure of the piping system to which it is attached.

2.2 VALVES

A. Gate, Globe, Check, Ball, and Butterfly Valves: Comply with requirements specified in Division 20, Section 20 05 23 "General-Duty Valves for Piping."

B. Automatic Temperature-Control Valves, Actuators, and Sensors: Comply with requirements specified in Division 23, Section 23 09 00 "Instrumentation and Control for HVAC.

C. Bronze, Calibrated-Orifice, Balancing Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Armstrong Pumps.
   b. Bell & Gossett.
   c. Flow Design.
   d. Griswold Controls.
   e. HCI (Hydronics Components Inc)
   f. Nexus Valve.
   g. Taco.

2. Body: Bronze or brass body, ball with calibrated orifice or venturi.
3. Ball: Stainless steel.
4. Plug: Resin.
5. Seat: PTFE.
6. End Connections: Threaded or socket.
7. Pressure Gage Connections: Integral seals for portable differential pressure meter.
8. Handle Style: Lever, with memory stop to retain set position.
9. CWP Rating: Minimum 125 psig.
10. Maximum Operating Temperature: 250 deg F.

2.3 AIR-CONTROL DEVICES

A. Manual Air Vents:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Amtrol.
   b. Armstrong Pumps.
   c. Bell & Gossett.
   d. Nexus Valve.
   e. Taco.

2. Body: Bronze.
3. Internal Parts: Nonferrous.
4. Operator: Screwdriver or thumbscrew.
5. Inlet Connection: NPS 1/2.
6. Discharge Connection: NPS 1/8.

7. CWP Rating: 150 psig.
8. Maximum Operating Temperature: 225 deg F.

B. Automatic Air Vents:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Amtrol.
   b. Armstrong Pumps.
   c. Bell & Gossett.
   d. Nexus Valve.
   e. Taco.

2. Body: Bronze or cast iron.
3. Internal Parts: Nonferrous.
4. Operator: Noncorrosive metal float.
5. Inlet Connection: NPS 1/2.
6. Discharge Connection: NPS 1/4.
7. CWP Rating: 150 psig.
8. Maximum Operating Temperature: 240 deg F.

2.4 HYDRONIC PIPING SPECIALTIES

A. Y-Pattern Strainers:

1. Body: ASTM A 126, Class B, cast iron with bolted cover and bottom drain connection.
2. End Connections: Threaded ends for NPS 2 and smaller; flanged ends for NPS 2-1/2 and larger.
3. Strainer Screen: Stainless-steel, mesh strainer, or perforated stainless-steel basket.
4. CWP Rating: 125 psig.

B. Expansion Fittings: Comply with requirements in Division 20, Section 20 05 16 "Expansion Fittings and Loops for HVAC Piping."

PART 3 - EXECUTION

3.1 VALVE APPLICATIONS

A. Install shutoff-duty valves at each branch connection to supply mains and at supply connection to each piece of equipment.

B. Install throttling-duty or calibrated-orifice, balancing valves at each branch connection to return main.

C. Install calibrated-orifice, balancing valves in the return pipe of each hydronic terminal.

D. Install check valves at each pump discharge and elsewhere as required to control flow direction.

3.2 HYDRONIC SPECIALTIES INSTALLATION

A. Install manual air vents at high points in piping, at heat-transfer coils, and elsewhere as required for system air venting.

B. Install automatic air vents at high points of system piping in mechanical equipment rooms only. Install manual vents at heat-transfer coils and elsewhere as required for air venting.

END OF SECTION 23 21 16

SECTION 23 31 13 - 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.

B. Division 20, Common Work Results for Mechanical, requirements apply to this section.

C. Division 20, Section 20 59 93 "Testing, Adjusting, and Balancing" for testing, adjusting, and balancing requirements for metal ducts.

D. Division 23, Section 23 33 00 "Air Duct Accessories" for dampers, sound-control devices, duct-mounting access doors and panels, turning vanes, and flexible ducts.

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. Duct liner.
5. Sealants and gaskets.
6. Hangers and supports.

1.3 DEFINITIONS

A. ASCE/SEI: American Society of Civil Engineers/Structural Engineers Institute.

B. ASHRAE: American Society of Heating, Refrigeration, and Air Conditioning Engineers.

C. AWS: American Welding Society.

D. CFR: Code of Federal Regulations.

E. EPA: Environmental Protection Agency.

F. EPDM: Ethylene-propylene-diene terpolymer rubber.

G. ICC: International Code Council.

H. IESNA: Illuminating Engineers Society of North America.

I. HEPA: High Efficiency Particulate Arrestor.

J. LEED: Leadership in Energy and Environmental Design.

K. NADCA: National Air Duct Cleaners Association.

L. NAIMA: North American Insulation Manufacturers Association.

M. NFPA: National Fire Protection Association.

N. NRTL: Nationally Recognized Testing Laboratory.

O. SMACNA: Sheet Metal and Air Conditioning Contractors' National Association.

P. SPIDA: Spiral Duct Manufacturers Association.

Q. UL: Underwriters Laboratories, Inc.

R. VOC: Volatile Organic Compound.

1.4 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 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 the 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."

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.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of the following products:

1. Liners and adhesives.
2. Sealants and gaskets.

B. Shop Drawings: CAD-generated and drawn to 1/4 inch equals 1 foot scale. Show fabrication and installation details for metal ducts. Shop drawings are to be reviewed by the Architect prior to any fabrication.

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. Elevation of top and 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.

C. Delegated-Design Submittal:

1. Sheet metal thicknesses.
2. Joint and seam construction and sealing.
3. Reinforcement details and spacing.
4. Materials, fabrication, assembly, and spacing of hangers and supports.

1.6 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Duct installation in congested spaces, indicating coordination with general construction, building components, and other building services. Indicate proposed changes to duct layout.
2. Suspended ceiling components.
3. Structural members to which duct will be attached.
4. Size and location of initial access modules for acoustical tile.
5. Penetrations of smoke barriers and fire-rated construction.
6. Items penetrating finished ceiling including the following:

   a. Lighting fixtures.
   b. Air outlets and inlets.
   c. Speakers.
   d. Sprinklers.
   e. Access panels.
   f. Fire alarm devices.
   g. Perimeter moldings.

B. Welding certificates.

C. Field quality-control reports.

1.7 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports.
2. AWS D9.1M/D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.

B. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and System Start-Up."

C. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.4.4 - "HVAC System Construction and Insulation."

D. NFPA Compliance:

1. NFPA 90A, “Installation of Air Conditioning and Ventilating Systems.”
2. NFPA 90B, “Installation of Warm Air Heating and Air Conditioning Systems.”

PART 2 - PRODUCTS

2.1 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: G60.
2. Finishes for Surfaces Exposed to View: Mill phosphatized.

C. Factory- or Shop-Applied Antimicrobial Coating:

1. Apply to the surface of sheet metal that will form the interior surface of the duct. An untreated clear coating shall be applied to the exterior surface.
2. Antimicrobial compound shall be tested for efficacy by an NRTL and registered by the EPA for use in HVAC systems.
3. Coating containing the antimicrobial compound shall have a hardness of 2H, minimum, when tested according to ASTM D 3363.
4. 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.
5. Shop-Applied Coating Color: Black.
6. Antimicrobial coating on sheet metal is not required for duct containing liner treated with antimicrobial coating.

D. 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.

2.2 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.

1. Minimum steel gauge shall be as follows unless pressure class requires thicker gage:

a. Ducts through 12 Inches wide: 24 gauge.
b. Ducts 13 through 30 inches wide: 22 gauge.
c. Ducts 31 through 84 inches wide: 20 gauge.
d. Ducts 84 inches wide and larger: 18 gauge.

B. Transverse Joints: Select joint types and fabricate according to 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."

C. Longitudinal Seams: Select seam types and fabricate according to 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."

D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 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," Chapter 3, "Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eastern Sheet Metal (ESM).
2. Lindab.
3. McGill AirFlow.
4. SEMCO.
5. Sheet Metal Connectors.
6. Spiral Manufacturing Co.

C. Transverse Joints: Select joint types and fabricate according to 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."

1. Transverse joints in ducts larger than 60 inches in diameter: Flanged.
2. Transverse joints in ducts 60 inches and smaller in diameter shall be flanged, beaded sleeve, or draw band joint.

D. Longitudinal Seams: Select seam types and fabricate according to 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 round ducts 90 inches and smaller in diameter with one of the following based on indicated pressure class:

   a. Equal to or greater than +/- 4 inches.

      1) Butt Weld Seam.
      2) Spiral Seam.

   b. Equal to or less than +/- 4 inches.

      1) Spiral Seam.
      2) Lap and Rivet.
      3) Grooved Seam

E. Tees and Laterals: Select types and fabricate according to 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 DUCT LINER

A. Flexible Elastomeric Duct Liner: Preformed, cellular, closed-cell, sheet materials complying with ASTM C 534, 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. Aeroflex USA.
   b. Armacell.
   c. Rubatex International.

2. 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.

   a. 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).
   b. 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."

B. 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- 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.

C. Shop Application of Duct Liner: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 7-11, "Flexible Duct Liner Installation."

1. Adhere a single layer of indicated thickness of duct liner with at least 90 percent adhesive coverage 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.
4. Fold and compress liner in corners of rectangular ducts or cut and fit to ensure butted-edge 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 fpm.
7. Secure liner with mechanical fasteners 4 inches from corners and at intervals not exceeding 12 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:

    a. Fan discharges.
    b. Intervals of lined duct preceding unlined duct.
    c. Upstream edges of transverse joints in ducts where air velocities are higher than 2500 fpm 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.

    a. Sheet Metal Inner Duct Perforations: 3/32-inch diameter, with an overall open area of 23 percent.

10. Terminate inner ducts with buildouts attached to fire-damper sleeves, dampers, turning vane assemblies, or other devices. Fabricated buildouts (metal hat sections) or other buildout means are optional; and when used, secure buildouts to duct walls with bolts, screws, rivets, or welds.

2.5 SEALANT AND GASKETS

A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.

B. Water-Based Joint and Seam Sealant:

1. Application Method: Brush on.
2. Solids Content: Minimum 65 percent.
3. Shore A Hardness: Minimum 20.
4. Water resistant.

5. Mold and mildew resistant.
6. VOC: Maximum 75 g/L (less water).
7. Maximum Static-Pressure Class: 10-inch w.g., positive and negative.
8. Service: Indoor or outdoor.
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

C. Solvent-Based Joint and Seam Sealant:

1. Application Method: Brush on.
2. Base: Synthetic rubber resin.
3. Solvent: Toluene and heptane.
4. Solids Content: Minimum 60 percent.
5. Shore A Hardness: Minimum 60.
6. Water resistant.
7. Mold and mildew resistant.
1. For indoor applications, sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. VOC: Maximum 395 g/L.
3. 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."
4. Maximum Static-Pressure Class: 10-inch wg, positive or negative.
5. Service: Indoor or outdoor.
6. 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.
1. For indoor applications, sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. 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."

E. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.

F. Round Duct Joint O-Ring Seals:

1. Seal shall provide maximum leakage class of 3 cfm/100 sq. ft. at 1-inch w.g. and shall be rated for 10-inch w.g. 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.

2.6 HANGERS AND SUPPORTS

A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.

B. 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."

C. Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A 603.

D. Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.

E. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

F. Trapeze and Riser Supports:

1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.

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 according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.

C. Install round ducts in maximum practical lengths.

D. Install ducts with fewest possible joints.

E. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.

F. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.

G. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

H. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.

I. Route ducts to avoid passing through required exit stairwells, elevator hoistways and machinery rooms, transformer vaults and electrical equipment rooms and enclosures.

J. 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.

K. Where ducts pass through fire-rated interior partitions and exterior walls, install fire dampers. Comply with requirements in Division 23, Section 23 33 00 "Air Duct Accessories" for fire and smoke dampers.

L. Protect duct interiors from moisture, construction debris and dust, and other foreign materials.

3.2 DUCT SEALING

A. Seal ducts for duct static-pressure, seal classes, and leakage classes specified in "Duct Schedule" Article according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

B. Seal ducts to the following seal classes according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible":

1. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
2. Unconditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch w.g. and Lower: Seal Class B.
3. Unconditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch w.g.: Seal Class A.
4. Unconditioned Space, Return-Air Ducts: Seal Class B.
5. Conditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch w.g. and Lower: Seal Class B.

3.3 HANGER AND SUPPORT INSTALLATION

A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."

B. Comply with requirements in Division 20, Section 20 05 48 "Vibration Controls" for vibration isolation requirements.

C. 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.

D. 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.

E. Hangers Exposed to View: Threaded rod and round duct collar supports shall be used for supporting exposed ductwork. The use of aircraft cable will not be accepted.

F. 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.

G. 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.

3.4 CONNECTIONS

A. Make connections to equipment with flexible connectors complying with Division 23, Section 23 33 00 "Air Duct Accessories."

B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.5 PAINTING

A. Paint exterior of all exposed, internally lined metal ducts the color specified by Architect.

B. 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. Paint materials and application requirements are specified in Division 09 painting Sections.

3.6 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. Supply Ducts with a Pressure Class of 3-Inch w.g. or Higher: Test no less than 100 percent of total installed ductwork before applying external insulation.

3. Disassemble, reassemble, and seal segments of systems to accommodate leakage testing and for compliance with test requirements.
4. 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.
5. 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.
2. Test sections of metal duct system, chosen randomly by Owner, for cleanliness according to "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.

3.7 DUCT CLEANING

A. Ensure all ductwork is clean before testing, adjusting, and balancing.

B. New ducts that are protected from debris during onsite storage and after installation, and meet the requirements of the Duct System Cleanliness Test described above do not require additional cleaning.

C. New ducts that are utilized for temporary heating and cooling, include MERV 8 filtration on all points of intake (return air), and meet the requirements of the Duct System Cleanliness Test do not require additional cleaning.

D. Use service openings for entry and inspection.

1. Create new openings and install access panels appropriate for duct static-pressure class if required for cleaning access. Provide insulated panels for insulated or lined duct. Patch insulation and liner as recommended by duct liner manufacturer. Comply with Division 23 Section 23 33 00 "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.

E. 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.

F. 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.

G. 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 according to NADCA 1992. 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 according to manufacturer's written instructions after removal of surface deposits and debris.

3.8 START UP

A. Air Balance: Comply with requirements in Division 23 Section 23 05 93 "Testing, Adjusting, and Balancing for HVAC."

3.9 DUCT SCHEDULE

A. Fabricate ducts with galvanized sheet steel except as otherwise indicated.

B. Supply Ducts:

1. Ducts Connected to Multi-Zone, Variable-Air-Volume Air-Handling Units:

a. Pressure Class: Positive 4-inch w.g..
b. Minimum SMACNA Seal Class: A.
c. SMACNA Leakage Class for Rectangular: 4.
d. SMACNA Leakage Class for Round: 2.

C. Return Ducts:

1. Ducts Connected to Air-Handling Units:

a. Pressure Class: Negative 2-inch w.g..
b. Minimum SMACNA Seal Class: C.
c. SMACNA Leakage Class for Rectangular: 16.
d. SMACNA Leakage Class for Round: 8.

D. Intermediate Reinforcement:

1. Galvanized-Steel Ducts: Galvanized steel or carbon steel coated with zinc-chromate primer.

E. Liner:

1. Supply Air Ducts: Flexible elastomeric, 2 inches thick. From Air-Handling Unit discharge to a distance no less than 30-feet away measured vertically and horizontally.
2. Return Air Ducts: Flexible elastomeric, 2 inches thick. From Air-Handling Unit intake to a distance no less than 30-feet away measured vertically and horizontally and wherever exposed to view.
3. Relief Air, Exhaust Air Ducts: Flexible elastomeric, 2 inches thick. From Air-Handling Unit intake to a distance no less than 30-feet away measured vertically and horizontally.
4. Supply Air Plenums: Flexible elastomeric, 2 inches thick.
5. Return Air Plenums: Flexible elastomeric, 2 inches thick.
6. Relief Air, Exhaust Air Plenums: Flexible elastomeric, 2 inches thick.

F. 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."

2. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."

   a. Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
   b. Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
   c. 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."

3. 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 three segments for 90-degree elbow.
2) Velocity 1000 to 1500 fpm: 1.0 radius-to-diameter ratio and four segments for 90-degree elbow.
3) Velocity 1500 fpm or Higher: 1.5 radius-to-diameter ratio and 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: Standing seam.

G. 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: 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.

END OF SECTION 23 31 13

SECTION 23 33 00 - AIR DUCT 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.

B. Division 20, Section 20 05 00 “Common Work Results for Mechanical”, requirements apply to this section.

C. Division 28, Section 28 31 11 "Digital, Addressable Fire-Alarm System" for duct-mounted fire and smoke detectors.

D. Division 28, Section 28 31 12 "Zoned (DC-Loop) Fire-Alarm System" for duct-mounted fire and smoke detectors.

1.2 SUMMARY

A. Section Includes:
1. Manual volume dampers.
2. Fire dampers.
3. Flange connectors.
4. Turning vanes.
5. Remote damper operators.
6. Duct mounted access doors.
7. Flexible connectors.
8. Flexible ducts.
9. Duct accessory hardware.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For duct accessories. Include plans, elevations, sections, details and attachments to other work.

1. 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 and combination fire- and smoke-damper installations, including sleeves; and duct mounted access doors and remote damper operators.
e. Wiring Diagrams: For power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which ceiling mounted access panels and access doors required for access to duct accessories are shown and coordinated with each other, using input from Installers of the items involved.

B. Source quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For air duct accessories to include in operation and 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. Fusible Links: Furnish quantity equal to 10 percent of amount installed.

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 AMCA 500-D testing for damper rating.

2.2 MATERIALS

A. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.

1. Galvanized Coating Designation: G60.
2. Exposed-Surface Finish: Mill phosphatized.

B. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.

C. 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. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Air Balance.
2. American Warming and Ventilating.
3. Flexmaster U.S.A.
4. Greenheck Fan Corporation.
5. McGill AirFlow.
6. METALAIRE.
7. Nailor Industries.
8. Pottorff.
9. Ruskin Company.
10. Vent Products Company.

B. Low-Leakage, Steel, Manual Volume Dampers:

1. Low-leakage rating, with linkage totally enclosed within the frame and out of the airstream, and bearing AMCA's Certified Ratings Seal for both air performance and air leakage.
2. Suitable for horizontal or vertical applications.
3. Frames:

    a. Hat shaped.
    b. 0.094-inch- thick, galvanized sheet steel.
    c. Interlocking, gusseted corners.
    d. 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. Galvanized, roll-formed steel, 0.064 inch thick.

5. Blade Axles: Plated steel.
6. Bearings:

    a. Molded synthetic.
    b. Dampers in ducts with pressure classes of 3-inch w.g. or less shall have axles full length of damper blades and bearings at both ends of operating shaft.

7. Blade Seals: Vinyl.
8. Jamb Seals: Cambered aluminum.
9. Tie Bars and Brackets: Galvanized steel.
10. Accessories:

    a. Include locking device with 2” stand-off bracket to hold single-blade dampers in a fixed position without vibration.

C. Low-Leakage, Aluminum, Manual Volume Dampers:

1. Low-leakage rating, with linkage totally enclosed within the frame and out of the airstream, and bearing AMCA's Certified Ratings Seal for both air performance and air leakage.
2. Suitable for horizontal or vertical applications.
3. Frames: Hat-shaped, 0.10-inch- thick, aluminum sheet channels; interlocking, gusseted corners; 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. Roll-Formed Aluminum Blades: 0.10-inch- thick aluminum sheet.
    d. Extruded-Aluminum Blades: 0.050-inch- thick extruded aluminum.

5. Blade Axles: Stainless steel.
6. Bearings:

    a. Molded synthetic.
    b. Dampers in ducts with pressure classes of 3-inch w.g. or less shall have axles full length of damper blades and bearings at both ends of operating shaft.

7. Blade Seals: Vinyl.
8. Jamb Seals: Cambered aluminum.
9. Tie Bars and Brackets: Aluminum.
10. Accessories:

    a. Include locking device with 2” stand-off bracket to hold single-blade dampers in a fixed position without vibration.

D. Jackshaft:

1. Size: 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.

E. 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 FIRE DAMPERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Air Balance Inc.
2. Cesco Products.
3. Greenheck Fan Corporation.
4. McGill AirFlow.

5. METALAIRE.
6. Nailor Industries.
7. Pottorff.
8. Ruskin Company.
9. Vent Products Company,
10. Ward Industries.

B. Type: Dynamic; rated and labeled according to UL 555 by an NRTL.

C. Closing rating in ducts up to 4-inch w.g. static pressure class and minimum 2000-fpm velocity.

D. Fire Rating: 1-1/2 hours.

E. Frame: Curtain type with blades outside airstream, except when located behind grille where blades may be inside airstream; fabricated with roll-formed, 0.034-inch- thick galvanized steel; with mitered and interlocking corners.

F. Mounting Sleeve: Factory- or field-installed, galvanized sheet steel.

1. Minimum Thickness: 0.05 inch thick, as indicated, and of length to suit application.
2. Exception: Omit sleeve where damper-frame width permits direct attachment of perimeter mounting angles on each side of wall or floor; thickness of damper frame must comply with sleeve requirements.

G. Mounting Orientation: Vertical or horizontal as indicated.

H. Blades: Roll-formed, interlocking, 0.025-inch- thick, galvanized sheet steel. In place of interlocking blades, use full-length, 0.034-inch- thick, galvanized-steel blade connectors.

I. Horizontal Dampers: Include blade lock and stainless-steel closure spring.

J. Heat-Responsive Device: Replaceable, 165 deg F rated, fusible links.

2.5 FLANGE CONNECTORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Ductmate Industries.
2. Nexus PDQ.
3. Ward Industries, Inc.

B. Description: Add-on or roll-formed, factory-fabricated, slide-on transverse flange connectors, gaskets, and components.

C. Material: Galvanized steel.

D. Gage and Shape: Match connecting ductwork.

2.6 TURNING VANES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Ductmate Industries.
2. Duro Dyne.
3. METALAIRE.
4. SEMCO.
5. Ward Industries.

B. 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.

C. 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."

D. Vane Construction: For ductwork 2-inch w.g. and lower, single wall construction for ducts up to 18 inches wide and double wall for larger dimensions. For ductwork 3-inch w.g. and higher, double wall construction.

2.7 REMOTE DAMPER OPERATORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Metropolitan Air Technology (MAT).
2. Pottorff.
3. Ventfabrics.
4. Young Regulator Company.

B. Description: Cable system designed for remote manual damper adjustment.

C. Cable: Stainless steel.

D. Ceiling-Box Mounting: Recessed, 3/4 inches deep.

E. Ceiling-Box Cover-Plate Material: Steel, factory painted to match color of ceiling or factory primed for field painting.

2.8 DUCT MOUNTED ACCESS DOORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. American Warming and Ventilating.
2. Cesco Products.

3. Ductmate Industries.
4. Flexmaster U.S.A.
5. Greenheck Fan Corporation.
6. McGill AirFlow.
7. Nailor Industries.
8. Pottorff.
9. Ruskin.
10. Ventfabrics.
11. Ward Industries.

B. Duct Mounted Access Doors: Fabricate access panels according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 7-2, "Duct Access Doors and Panels," and 7-3, "Access Doors - Round Duct."

1. Door:

a. Double wall, rectangular.
b. Galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class.
c. Hinges and Latches: 1-by-1-inch butt or piano hinge and cam latches.
d. Fabricate doors airtight and suitable for duct pressure class.

2. Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.
3. Number of Hinges and Locks:

a. Access Doors Less Than 12 Inches Square: No hinges, two compression latches.
b. Access Doors up to 18 Inches Square: Continuous piano hinge and one compression latch.
c. Access Doors up to 24 by 24 Inches: Continuous piano hinge and two compression latches.

2.9 FLEXIBLE CONNECTORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Ductmate Industries.
2. Duro Dyne.
3. Ventfabrics.
4. Ward Industries.

B. Materials: Flame-retardant or noncombustible fabrics.

C. Coatings and Adhesives: Comply with UL 181, Class 1.

D. Metal-Edged Connectors: Factory fabricated with a fabric strip 3-1/2 inches wide attached to 2 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.

E. 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.

F. 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.

G. High-Temperature System, Flexible Connectors: Glass fabric coated with silicone rubber.

1. Minimum Weight: 16 oz./sq. yd..
2. Tensile Strength: 285 lbf/inch in the warp and 185 lbf/inch in the filling.
3. Service Temperature: Minus 67 to plus 500 deg F.

H. Thrust Limits: Combination coil spring and elastomeric insert with spring and insert in compression, and with a load stop. Include rod and angle-iron brackets for attaching to fan discharge and duct.

1. Frame: Steel, fabricated for connection to threaded rods and to allow for a maximum of 30 degrees of angular rod misalignment without binding or reducing isolation efficiency.
2. Outdoor Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
6. Elastomeric Element: Molded, oil-resistant rubber or neoprene.
7. Coil Spring: Factory set and field adjustable for a maximum of 1/4-inch movement at start and stop.

2.10 FLEXIBLE DUCTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Flexmaster U.S.A.
2. Hart & Cooley
3. Thermaflex.

B. Insulated, Flexible Duct: UL 181, Class 1, multiple layers of aluminum laminate supported by helically wound, spring-steel wire; fibrous-glass insulation; aluminized vapor-barrier film.

1. Pressure Rating: 10-inch w.g. positive and 1.0-inch w.g. negative.
2. Maximum Air Velocity: 5000 fpm.
3. Temperature Range: Minus 20 to plus 210 deg F.
4. Insulation R-value: Comply with ASHRAE/IESNA 90.1 and the International Energy Conservation Code requirements.

C. Flexible Duct Connectors:

1. Clamps: Stainless-steel band with zinc-plated hex screw to tighten band with a worm-gear action in sizes 3 through 18 inches, to suit duct size.

2. Non-Clamp Connectors: Adhesive plus sheet metal screws.

2.11 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 and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.

B. Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.

C. 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.

D. Set dampers to fully open position before testing, adjusting, and balancing.

E. Install test holes at fan inlets and outlets and elsewhere as indicated.

F. Install fire dampers according to UL listing.

G. Install duct access doors on sides of ducts to allow for inspecting, adjusting, and maintaining accessories and equipment at the following locations:

1. On both sides of duct mounted bipolar ionization devices.
2. At outdoor-air intakes.
3. Downstream from manual volume dampers, control dampers, backdraft dampers, and equipment.
4. Adjacent to and close enough to fire or combination fire and smoke dampers, to reset or reinstall fusible links. Access doors for access to fire or combination fire and smoke dampers having fusible links shall be pressure relief access doors and shall be outward operation for access doors installed upstream from dampers and inward operation for access doors installed downstream from dampers.
5. Upstream and downstream from turning vanes.
6. At control devices requiring inspection.
7. At airflow monitoring stations.

8. Elsewhere as indicated.

H. Install access doors with swing against duct static pressure.

I. Access door sizes, unless otherwise indicated:

1. One-Hand or Inspection Access: 8 by 5 inches.
2. Two-Hand Access: 12 by 6 inches.
3. Head and Hand Access: 18 by 10 inches.
4. Head and Shoulders Access: 20 by 14 inches.
5. Body Access: 24 by 14 inches.
6. Body plus Ladder Access: 24 by 18 inches.

J. Label access doors according to Division 20, Section 20 05 53 "Mechanical Identification" to indicate the purpose of access door.

K. Install flexible connectors to connect ducts to equipment.

L. For fans developing static pressures of 5-inch w.g. and more, cover flexible connectors with loaded vinyl sheet held in place with metal straps.

M. Connect terminal units to supply ducts directly or with maximum 12-inch lengths of flexible duct. Do not use flexible ducts to change directions.

N. Connect supply diffusers to ducts with maximum 60-inch lengths of flexible duct clamped or strapped in place.

O. Connect return grilles and exhaust grilles directly to ducts.

P. Connect flexible ducts to metal ducts with adhesive plus sheet metal screws.

Q. Install duct test holes where required for testing and balancing purposes.

R. Install thrust limits at centerline of thrust, symmetrical on both sides of equipment. Attach thrust limits at centerline of thrust and adjust to a maximum of 1/4-inch movement during start and stop of fans.

3.2 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Operate dampers to verify full range of movement.
2. Inspect locations of access doors and verify that purpose of access door can be performed.
3. Operate fire, smoke, and combination fire and smoke dampers to verify full range of movement and verify that proper heat-response device is installed.
4. Inspect turning vanes for proper and secure installation.
5. Operate remote damper operators to verify full range of movement of operator and damper.

END OF SECTION 23 33 00

SECTION 23 36 00 - AIR TERMINAL UNITS

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.

B. Division 20, Section 20 05 00 “Common Work Results for Mechanical”, requirements apply to this section.

C. Division 20, Section 20 05 53 “Mechanical Identification”, requirements apply to this section.

1.2 SUMMARY

A. This Section includes the following:

1. Single-duct air terminal units.
2. Casing liner.

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.

B. Shop Drawings: For air terminal units.

1. Include plans, elevations, sections, and mounting details.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.
4. Hangers and supports, including methods for duct and building attachment and vibration isolation.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Ceiling suspension assembly members.
2. Size and location of initial access modules for acoustic tile.

3. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.

B. Field quality-control reports.

1.5 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 Division 01, Section 01 78 23 "Operation and Maintenance Data," include the following:

a. Instructions for resetting minimum and maximum air volumes.

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."

2.2 SINGLE-DUCT AIR TERMINAL UNITS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.
1. Enviro-Tec.
2. Krueger.
3. Nailor Industries.
4. Price Industries.
5. Titus.

B. Configuration: Volume-damper assembly inside unit casing with control components inside a protective metal shroud.

C. Casing: 0.034-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.
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.
6. Provide mounting brackets on casing.

D. 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.
3. The damper shaft shall incorporate a visual position indicator etched into the end of the damper shaft to clearly indicate damper position over the full range of 90 degrees.

E. Hydronic Heating Coils: Copper tube, with mechanically bonded aluminum fins spaced no closer than 0.1 inch, and rated for a minimum working pressure of 200 psig and a maximum entering-water temperature of 220 deg F. Include manual air vent and drain valve.

F. Factory, Hydronic Piping Package: ASTM B 88, Type L copper tube with wrought-copper fittings and brazed joints. Label piping to indicate service, inlet, and outlet.

1. Three-way, modulating control valve for heating coil.
2. Hose Kits: Minimum 400-psig working pressure and operating temperatures from 33 to 211 deg F. Tag hose kits to equipment designations.

   a. Length: 24 inches.
   b. Minimum Diameter: Equal to fan coil unit connection size.

3. Two-Piece Ball Valves: Bronze body with full-port, chrome-plated bronze ball; PTFE or TFE seats; and 600-psig minimum CWP rating and blowout-proof stem.
4. Calibrated-Orifice Balancing Valves: Bronze body, ball type; 125-psig working pressure, 250 deg F maximum operating temperature; with calibrated orifice or venturi, connections for portable differential pressure meter with integral seals, threaded ends, and a memory stop to retain set position.
5. Y-Pattern Hydronic Strainers: Cast-iron body (ASTM A 126, Class B); 125-psig working pressure; with threaded connections, bolted cover, perforated stainless-steel basket, and bottom drain connection. Include minimum NPS 1/2 hose-end, full-port, ball-type blowdown valve in drain connection.
6. Wrought-Copper Unions: ASME B16.22.

G. DDC Controls: Single-package unitary controller and actuator specified in Division 23 Section 23 09 00 "Instrumentation and Control for HVAC."

H. Control devices shall be compatible with temperature controls system specified in Division 23 Section 23 09 00 "Instrument and Control for HVAC."

1. Electronic Damper Actuator: 24 V, powered open, capacitous return.
2. 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.
3. 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:

   a. Occupied and unoccupied operating mode.
   b. Remote reset of airflow or temperature set points.

c. Adjusting and monitoring with portable terminal.
d. Communication with temperature-control system specified in Section 230923 "Direct Digital Control (DDC) System for HVAC."

4. Room Sensor: Wall mounted electronic type with temperature set-point display and access for connection of portable operator terminal.

I. Controls:

1. Suitable for operation with duct pressures between 0.25- and 3.0-inch wg inlet static pressure.

J. Control Sequences:

1. Occupied:

a. In a call for cooling, airflow will increase as the damper opens towards its design cooling airflow setting to satisfy set point.
b. In a call for less cooling, airflow will decrease as the damper closes towards its minimum cooling airflow setting to satisfy set point.
c. In a call for heating, with the damper at its minimum cooling airflow setting the hot water coil two-way control valve will open to permit hot water flow through the heating coil and the damper will open towards its heating airflow setting. The two-way control valve will modulate to satisfy setpoint.

2. Unoccupied:

a. Damper opens to its design cooling airflow setting.

2.3 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: 1 inch.
2. Density: 1.5 lbs. per cu. ft.
3. 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.
4. Liner Adhesive: As recommended by insulation manufacturer and complying with NFPA 90A or NFPA 90B.

a. Adhesive VOC Content: 50 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."

2.4 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 Division 20, Section 20 05 29 "Hangers and Supports."

B. Building Attachments: Powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.

1. Powder-actuated fasteners shall only be used with prior approval from a Structural Engineer.
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.

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 sensor.

D. Verify locations of wall-mounted sensors with Owner and/or Architect before installation. Install devices 48 inches above finished floor.

3.3 CONNECTIONS

A. Where installing piping adjacent to air terminal unit, allow space for service and maintenance.

B. Hot-Water Piping: Comply with requirements in Division 23, Section 23 21 13 "Hydronic Piping" and Division 23, Section 23 21 16 “Hydronic Piping Specialties," and connect heating coils to supply with shutoff valve, strainer, control valve, and union or flange; and to return with balancing valve and union or flange.

C. Comply with requirements in Division 23, Section 23 31 13 "Metal Ducts" for connecting ducts to air terminal units.

D. Make connections to air terminal units with flexible connectors complying with requirements in Division 23, Section 23 33 00 "Air Duct Accessories."

3.4 IDENTIFICATION

A. Label each air terminal unit with plan number, nominal airflow, and maximum and minimum factory-set airflows.

B. Identify the location of each air terminal with an identification label affixed to the ceiling grid immediately below the location of the air terminal. The identification label shall have a white background with black lettering.

C. Comply with requirements in Division 20, Section 20 05 53 "Mechanical Identification" for equipment labels and warning signs and labels.

3.5 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. After installing air terminal units and after electrical circuitry has been energized, test for compliance with requirements.
2. Leak Test: After installation, fill water coils and test for leaks. Repair leaks and retest until no leaks exist.
3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Air terminal unit will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.6 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.

END OF SECTION 23 36 00

SECTION 23 37 13 - DIFFUSERS, REGISTERS, AND GRILLES

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.

B. Division 20, 20 05 00 “Common Work Results for Mechanical”, requirements apply to this section.

C. Division 23, Section 23 33 00 "Air Duct Accessories" for fire and smoke dampers and volume-control dampers not integral to diffusers, registers, and grilles.

1.2 SUMMARY

A. Section Includes:

1. Rectangular and square ceiling diffusers.
2. Perforated diffusers.
3. Adjustable bar registers.
4. Fixed face grilles.
5. Linear bar grilles.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated, include the following:

1. Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.
2. Diffuser, Register, and Grille Schedule: Indicate drawing designation, room location, quantity, model number, size, and accessories furnished.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from Installers of the items involved:

1. Ceiling suspension assembly members.
2. Method of attaching hangers to building structure.
3. Size and location of initial access modules for acoustical tile.
4. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, fire alarm devices, access panels, and special moldings.
5. Duct access panels.

B. Source quality-control reports.

PART 2 - PRODUCTS

2.1 CEILING DIFFUSERS

A. Rectangular and Square Ceiling Diffusers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. METALAIRE.
   b. Nailor Industries.
   c. Price Industries.
   d. Titus.

B. Perforated Diffuser:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. METALAIRE.
   b. Nailor Industries.
   c. Price Industries.
   d. Titus.

2.2 REGISTERS AND GRILLES

A. Adjustable Bar Register**:**

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. METALAIRE.
   b. Nailor Industries.
   c. Price Industries.
   d. Titus.

B. Fixed Face Grille**:**

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. METALAIRE.
   b. Nailor Industries.
   c. Price Industries.
   d. Titus.

C. Linear Bar Grille**:**

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. METALAIRE.
   b. Nailor Industries.
   c. Price Industries.
   d. Titus.

2.3 SOURCE QUALITY CONTROL

A. Verification of Performance: Rate diffusers, registers, and grilles according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas where diffusers, registers, and grilles are to be installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install diffusers, registers, and grilles level and plumb.

B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.

C. Install diffusers, registers, and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

D. Support flexible duct connectors at connection to air diffusion devices with “FLEXFLOW ELBOW” elastomeric duct elbow support as manufacturered by Thermaflex or approved equal.

3.3 ADJUSTING

A. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION 23 37 13

SECTION 26 0010 - GENERAL REQUIREMENTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

B. Division 01, Commissioning Requirements, applies to this section and will require the contractor participation in the commissioning process.

1.2 SUMMARY

A. This Section includes general administrative and procedural requirements for electrical systems provided under CSI Divisions 26, 27 and 28. The following requirements are included in this Section to supplement the requirements specified in Division 1 Specification Sections.

1.3 QUALITY ASSURANCE

A. Scope of Work: Furnish all labor, material, equipment, technical supervision, and incidental services required to complete, test and leave ready for operation the electrical systems as specified in the Divisions 26, 27 and 28 Specification sections and as indicated on Drawings.

B. Codes and Standards: Perform all Work in accordance with applicable Federal, State and local codes rules, ordinances and regulations. The electrical and physical properties of all materials, and the design, performance characteristics, and methods of construction of all items of equipment, shall be in accordance with the latest issue of the various, applicable Standards, Rules and Regulations of NFPA, NECA, UL, and as follows unless otherwise indicated.

1. A.N.S.I. - American National Standards Institute
2. A.S.T.M. - American Society for Testing Materials
3. I.C.E.A. - Insulated Cable Engineers Association
4. I.E.E.E. - Institute of Electrical and Electronics Engineers
5. N.E.C. - National Electrical Code
6. N.E.C.A. -National Electrical Contractors Association
7. N.E.M.A. - National Electrical Manufacturer's Association
8. U.L. - Underwriters Laboratories, Inc.

9. N.E.C.A. 1-2000, “Practices for Good Workmanship in Electrical Contracting (ANSI).”

C. Where available products included in the work shall be “Listed”, as defined in article 100 of the NEC, by a nationally recognized testing laboratory. The listing shall be acceptable to the authority having jurisdiction. The listing shall indicate that the product’s safety-related standards have been evaluated with regard to all reasonably foreseeable safety-related hazards, including fire, electrical shock and mechanical hazards.

D. Notify the Architect/Engineer before submitting a proposal should any changes in Drawings or Specifications be required to conform to the above codes, rules or regulations. After entering into Contract, make all changes required to conform to above ordinances, rules and regulations without additional expense to the Owner.

E. All materials shall be new unless indicated otherwise to reuse existing equipment.

F. Source Limitations: All equipment of the same or similar systems shall be by the same manufacturer.

G. Tests and Inspections: Perform all tests required by state, city, county and/or other agencies having jurisdiction. Provide all materials, equipment, etc., and labor required for tests.

H. Performance Requirements: Perform all work following practices for good workmanship, in accordance with the latest accepted standards and practices for the trades involved.

I. Sequence and Schedule: Work so as to avoid interference with the work of other trades. Be responsible for removing and relocating any work which in the opinion of the Owner’s Representatives causes interference.

1.4 CODES, PERMITS AND FEES

A. Unless otherwise indicated, all required permits, licenses, inspections, approvals and fees for electrical work shall be secured and paid for by the Contractor.

B. Rules of local utility companies shall be complied with. Coordinate with the utility companies supplying service to the installation and determine all required interface devices, including the following, and include the cost of all such items and all utilities costs in proposal. Including.

1. All current and potential transformers,
2. Meter boxes,
3. C.T. cabinets and meters which will be required.
4. Surge protection,
5. Raceway sizes,
6. Connection points.

C. Prepare any detailed Drawings or diagrams which may be required by the governing authorities or authorities having jurisdiction. Where the Drawings and/or Specifications indicate materials or construction in excess of code requirements, the Drawings and/or Specifications shall govern.

1.5 DRAWINGS

A. The Drawings show the location and general arrangement of equipment, electrical systems and related items. They shall be followed as closely as elements of the construction will permit.

B. Examine the Drawings of other trades and verify the conditions governing the work on the job site. Arrange work accordingly, providing such fittings, conduit, junction boxes and accessories as may be required to meet such conditions.

C. Deviations from the Drawings, with the exception of minor changes in routing and other such incidental changes that do not affect the functioning or serviceability of the systems, shall not be made without the written approval of the Architect/Engineer.

D. The architectural and structural Drawings take precedence in all matters pertaining to the building structure, mechanical Drawings in all matters pertaining to mechanical trades and electrical Drawings in all matters pertaining to electrical trades. Where there are conflicts or differences between the Drawings for the various trades, report such conflicts or differences to the Architect/Engineer for resolution.

E. Drawings are not intended to be scaled for rough-in or to serve as shop drawings. Take all field measurements required to complete the Work.

1.6 MATERIAL AND EQUIPMENT MANUFACTURERS

A. All items of equipment shall be furnished complete with all accessories normally supplied with the catalog items listed and all other accessories necessary for a complete and satisfactory operating system. All equipment and materials shall be new and shall be standard products of manufacturers regularly engaged in the production of electrical equipment and shall be of the manufacturer's latest design.

B. If an approved manufacturer is other than the manufacturer used as the basis for design, the equipment or product provided;

1. Shall be equal in size, quality, durability, appearance, capacity, and efficiency through all ranges of operation,

2. Shall conform with arrangements and space limitations of the equipment shown on the plans and/or specified,

3. Shall be compatible with the other components of the system,

4. Shall be by the same manufacturer, and

5. Shall comply with the requirements for Items Requiring Prior Approval specified in this section of the Specifications.

All costs to make these items of equipment comply with these requirements including, but not limited to, electrical work, mechanical work, controls work, technology work and building alterations shall be included in the original Bid.

1.7 INSPECTION OF SITE

A. Visit the site, examine and verify the conditions under which the Work must be conducted before submitting Proposal. The submitting of a Proposal implies that the Contractor has visited the site and understands the conditions under which the Work must be conducted. No additional charges will be allowed because of failure to make this examination or to include all materials and labor to complete the Work.

1.8 ITEMS REQUIRING PRIOR APPROVAL

A. Bids shall be based upon manufactured equipment specified. All items that the Contractor proposes to use in the Work that are not specifically named in the Contract Documents must be submitted for review prior to bids. Such items must be submitted in compliance with Division 1 specifications. Requests for prior approval must be accompanied by complete catalog information, including but not limited to, model, size, accessories, complete electrical information and performance data in the form given in the equipment schedule on the drawings at stated design conditions. Where items are referred to by symbolic designations on the drawings, all requests for prior approval shall bear the same designations.

1. Equipment to be considered for prior approval shall be equal in quality, durability, appearance, capacity and efficiency through all ranges of operation, shall fulfill the requirements of equipment arrangement and space limitations of the equipment shown on the plans and/or specified and shall be compatible with the other components of the system.

2. All costs incurred to make equipment comply with other requirements, including providing maintenance, clearance, electrical, replacement of other components, and building alterations shall be included in the original bid.

B. Voluntary alternates may be submitted for consideration, with listed addition or deduction to the bid.

1.9 SHOP DRAWINGS/SUBMITTALS

A. Submit project-specific submittals for review in compliance with Division 1.

B. All shop Drawings shall be submitted in groupings of similar and/or related items (lighting fixtures, switchgear, etc.). Incomplete submittal groupings will be returned unchecked.

C. If deviations (not substitutions) from Contract Documents are deemed necessary by the Contractor, details of such deviations, including changes in related portions of the project and the reasons therefore, shall be submitted with the submittal for approval.

D. Submit for approval shop drawings for all electrical systems and equipment as listed below. Where items are referred to by symbolic designation on the Drawings and in the Specifications, all submittals shall bear a similar designation (light fixtures, wiring devices, etc.) as identified on the Drawings and in the Specifications and shall be submitted together and under the same cover, unless requested otherwise. Refer to other sections of the electrical Specifications for additional requirements.

1. Wiring Devices
2. Lighting Control Devices
3. Enclosed Switches and Circuit Breakers
4. Transformers
5. Panelboards
6. Fuses
7. Interior Lighting
8. Digital Lighting Controls
9. Fire Alarm

1.10 COORDINATION DRAWINGS

1.11 OPERATION AND MAINTENANCE INSTRUCTIONAL MANUALS

A. Submit project specific Operation and Maintenance Instructional Manuals for review in compliance with Division 1 Specification Sections.

B. Provide complete operation and maintenance instructional manuals covering all electrical equipment herein specified, together with parts lists. Maintenance and operating instructional manuals shall be job specific to this project. Generic manuals are not acceptable. Four (4) copies of all literature shall be furnished for Owner and shall be bound in ring binder form. Maintenance and operating instructional manuals shall be provided when construction is approximately 75% complete.

C. The operating and maintenance instructions shall include a brief, general description for all mechanical systems including, but not limited to:

1. Routine maintenance procedures.

2. Lubrication chart listing all types of lubricants to be used for each piece of equipment and the recommended frequency of lubrication.

3. Trouble-shooting procedures.

4. Contractor's telephone numbers for warranty repair service.

5. Submittals.

6. Recommended spare parts lists.

7. Names and telephone numbers of major material suppliers and subcontractors.

8. System schematic drawings on 8-1/2" x 11" sheets.

1.12 RECORD DRAWINGS

A. Submit record drawings in compliance with Division 1.

B. Contractor shall submit to the Architect/Engineer, record drawings in portable device format which have been neatly marked to represent as-built conditions for all new electrical work.

C. The Contractor shall keep accurate note of all deviations from the construction documents and discrepancies in the underground concealed conditions and other items of construction on field drawings as they occur. The marked-up field documents shall be available for review by the Architect, Engineer and Owner at their request.

1.13 INSTRUCTION OF OWNER PERSONNEL

A. Before final inspection, instruct Owner's designated personnel in operation, adjustment, and maintenance of electrical equipment and systems at agreed upon times. A minimum of 4 hours of formal instruction to Owner's personnel shall be provided. Additional hours are specified in individual specification sections.

B. Use operation and maintenance manuals as basis for instruction. Review contents of manual with personnel in detail to explain all aspects of operation and maintenance.

C. In addition to individual equipment training provide overview of each electrical system. Utilize the as-built documents for this overview.

D. Prepare and insert additional data in operation and maintenance manual when need for such data becomes apparent during instruction, or as requested by Owner.

1.14 WARRANTY

A. Warranty: Comply with the requirements in Division 1 Specification Sections. Contractor shall warranty that the electrical installation is free from defects and agrees to replace or repair, to the Owner’s satisfaction, any part of this electrical installation which becomes defective within a period of one year (unless specified otherwise in other Division 26, 27 or 28 sections) from the date of substantial completion following final acceptance, provided that such failure is due to defects in the equipment, material, workmanship or failure to follow the contract documents.

B. Contractor shall be responsible for any and all temporary services including equipment and installation required to maintain operation as a result of any equipment failure or defect during warranty period.

C. File with the Owner any and all warranties from the equipment manufacturers including the operating conditions and performance capacities they are based on.

1.15 USE OF EQUIPMENT

A. The use of any equipment, or any part thereof for purposes other than testing even with the Owner's consent, shall not be construed to be an acceptance of the work on the part of the Owner, nor be construed to obligate the Owner in any way to accept improper work or defective materials.

B. Do not use Owner's lamps for temporary lighting except as allowed and directed by the Owner. Equip lighting fixtures with new lamps when the project is turned over to the Owner.

1.16 COORDINATION

A. Coordinate arrangement, mounting, and support of electrical equipment:

1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.

2. To provide for ease of disconnecting the equipment with minimum interference to other installations.

3. To allow right of way for piping and conduit installed at required slope.

4. So connecting raceways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.

B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

C. Coordinate location of access panels and doors for electrical items that are behind finished surfaces or otherwise concealed. Access doors and panels are specified in Division 8 Section "Access Doors and Frames."

D. Coordinate electrical testing of electrical, mechanical, and architectural items, so equipment and systems that are functionally interdependent are tested to demonstrate successful interoperability.

PART 2 - PRODUCTS

Not applicable.

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

A. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items. If mounting heights are not indicated, install to provide maximum possible physical space for access after installation without adding a hazardous situation. Contact the Architect for direction.

B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.

C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.

D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.

E. Right of Way: Give to raceways and piping systems installed at a required slope.

3.2 DEMOLITION WORK

A. All demolition of existing electrical equipment and materials will be done by this Contractor unless otherwise indicated. Include all items such as, but not limited to, electrical equipment, devices, lighting fixtures and associated conduit and wiring called out on the Drawings and as necessary whether such items are actually indicated on the Drawings or not in order to accomplish the installation of the specified new work. Remove abandoned wire and cable. Remove abandoned raceways unless removal will require extensive building wall or structure removal which was not part of the work. Abandoned raceways to remain shall be left in a safe and finished condition.

B. In general, demolition work is indicated on the Drawings. However, the Contractor shall visit the job site to determine the full extent and character of this work.

C. Unless specifically noted to the contrary, removed materials shall not be reused in the work. Salvaged materials that are to be reused shall be stored safe against damage and turned over to the appropriate trade for reuse. Salvaged materials of value that are not to be reused shall remain the property of the Owner unless such ownership is waived. Items on which the Owner waives ownership shall become the property of the Contractor, who shall remove and legally dispose of same, away from the premises.

D. Where equipment or fixtures are removed, outlets shall be properly blanked off, and conduits capped. After alterations are done, the entire installation shall present a "finished" look, as approved by the Architect/Engineer. The original function of the present electrical work to be

modified shall not be changed unless required by the specific revisions to the system as specified or as indicated.

E. Appropriately reroute lighting, power and technology wiring as required to maintain service to equipment and devices to remain. Where walls and ceilings are to be removed, the conduit is to be cut off by the Electrical Trades so that the abandoned conduit in these walls and ceilings may be safely removed. Plug the ends of conduits which cannot be removed and cannot be reused.

F. Where new walls and/or floors are installed which interfere with existing outlets, devices, etc., the Electrical Trades shall adjust, extend and reconnect such items as required to maintain continuity of same.

G. All electrical work in altered and unaltered areas shall be run concealed in finished spaces. Use of surface raceway or exposed conduits will be permitted only where approved by the Architect/Engineer.

H. Existing lighting shall be reused where indicated on plans. Reused fixtures shall be detergent cleaned, re-lamped and reconditioned suitable for satisfactory operation and appearance.

3.3 INSTALLATION OF EQUIPMENT

A. Install all equipment in strict accordance with all directions and recommendations furnished by the manufacturer. Where such directions are in conflict with the Drawings and Specifications, report such conflicts to the Architect/Engineer for resolution.

B. Prior to rough in, allow for flexibility, ten feet in any direction, in the final location of electrical system and wiring devices without additional cost to the Owner.

3.4 WORK IN EXISTING BUILDINGS

A. The Owner will provide access to existing buildings as required. Access requirements to occupied buildings shall be identified on the project schedule. The Contractor, once Work is started in the existing building, shall complete same without interruption so as to return work areas as soon as possible to Owner.

B. Adequately protect and preserve all existing and newly installed Work. Promptly repair any damage at Contractor's expense.

C. Consult with the Owner’s Representative as to the methods of carrying on the Work so as not to interfere with the Owner's operation any more than absolutely necessary. Accordingly, all service lines shall be kept in operation as long as possible and the services shall only be interrupted at such time as will be designated by the Owner's Representative.

D. Prior to starting work in any area, obtain approval for doing so from a qualified representative of the Owner who is designated and authorized by the Owner to perform testing and abatement of

all hazardous materials including but not limited to, asbestos. The Contractor shall not perform any inspection, testing, containment, removal or other work that is related in any way whatsoever to hazardous materials under the Contract.

3.5 TEMPORARY SERVICES

A. Provide and remove upon completion of the project, in accordance with the general conditions and as described in Division 1, complete temporary electrical and telecommunication (voice/data) services for use during construction.

3.6 DISPOSAL

A. Fluorescent Lamps

1. Fluorescent lamps are known to contain mercury and are classified as hazardous material. All fluorescent lamps shall be assumed to contain mercury unless tested and confirmed otherwise with a toxicity characteristic leaching procedure (TCLP).

2. Hazardous materials, including fluorescent lamps, shall be sent to a lamp recycling facility. The materials shall be properly packaged with labels that meet the Department of Transportation Regulations and stored in a secure location prior to transportation.

3. The Contractor shall identify the costs of the lamp disposal process including, but not limited to, the lamp packaging, storage, transportation, disposal, and any profile fees.

4. At the completion of the project, provide documentation to verify that the lamps have been properly disposed of in accordance with all local, state and federal guidelines.

B. Ballasts

1. Lighting ballasts manufactured prior to 1979 have been known to contain polychlorinated biphenyls (PCBs). Unless specifically noted on the ballast as containing "No PCBs," the ballast shall be assumed to contain components with PCB materials.

2. Hazardous materials (ballasts with PCBs), shall be disposed of at a hazardous waste incineration facility, or at a recycling facility in accordance with the Code of Federal Regulations as administered by the EPA in regards to this issue. The ballasts shall be packaged/stored in fifty-five gallon steel drums with labels that meet the Department of Transportation Regulations.

3. The Contractor shall identify the costs of the ballast disposal process including, but not limited to, the packaging, storage, transportation, disposal, and any profile fees.

4. Provide at completion of the project documentation (manifests) to verify that the ballasts have properly been disposed of in accordance with all local, state and federal guidelines.

3.7 ACCESS DOORS, CHASES AND RECESSES

A. Provided by the architectural trades, but the Contractor shall be responsible for their accurate location and size.

3.8 CUTTING, PATCHING AND DAMAGE TO OTHER WORK

A. Refer to General Conditions for requirements.

B. All cutting, patching and repair work shall be performed by the Contractor through approved, qualified subcontractors. Contractor shall include full cost of same in bid.

3.9 EQUIPMENT CONNECTIONS

A. As included in the work, make connections to equipment, motors, elevator controllers and associated equipment, lighting fixtures, and other items included in the work in accordance with the approved shop Drawings and rough-in measurements furnished by the manufacturers of the particular equipment furnished. All additional connections not shown on the Drawings, but called out by the equipment manufacturer's shop Drawings shall be provided.

3.10 CLEANING

A. All debris shall be removed daily as required to maintain the work area in a neat, orderly condition.

B. Final cleanup shall include, but not be limited to, washing of fixture lenses or louvers, switchboards, substations, motor control centers, panels, etc. Fixture reflectors and lenses or louvers shall be left with no water marks or cleaning streaks.

3.11 PROTECTION AND HANDLING OF EQUIPMENT AND MATERIALS

A. Equipment and materials shall be protected from theft, injury or damage.

B. Protect conduit openings with temporary plugs or caps.

C. Provide adequate storage for all equipment and materials delivered to the job site. Location of the space will be designated by the Owner's representative or Architect/Engineer. Equipment set in place in unprotected areas must be provided with temporary protection.

3.12 EXTRA WORK

A. For any extra electrical work which may be proposed, this Contractor shall furnish an itemized breakdown of the estimated cost of the materials and labor required to complete this work. Proceed only after receiving a written order establishing the agreed price and describing the

work to be done. Prior to any extra work which may be proposed, submit unit prices (same prices for increase/decrease of work) for the following items:

1. 1/2", 3/4", 1", 1-1/2" conduit;
2. #12, #10, #8, #6, #2 wire;
3. Receptacles,
4. GFCI receptacle,
5. Fire alarm devices,
6. Light Fixtures by type.
7. Lighting Control Devices

3.13 DRAWINGS AND MEASUREMENTS

A. These Specifications and accompanying Drawings are intended to describe and provide for finished work. They are intended to be cooperative, and what is called for by either shall be as binding as if called for by both. The Contractor understands that the work herein described shall be complete in every detail.

B. The Drawings are not intended to be scaled for rough-in measurements or to serve as Shop Drawings. Field measurements necessary for ordering materials and fitting the installation to the building construction and arrangement are the Contractor's responsibility. The Contractor shall check latest Architectural Drawings and locate light switches from same where door swings are different from Electrical Drawings.

END OF SECTION 26 0010

SECTION 26 0500 - COMMON WORK RESULTS FOR ELECTRICAL

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.

B. Division 01, Commissioning Requirements, apply to this section and all of Division 26 and 28, and will require the contractor participation in the Commissioning Process.

1.2 SUMMARY

A. Section Includes:

1. Electrical equipment coordination and installation.
2. Sleeves for raceways and cables.
3. Sleeve seals.
4. Grout.
5. Common electrical installation requirements.

1.3 DEFINITIONS

A. EPDM: Ethylene-propylene-diene terpolymer rubber.

1.4 COORDINATION

A. Coordinate arrangement, mounting, and support of electrical equipment:

1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
3. To allow right of way for piping and conduit installed at required slope.
4. So connecting raceways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.

B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

C. Coordinate location of access panels and doors for electrical items that are behind finished surfaces or otherwise concealed. Access doors and panels are specified in Division 08 Section "Access Doors and Frames."

D. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."

PART 2 - PRODUCTS

2.1 SLEEVES FOR RACEWAYS AND CABLES

A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.

B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral water stop, unless otherwise indicated.

C. Sleeves for Rectangular Openings: Galvanized sheet steel.

1. Minimum Metal Thickness:

a. For sleeve cross-section rectangle perimeter less than 50 inches and no side more than 16 inches, thickness shall be 0.052 inch.
b. For sleeve cross-section rectangle perimeter equal to, or more than, 50 inches and 1 or more sides equal to, or more than, 16 inches, thickness shall be 0.138 inch.

2.2 SLEEVE SEALS

A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.

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. Advance Products & Systems, Inc.
b. Calpico, Inc.
c. Metraflex Co.
d. Pipeline Seal and Insulator, Inc.

2. 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.
3. Pressure Plates: Plastic. Include two for each sealing element.
4. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.3 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

A. Comply with NECA 1.

B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.

C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.

D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.

E. Right of Way: Give to piping systems installed at a required slope.

3.2 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Electrical penetrations occur when raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.

B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.

C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.

D. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.

E. Cut sleeves to length for mounting flush with both surfaces of walls.

F. Extend sleeves installed in floors 2 inches above finished floor level.

G. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway or cable, unless indicated otherwise.

H. Seal space outside of sleeves with grout for penetrations of concrete and masonry
   1. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.

I. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants."

J. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves and seal raceway and cable penetration sleeves with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping."

K. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.

L. 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.

M. Underground, Exterior-Wall Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch annular clear space between raceway or cable and sleeve for installing mechanical sleeve seals.

3.3 SLEEVE-SEAL INSTALLATION

A. Install to seal exterior wall penetrations.

B. Use type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.4 FIRESTOPPING

A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for electrical installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

END OF SECTION 26 0500

SECTION 26 0519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

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 the following:
   1. Building wires and cables rated 600 V and less.
   2. Connectors, splices, and terminations rated 600 V and less.

B. Related Sections include the following:

C.
   1. Division 27 Section “Communications Horizontal Cabling” for cabling used for voice and data circuits.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Qualification Data: For testing agency.

C. Field quality-control test reports.

1.4 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.
   1. 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.

1.5 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. Available Manufacturers: Subject to compliance with requirements, 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. American Insulated Wire Corp.; a Leviton Company.
   3. General Cable Corporation.
   4. Senator Wire & Cable Company.
   5. Southwire Company.

B. Copper Conductors: Comply with NEMA WC 70.

C. Conductor Insulation: Comply with NEMA WC 70 for Types THHN-THWN, XHHW, and SO.

D. Multi-conductor Cable: Comply with NEMA WC 70 for metal-clad cable, Type MC and Type SO with ground wire. Metal-clad cable armor shall be steel.

E. Fire-resistive Cable: Comply with NEMA WC 70. Cable shall be UL labeled as 2-hour fire-rated, type MI mineral-insulated with nickel-clad copper conductor, magnesium oxide insulation, copper alloy sheath, and rated 600 volts. Provide factory installed terminations or field termination kits from the same manufacturer as the cable.
   1. Pentair Pyrotenax
   2. In lieu of the mineral-insulated cable above, a 2-hour fire rated metal clad cable may be substituted. Provide RSCC & Cable VITALink.
   3.

F. VFD Cable
   1. Type MC-HL: Comply with NEMA WC 70/ICEA S-95-658 and UL 1277.
   2. Cable designed for use with VFD/ASDs, with oversized crosslinked polyethylene insulation (XLPE), continuous corrugated welded armor, three bare stranded ground conductors, and sunlight- and oil-resistant outer PVC jacket.
   3. Provide termination fittings as recommended by manufacturer.

G. Aluminum Conductor
   1. Aluminum conductors are **not** permitted. All conductors shall be copper.

2.2 CONNECTORS AND SPLICES

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. AFC Cable Systems, Inc.
   2. Hubbell Power Systems, Inc.
   3. O-Z/Gedney; EGS Electrical Group LLC.
   4. 3M; Electrical Products Division.

5. Tyco Electronics Corp.
6. Thomas & Betts

B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material type, and class for application and service indicated.

C. Push in connectors shall not be provide.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: Copper. Stranded.

B. Branch Circuits: Copper. Unless indicated otherwise, solid for conductors #12AWG and smaller, stranded for conductors #10AWG and larger

C. Equipment circuits shall be copper, where required by manufacturer's recommendations or direction.

D. Minimum Conductor Sizes:
1. Feeders and Branch Circuits: No. 12 AWG.
2. Class 1 Control Circuits: No. 14 AWG.
3. Class 2 Control Circuits: No. 16 AWG.

E. Unless indicated otherwise, power circuits shall be 2#12, 1#12G, ¾"C.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Service Entrance: Type THHN-THWN or Type XHHW single conductors in raceway.

B. Fire Pump Service Entrance: Type THHN-THWN or Type XHHW, single conductors in raceway, installed below floor slab or installed in at least 3 inches of concrete, or 2-hour fire-resistive cable.

C. Emergency Feeder Circuits: Type THHN-THWN or Type XHHW, single conductors in raceway, installed below floor slab, installed in fully sprinkled spaces or installed in a minimum 2-hour fire rated system or shall be a 2-hour fire-resistive cable system.

D. Exposed Feeders: Type THHN-THWN, single conductors in raceway.

E. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspaces: Type THHN-THWN, single conductors in raceway.

F. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-THWN or Type XHHW, single conductors in raceway.

G. Feeders installed below Raised Flooring: Type THHN-THWN, single conductors in raceway.

H. Exposed Branch Circuits, including in Crawlspaces: Type THHN-THWN, single conductors in raceway.

I. Branch Circuits Concealed in Inaccessible Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway.
   1. Type MC Cable is permitted for installation of new devices in existing walls that are not part of the demolition scope. MC cable shall be limited to vertical runs within the walls. All horizontal (above ceiling) runs and homeruns shall be EMT. MC cable shall not be used for switch box connections or installed horizontally between boxes.

J. Edit the paragraph below to allow MC Cable as the Owner permits. Coordinate allowable lengths with the Owner.

K. Branch Circuits in Accessible Ceiling Spaces:
   1. Type THHN-THWN, single conductors in raceways, or
   2. Type MC Cable in lengths 6'-0" or less used for final whip from junction box to luminaires.
      a. MC Cable approved as a means of grounding may be used in lengths greater than 6'-0" within a single space for luminaire branch circuits. Homeruns back to panel shall be hard piped.
   3. OR

L. Branch Circuits Gypsum-Board Partitions: Type THHN-THWN, single conductors in raceways.
   1. Type MC Cable is permitted for installation of new devices in existing walls that are not part of the demolition scope. MC cable shall be limited to vertical runs within the walls. All horizontal (above ceiling) runs and homeruns shall be EMT. MC cable shall not be used for switch box connections or installed horizontally between boxes.

M. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-THWN, single conductors in raceway.

N. Branch Circuits Installed below Raised Flooring: Type THHN-THWN, single conductors in raceway.

O. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.

P. Class 1 Control Circuits: Type THHN-THWN, in raceway.

Q. Class 2 Control Circuits: Type THHN-THWN, in raceway, Power-limited cable, concealed in building finishes (not allowed in exposed ceiling of finished spaces), or Power-limited tray cable, in cable tray.

R. Motor branch circuits, which include a variable frequency drive (VFD): Provide VFD cable from the source overcurrent protection device to the motor. Shields shall be maintained electrically continuous and shall be terminated to the building ground system.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

A. For circuits that require a neutral conductor, provide a dedicated neutral back to the panelboard.

B. 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.

C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, which will not damage cables or raceway.

D. Identify and color-code conductors and cables according to Division 26 Section "Identification for Electrical Systems."

E. Do not install conductors supplied from different panelboards, distribution panels, or switchboards in same conduit or raceway, unless otherwise noted.

F. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.

G. Install cables parallel and perpendicular to surfaces of structural members, and follow surface contours where possible.

H. Do not route cables directly through panelboards, switchboards, motor starting equipment and similar equipment, as part of the cable pathway.

I. Support cables according to Division 26 Section "Hangers and Supports for Electrical Systems."

3.4 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 and UL 486B.

B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches (150 mm) of slack.

3.5 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Division 07 Section "Penetration Firestopping."

3.6 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections and prepare test reports.

B. Tests and Inspections:
   1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance conductors and feeder conductors and conductors feeding the following critical equipment and services for compliance with requirements.
      a. Conductors to the Fire Pump.
   2. Perform each electrical, visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification, including but not limited to the following:
      a. Bolted connection resistance,
      b. Insulation resistance with respect to ground and adjacent conductors,

c. Continuity verification,
d. Phase verification,
e. Resistance of parallel conductors.

3. Certify compliance with test parameters.

C. Test Reports: Prepare a written report to record the following:
1. Test procedures used.
2. Test results that comply with requirements.
3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

D. Remove and replace malfunctioning units and retest as specified above.

3.7 VOLTAGE DROP

A. Voltage drop shall not exceed two percent for feeder conductors.

B. Voltage drop shall not exceed three percent for branch conductors. Refer to table below for maximum permitted branch conductor lengths at rated voltages for indicated OCP. Where lengths are exceeded due to revised routing, calculate the voltage drop and provide the appropriate conductor size to achieve the maximum allowable voltage drop.

C.

D. E. Voltage Configuration	F. #12 AWG G. 20 amp OCP	H. #10 AWG I. 20 amp OCP	J. #10 AWG K. 30 amp OCP	L. #8 AWG M. 40 amp OCP	N. #6 AWG O. 50 amp OCP
P. 120V, single phase	Q. 56 feet	R. 93 feet	S. 62 feet	T. 72 feet	U. 91 feet
V. 208V, single phase	W. 97 feet	X. 162 feet	Y. 108 feet	Z. 124 feet	AA. 159 feet
BB. 240V, single phase	CC. 112 feet	DD. 187 feet	EE. 125 feet	FF. 144 feet	GG. 183 feet
HH. 277V, single phase	II. 129 feet	JJ. 216	KK. 144	LL. 166	MM. 211

		feet	feet	feet	feet
NN. 480V, single phase	OO. 225 feet	PP. 374 feet	QQ. 249 feet	RR. 288 feet	SS. 367 feet
TT. 208V, three phase	UU. 112 feet	VV. 187 feet	WW. 100 feet	XX. 115 feet	YY. 133 feet
ZZ. 240V, three phase	AAA. 103 feet	BBB. 173 feet	CCC. 125 feet	DDD. 144 feet	EEE. 183 feet
FFF. 480V, three phase	GGG. 259 feet	HHH. 433 feet	III. 288 feet	JJJ. 333 feet	KKK. 424 feet

LLL. Note: Table assumptions include copper conductors at 80% load capacity, 1.0 power factor, 75ºC temperature rating, EMT conduit, and three percent voltage drop.

END OF SECTION 26 0519

SECTION 26 0526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

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 methods and materials for grounding systems and equipment.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Other Informational Submittals: Plans showing dimensioned as-built locations of grounding features specified in Part 3 "Field Quality Control" Article, including the following:
   1. Test wells.
   2. Ground rods.
   3. Ground rings.

C. Field quality-control test reports.

1.4 QUALITY ASSURANCE

A. 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.

B. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Thomas & Betts
   2. Burndy
   3. ERICO

B. Listed and labeled by a nationally recognized testing laboratory acceptable to authorities having jurisdiction for applications in which used, and for specific types, sizes, and combinations of conductors and other items connected.

2.2 CONDUCTORS

A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

B. Bare Copper Conductors:
   1. Solid Conductors: ASTM B 3.
   2. Stranded Conductors: ASTM B 8.
   3. Tinned Conductors: ASTM B 33.
   4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch in diameter.
   5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
   6. Bonding Jumper: Copper tape, braided conductors, terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
   7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors, terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

C. Grounding Bus: Rectangular bars of annealed copper, size as indicated on electrical drawing E502; with insulators. Where not otherwise indicated, provide 24”L by 1/4”D by 4”H.

2.3 CONNECTORS

A. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, bolted pressure-type, with at least two bolts.
   1. Pipe Connectors: Clamp type, sized for pipe.

B. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

C. Compression Connectors: Irreversible, factory filled with an oxide inhibitor. Connectors must comply with IEEE837, UL467 and CSA22.2

2.4 GROUNDING ELECTRODES

2.5 IEEE 837 compliant grounding connectors

A. UL467 Grounding and Bonding Equipment

B. Ground Rods: Copper-clad steel; 3/4 inch by 10 feet.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Conductors: stranded unless otherwise indicated.

B. Underground Grounding Conductors: Install bare tinned-copper conductor, No. 2/0 AWG minimum.
   1. Bury at least 24 inches below grade.

2. Duct-Bank Grounding Conductor: Bury 12 inches above duct bank when indicated as part of duct-bank installation.

C. Isolated Grounding Conductors: Green-colored insulation with continuous yellow stripe. On feeders with isolated ground, identify grounding conductor where visible to normal inspection, with alternating bands of green and yellow tape, with at least three bands of green and two bands of yellow.

D. Grounding Bus: Install in electrical rooms, in rooms housing service equipment, and elsewhere as indicated. Refer to technology plans for additional requirements for MFD/IDF rooms.
1. Install bus on insulated spacers 1 inch, minimum, from wall 6 inches above finished floor, unless otherwise indicated.
2. Where indicated on both sides of doorways, route bus up to top of door frame, across top of doorway, down to specified height above floor, and connect to horizontal bus.
3. Provide No. 3/0 AWG minimum insulated copper grounding conductor in raceway from grounding bus to neutral bus service entrance equipment, unless noted otherwise on plans.

E. Conductor Terminations and Connections:
1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground or Encased in Concrete Connections: Welded or compression, except at test wells and as otherwise indicated.
3. Aboveground and exposed: Welded or compression connectors except at test wells and as otherwise indicated.
4. Connections to Ground Rods at Test Wells: Bolted connectors.
5. Connections to Structural Steel: Welded connectors.
6. Compression connectors shall be installed with the same manufactures die so that the die index matches the listed index on the connector. Connector must be fully crimped with a 14 ton or larger hydraulic tool so that the index number is indented on the connector.

3.2 GROUNDING UNDERGROUND DISTRIBUTION SYSTEM COMPONENTS

A. Comply with IEEE C2 grounding requirements.

B. Grounding Manholes and Handholes: Install a driven ground rod through manhole or handhole floor, close to wall, and set rod depth so 4 inches will extend above finished floor. If necessary, install ground rod before manhole is placed and provide No. 1/0 AWG bare, tinned-copper conductor from ground rod into manhole through a waterproof sleeve in manhole wall. Protect ground rods passing through concrete floor with a double wrapping of pressure-sensitive insulating tape or heat-shrunk insulating sleeve from 2 inches above to 6 inches below concrete. Seal floor opening with waterproof, non-shrink grout.

C. Grounding Connections to Manhole Components: Bond exposed-metal parts such as inserts, cable racks, pulling irons, ladders, and cable shields within each manhole or handhole, to ground rod or grounding conductor. Make connections with No. 4 AWG minimum, stranded, hard-drawn copper bonding conductor. Train conductors level or plumb around corners and fasten to manhole walls. Connect to cable armor and cable shields as recommended by manufacturer of splicing and termination kits.

D. Pad-Mounted Transformers and Switches: Install two ground rods and ground ring around the pad. Ground pad-mounted equipment and noncurrent-carrying metal items associated with substations by connecting them to underground cable and grounding electrodes. Install tinned-

copper conductor not less than No. 2 AWG for ground ring and for taps to equipment grounding terminals. Bury ground ring not less than 6 inches from foundation.

E. Pad-Mounted Generators: Install two ground rods and ground ring around the pad. Ground generator housing and noncurrent-carrying metal items associated with generator by connecting them to underground cable and grounding electrodes. Install tinned-copper conductor not less than No. 2 AWG for ground ring and for taps to equipment grounding terminals. Bury ground ring not less than 6 inches from the foundation.

3.3 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with all feeders and branch circuits.

B. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.

C. Water Heater, Heat-Tracing, and Antifrost Heating Cables: Install a separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.

D. Isolated Grounding Receptacle Circuits: Install an insulated equipment grounding conductor connected to the receptacle grounding terminal. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service, unless otherwise indicated.

E. Isolated Equipment Enclosure Circuits: For designated equipment supplied by a branch circuit or feeder, isolate equipment enclosure from supply circuit raceway with a nonmetallic raceway fitting listed for the purpose. Install fitting where raceway enters enclosure, and install a separate insulated equipment grounding conductor. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service, unless otherwise indicated.

F. Signal and Communication Equipment: For telephone, alarm, voice and data equipment rooms, MDF and IDF rooms, and other communication equipment, provide No. 4 AWG minimum insulated grounding conductor in raceway from grounding electrode system to each service location, terminal cabinet, wiring closet, and central equipment location.
   1. Service and Central Equipment Locations and Wiring Closets: Terminate grounding conductor on a 24-by-1/4-by-2-inch grounding bus.
   2. Terminal Cabinets: Terminate grounding conductor on cabinet grounding terminal.

3.4 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible, unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. Common Ground Bonding with Lightning Protection System: Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system. Bond electrical power system ground directly to lightning protection system grounding conductor at closest point to electrical service grounding electrode. Use bonding conductor sized same as system grounding electrode conductor, and install in a conduit.

C. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade, unless otherwise indicated.
   1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Use exothermic-welded or compression connections without exposing steel or damaging coating, if any.
   2. For grounding electrode system, install at least three rods, unless documented otherwise, spaced at least one-rod length from each other and located at least the same distance for other grounding electrodes, and connect to the service grounding electrode conductor.

D. Test Wells: Ground rod driven through drilled hole in bottom of handhole. Handholes are specified in Division 26 Section “Underground Ducts and Raceways for Electrical Systems” and shall be at least 12 inches deep, with cover.
   1. Test Wells: Install at least one test well for each service, unless otherwise indicated. Install at the ground rod electrically closest to service entrance. Set top of test well flush with finished grade or floor.

E. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance, except where routed through short lengths of conduit.
   1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
   2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install so vibration is not transmitted to rigidly mounted equipment.
   3. Use exothermic-welded connectors for outdoor locations, but if a disconnect-type connection is required, use a bolted clamp.

F. Wiring Devices:
   1. Install a 6 inch (150mm) green insulated pigtail from grounding terminal of wiring device to device box and equipment grounding conductor.
   2. For lighting fixtures, install insulated grounding conductor and terminate to terminal on lighting fixture housing.
   3. For electric motors, install an insulated equipment grounding conductor in branch circuit serving each electric motors, and bond to motor frame.

G. Grounding and Bonding for Piping:
   1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes, using a bolted clamp connector or by bolting a lug-type connector to a pipe flange, using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
   2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
   3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

H. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install bonding jumper to bond across flexible duct connections to achieve continuity.

I. Grounding for Steel Building Structure: Install a driven ground rod at base of each corner column and at intermediate exterior columns at distances not more than 60 feet apart. Install tinned-copper conductor not less than No. 2/0 AWG for tap to building steel.

J. Structural Steel and Catwalks: Provide braided bonding jumpers at building expansion joints to make building steel electrically continuous. Bond catwalks to building steel with braided bonding jumpers. Terminate bonding jumpers with exothermic welds.

K. Transformer Secondary Neutrals:
1. Reference detail on drawing E503.
2. Looping grounding conductors from transformer to transformer shall not be allowed.

L. Cable Tray: Provide bonding jumpers where required to make cable tray electrically continuous throughout. Provide No. 4 AWG minimum insulated copper grounding conductor in raceway from grounding electrode system to cable tray system, bonded to cable tray.

M. Ufer Ground (Concrete-Encased Grounding Electrode): Fabricate according to NFPA 70, using a minimum of 20 feet of bare copper conductor not smaller than No. 4 AWG.

N.
1. If concrete foundation is less than 20 feet long, coil excess conductor within base of foundation.
2. Bond grounding conductor to reinforcing steel in at least four locations and to anchor bolts. Extend grounding conductor below grade and connect to building grounding grid or to grounding electrode external to concrete.

3.5 FIELD QUALITY CONTROL

A. Perform the following tests and inspections and prepare test reports:
1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
2. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal at ground test wells and at individual ground rods. Make tests at ground rods before any conductors are connected.
   a. Measure ground resistance not less than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
   b. Perform tests by fall-of-potential method according to IEEE 81.
   c.
3. Prepare dimensioned drawings locating each test well, ground rod and ground rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order and key to the record of tests and observations. Include the number of rods driven and their depth at each location, and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.

B. Report measured ground resistances that exceed the following values:
1.
2. Power and Lighting Equipment or System with Capacity 500 kVA and Less: 10 ohms.
3. Power and Lighting Equipment or System with Capacity 500 to 1000 kVA: 5 ohms.
4. Power and Lighting Equipment or System with Capacity More Than 1000 kVA: 3 ohms
5. Power Distribution Units or Panelboards Serving Electronic Equipment: 3 ohm(s).
6. Substations and Pad-Mounted Equipment: 5 ohms.
7. Manhole Grounds: 10 ohms.

C. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION 26 0526

SECTION 26 0529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

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 the following:
   1. Hangers and supports for electrical equipment and systems.
   2. Construction requirements for concrete bases.

1.3 DEFINITIONS

A. EMT: Electrical metallic tubing.

B. IMC: Intermediate metal conduit.

C. RMC: Rigid metal conduit.

1.4 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.

1.5 SUBMITTALS

A. Product Data: For the following:
   1. Steel slotted support systems.
   2. Nonmetallic slotted support systems.

1.6 QUALITY ASSURANCE

A. Comply with NFPA 70.

1.7 COORDINATION

A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.

B. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Division 07 Section "Roof Accessories."

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems (Adjustable and Fixed Length): Comply with MFMA-4, factory-fabricated components for field assembly.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Allied Tube & Conduit.
      b. Cooper B-Line, Inc.; a division of Cooper Industries.
      c. ERICO International Corporation.
      d. GS Metals Corp.
      e. Thomas & Betts Corporation.
      f. Unistrut; Tyco International, Ltd.
      g. Wesanco, Inc.
   2. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
   3. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
   4. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
   5. Channel Dimensions: Selected for applicable load criteria.

B. Nonmetallic Slotted Support Systems: Structural-grade, factory-formed, glass-fiber-resin channels and angles with 9/16 inch-diameter holes at a maximum of 8 inches o.c. in at least 1 surface.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   2.
      a. Allied Tube and Conduit.
      b. Cooper B-Line, Inc.; a division of Cooper Industries.
      c. Fabco Plastics Wholesale Limited.
      d. Seasafe, Inc.
   3. Fittings and Accessories: Products of channel and angle manufacturer and designed for use with those items.
   4. Fitting and Accessory Materials: Same as channels and angles, except metal items may be stainless steel.
   5. Rated Strength: Selected to suit applicable load criteria.

C. Raceway and Cable Supports: As described in NECA 1 and NECA 101.

D. Conduit and Cable Support Devices: Steel and malleable-iron hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

E. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored 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 malleable iron.

F. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

G. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
   1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened Portland cement concrete, steel or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
   2.
      a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      b.
         1) Hilti, Inc.
         2) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
         3) MKT Fastening, LLC.
         4) Simpson Strong-Tie Co., Inc.; Masterset Fastening Systems Unit.
   3. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened Portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
      a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
         1) Cooper B-Line, Inc.; a division of Cooper Industries.
         2) Empire Tool and Manufacturing Co., Inc.
         3) Hilti Inc.
         4) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
         5) MKT Fastening, LLC.
   4. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
   5. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
   6. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
   7. Toggle Bolts: All-steel springhead type.
   8. Hanger Rods: Threaded steel.

2.2 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 Division 05 Section "Metal Fabrications" for steel shapes and plates.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with NECA 1,NECA 101, and the NEC for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.

B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as scheduled in NECA 1, where it's Table 1 lists maximum spacings less than stated in NFPA 70. Minimum rod size shall be 1/4 inch in diameter.

C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.

1. Secure raceways and cables to these supports with clamps approved for the application by an agency acceptable to the authorities having jurisdiction.

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, as permitted in 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 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 reinforcing bars.

F. Adjustable length slotted steel supports shall be clamped to a fixed length, per manufacturer’s instructions to maintain weight support restrictions recommended by the manufacturer.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

A. Comply with installation requirements in Division 05 Section "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 Division 03 Section "Cast-in-Place Concrete."

C. Anchor equipment to concrete base.
   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. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 26 0529

SECTION 26 0533 - RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

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 raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

B. Related Sections include the following:
   1. Division 26 Section "Underground Ducts and Raceways for Electrical Systems" for exterior ductbanks, manholes, and underground utility construction.

1.3 DEFINITIONS

A. EMT: Electrical metallic tubing.

B. FMC: Flexible metal conduit.

C. IMC: Intermediate metal conduit.

D. LFMC: Liquidtight flexible metal conduit.

E. RNC: Rigid nonmetallic conduit.

1.4 SUBMITTALS

A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

B. Shop Drawings: For the following raceway components, include plans, elevations, sections, details and attachments to other work:
   1. Custom enclosures and cabinets.

1.5 COORDINATION

A. Create Coordination Drawings for use in raceway installation.
   1. Create conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
      a. Structural members in the paths of conduit groups with common supports.
      b. HVAC and plumbing items and architectural features in the paths of conduit groups with common supports.

B. Manufacturer Seismic Qualification Certification: Submit certification that enclosures and cabinets and their mounting provisions, including those for internal components, will withstand seismic forces defined in Division 26 Section "Vibration and Seismic Controls for Electrical Systems". Include the following:
   1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
   2.
      a. The term "withstand" means "the cabinet or enclosure will remain in place without separation of any parts when subjected to the seismic forces specified".
   3. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
   4. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

C. Qualification Data: For professional engineer and testing agency.

D. Source quality-control test reports.

1.6 QUALITY ASSURANCE

A. 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.

B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 METAL CONDUIT AND TUBING

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work limited to, the following:
   1. AFC Cable Systems, Inc.
   2. Alflex Inc.
   3. Allied Tube & Conduit; a Tyco International Ltd. Co.
   4. Anamet Electrical, Inc.; Anaconda Metal Hose.
   5. Electri-Flex Co.
   6. Manhattan/CDT/Cole-Flex.
   7. Maverick Tube Corporation.
   8. O-Z Gedney; a unit of General Signal.
   9. Wheatland Tube Company.
   10. Thomas & Betts

B. Rigid Steel Conduit: ANSI C80.1.

C. Aluminum Rigid Conduit: ANSI C80.5.

D. IMC: ANSI C80.6.

E. ANSI C80.6 standard for electrical intermediate metal conduit

F. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit IMC.
   1. Comply with NEMA RN 1.
   2. Coating Thickness: 0.040 inch, minimum.

G. EMT: ANSI C80.3.

H. ANSI C80.3 american national standard for electrical metallic tubing steel

I. FMC: Zinc-coated steel.

J. LFMC: Flexible steel conduit with PVC jacket.

K. Fittings for Conduit (Including all Types and Flexible and Liquidtight), EMT, and Cable: NEMA FB 1; listed for type and size raceway with which used, and for application and environment in which installed.
   1.
   2. Conduit Fittings for Hazardous (Classified) locations. Comply with UL 886.
   3. Fittings for EMT: set screw or compression type.
   4. Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with the provided raceways as required for complete system.
   5. Coating for Fittings for PVC-Coated Conduit: Minimum thickness, 0.040 inch, with overlapping sleeves protecting threaded joints.

L. Joint Compound for Rigid Steel Conduit or IMC: Listed for use in cable connector assemblies, and compounded for use to lubricate and protect threaded raceway joints from corrosion and enhance their conductivity.

2.2 NONMETALLIC CONDUIT AND TUBING

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. AFC Cable Systems, Inc.
   2. Anamet Electrical, Inc.; Anaconda Metal Hose.
   3. Arnco Corporation.
   4. CANTEX Inc.
   5. CertainTeed Corp.; Pipe & Plastics Group.
   6. Condux International, Inc.
   7. ElecSYS, Inc.
   8. Electri-Flex Co.
   9. Thomas & Betts; Carlon Electrical Products.
   10. Manhattan/CDT/Cole-Flex.
   11. RACO; a Hubbell Company.
   12. Thomas & Betts Corporation.

B. RNC: NEMA TC 2, Type EPC-40-PVC, unless otherwise indicated.

C. NEMA TC 2 Electrical Polyvinyl Chloride (PVC) Conduit

D. Fittings for RNC: NEMA TC 3; match to conduit or tubing type and material.
   1. Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with the provided raceways as required for complete system.

2.3 OPTICAL FIBER/COMMUNICATIONS CABLE RACEWAY AND FITTINGS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Arnco Corporation.
   2. Endot Industries Inc.
   3. IPEX Inc.
   4. Lamson & Sessions; Carlon Electrical Products.
   5. Legrand Ortronics

B. Description: Comply with UL 2024; flexible type, approved for plenum installation.
   a) Plenum - Evaluated for installation in other spaces used for environmental air in accordance with the National Electrical Code, ceiling cavity plenums and raised floor plenums in accordance with NFPA 76 and NFPA 90A as well as riser and general purpose applications.
   b) Riser - Evaluated for installation in risers in accordance with the National Electrical Code and NFPA 76 as well as general purpose applications.
   c) General Use - Evaluated for general purpose applications only in accordance with the National Electrical Code and NFPA 76

2.4 METAL WIREWAYS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Cooper B-Line, Inc.
   2. Hoffman.
   3. Legrand Cablofil
   4. Square D; Schneider Electric.

B. Description: Sheet metal sized and shaped as indicated, NEMA 250, Type 1, 12, or 3R (as required by location), unless otherwise indicated.

C. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

D. Wireway Covers: Small sizes (4 inches by 4 inches and smaller) shall be hinged type with fastening device. Larger sizes shall be provided with a screw-cover and gasket.

E. Finish: Manufacturer's standard enamel finish.

2.5 NONMETALLIC WIREWAYS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Hoffman.
   2. Lamson & Sessions; Carlon Electrical Products.

B. Description: Fiberglass polyester, extruded and fabricated to size and shape indicated, with no holes or knockouts. Cover is gasketed with oil-resistant gasket material and fastened with captive screws treated for corrosion resistance. Connections are flanged, with stainless-steel screws and oil-resistant gaskets.

C. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

2.6 SURFACE RACEWAYS

A. Surface Metal Raceways: Galvanized steel with snap-on covers. Manufacturer's standard enamel finish in color selected by Architect.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Legrand Wiremold
      b. Panduit Corp

B. Surface Nonmetallic Raceways: Two-piece construction, manufactured of rigid PVC with texture and color selected by Architect from manufacturer’s standard colors.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Enduro Systems, Inc.; Composite Products Division.
      b. Hubbell Incorporated; Wiring Device-Kellems Division.
      c. Lamson & Sessions; Carlon Electrical Products.
      d. Panduit Corp.
      e. Legrand Wiremold

C. Surface Aluminum Raceways: Two-piece construction, manufactured of extruded anodized aluminium with texture and color selected by Architect from manufacturer’s standard colors.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Enduro Systems, Inc.; Composite Products Division.
      b. Hubbell Incorporated; Wiring Device-Kellems Division.
      c. Lamson & Sessions; Carlon Electrical Products.
      d. Panduit Corp.
      e. Legrand Wiremold

2.7 BOXES, ENCLOSURES, AND CABINETS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.
   2. EGS/Appleton Electric.
   3. Erickson Electrical Equipment Company.
   4. Hoffman.
   5. Hubbell Incorporated; Killark Electric Manufacturing Co. Division.
   6. O-Z/Gedney; a unit of General Signal.
   7. RACO; a Hubbell Company.
   8. Robroy Industries, Inc.; Enclosure Division.
   9. Scott Fetzer Co.; Adalet Division.
   10. Spring City Electrical Manufacturing Company.
   11. Thomas & Betts Corporation.
   12. Legrand Wiremold
   13. Woodhead, Daniel Company; Woodhead Industries, Inc. Subsidiary.

B. Sheet Metal Outlet and Device Boxes: NEMA OS 1, one piece cold drawn type, welded boxes are not acceptable.

C. NEMA OS 1 Sheet-Steel Outlet Boxes, Device Boxes, Covers and Box SupportsCast-Metal Outlet and Device Boxes: NEMA FB 1, Type FD, with gasketed cover.

D. NEMA FB 1 Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable

E. Nonmetallic Outlet and Device Boxes: NEMA OS 2. NEMA OS 2 Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports

F. Metal Floor Boxes Cast or sheet metal (as required by location) fully adjustable, rectangular.

G. Non-metallic Floor Boxes: Nonadjustable round.

H. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

I. Cast-Metal Access, Pull, and Junction Boxes: NEMA FB 1, with gasketed cover.

J. Dividers: Provide listed dividers inside multi-gang boxes where required to separate phases.

K. Metal barriers to separate wiring of different systems and voltages exceeding 150V.

L. Hinged-Cover Enclosures: 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. Nonmetallic Enclosures: Plastic.

M. 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.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below, unless otherwise indicated:
   1. Exposed Conduit: Rigid steel conduit, IMC, or RNC, Type EPC-40-PVC.
   2. Concealed Conduit, Aboveground: Rigid steel conduit, IMC , or RNC, Type EPC-40-PVC.
   3. Underground Conduit: RNC, Type EPC-40-PVC, direct buried.
   4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
   5. Boxes and Enclosures, Aboveground: NEMA 250, Type 4.

B. Comply with the following indoor applications, unless otherwise indicated:
   1. Exposed, Not Subject to Physical Damage: Rigid steel conduit, IMC or EMT.
   2. Exposed and Subject to Severe Physical Damage: Rigid steel conduit or IMC. Includes raceways in the following locations:
      a. Loading dock.
      b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.

c. Mechanical rooms.

3. Concealed in Ceilings and Interior Walls and Partitions: Rigid steel conduit, IMC or EMT.
4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
5. Damp or Wet Locations: Rigid steel conduit or IMC.
6. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 3R in damp or wet locations and NEMA 250, Type 4 stainless steel in kitchen areas.
7. Raceways for Optical Fiber or Communications Cable in Spaces Used for Environmental Air: EMT. Conduit ends shall be provided plastic bushings.
8. Raceways for Optical Fiber or Communications Cable Risers in Vertical Shafts: EMT. Conduit ends shall be provided plastic bushings.
9. Raceways for Concealed General Purpose Distribution of Optical Fiber or Communications Cable: EMT. Conduit ends shall be provided plastic bushings.
10. Unless otherwise noted or indicated by the manufacturer's installation instructions, provide rigid steel conduit or IMC for all load-side power feeders, line-side power feeders, or control conduits for variable frequency drives or variable speed drives.
11. Choose ½ or ¾ Many clients prefer ¾" minimum raceway size. CMU Prefers ½". **Check the Owner's standards**. Allowing ½" min will give the contractor flexibility and could offer cost savings.

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.
2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with that material. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer.

E. Do not install aluminum conduits in contact with concrete.

F. Install nonferrous conduit or tubing for circuits operating above 60 Hz. Where aluminum raceways are installed for such circuits and pass through concrete, install in nonmetallic sleeve.

G. Conduits shall be routed inside the building, in lieu of exposed across the roof, unless indicated otherwise.
1. Roof support for Tray and conduits: Provide a roof support system similar to Cablofil Cablo-Port. The support system shall be
   a. Sunlight, UV and weather resistant and shall use a rubber base in contact with the roof,
   b. Non Penetrating: Fastening system shall not penetrate roof membrane or use glues which are incompatible with the roofing material.
   c. Height and angle adjustable in the field,
   d. Provided with reflective strips,
   e. Composed of recycled materials.

3.2 INSTALLATION

A. Comply with NECA 1 for installation requirements applicable to products specified in Part 2 except where requirements on Drawings or in this Article are stricter.

B. Keep raceways at least 8 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

C. Install raceways parallel to building lines.

D. Install raceway expansion fittings at building expansion joints, parallel to building lines.

E. Complete raceway installation before starting conductor installation.

F. Support raceways as specified in Division 26 Section "Hangers and Supports for Electrical Systems."

G. Arrange stub-ups so curved portions of bends are not visible above the finished slab.

H. Install no more than the equivalent of three 90-degree bends in any conduit run except for communications conduits, for which fewer bends are allowed.

I. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise indicated.

J. Raceways Embedded in Slabs:
   1. Conduits embedded in slabs shall not be larger than 1-inch diameter. Multiple parallel embedded conduits shall be spaced a minimum of 4-inches on center.
   2. Run conduit parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.
   3. Arrange raceways to cross building expansion joints at right angles with expansion fittings.

K. 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.

L. Provide insulating and grounding bushings at junction boxes, outlet boxes, and cabinets for conduits one-inch and larger in diameter.

M. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors, including conductors smaller than No. 4 AWG.

N. 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.

O. Raceways for Optical Fiber and Communications Cable: Install raceways, metallic and nonmetallic, rigid and flexible, as follows:
   1. 3/4-Inch Trade Size and Smaller: Install raceways in maximum lengths of 50 feet.
   2. 1-Inch Trade Size and Larger: Install raceways in maximum lengths of 75 feet.
   3. Install with a maximum of two 90-degree bends or equivalent for each length of raceway unless Drawings show stricter requirements. Separate lengths with pull or junction boxes or terminations at distribution frames or cabinets where necessary to comply with these requirements.
   4. Conduit ends shall be provided plastic bushings.

P. Install raceway sealing fittings at suitable, approved, and accessible locations 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 at the following points:
   1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
   2. Where otherwise required by NFPA 70.

Q. Expansion-Joint Fittings for RNC: Install in each run of aboveground conduit that is located where environmental temperature change may exceed 30 deg. F, and that has straight-run length that exceeds 25 feet.
   1. Install-expansion joint fittings for each of the following locations, and provide type and quantity of fittings that accommodate temperature change listed for location.
   2.
      a. Outdoor Locations Not Exposed to Direct Sunlight: 125 degree F temperature change.
      b. Outdoor Locations Exposed to Direct Sunlight: 155 degree F temperature change.
      c. Indoor Spaces: Connected with the Outdoors without Physical Separation: 125 degree F temperature change.
      d. Attics: 135 degree F temperature change.
   3.
   4. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight-run per deg F of temperature change.
   5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at the time of installation.

R. Flexible Conduit Connections: Use maximum of 72 inches of flexible conduit for recessed and semi-recessed lighting fixtures, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
   1. Use LFMC in damp or wet locations.
   2. MC cable approved as a grounding means may be used for lengths greater than 72" inched for recessed and semi-recessed light fixtures.

S. 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.

T. Set metal floor boxes level and flush with finished floor surface.

U. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:
   1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Division 31 Section "Earth Moving" for pipe less than 6 inches in nominal diameter.
   2. Install backfill as specified in Division 31 Section "Earth Moving."
   3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Division 31 Section "Earth Moving."
   4. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through the floor.
      a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete.
      b. For stub-ups at equipment mounted on outdoor concrete bases, extend steel conduit horizontally a minimum of 60 inches from edge of equipment pad or foundation. Install insulated grounding bushings on terminations at equipment.

5. Warning Planks: Bury warning planks approximately 12 inches above direct-buried conduits, placing planks 24 inches o.c. Align planks along the width and along the centerline of conduit.

3.4 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Refer to Specification 26 0500 “Common Work Results for Electrical” for sleeve and sleeve-seal installation instructions.

3.5 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

3.6 PROTECTION

A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.
   1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
   2. Coordinate installation of PVC coated conduit with factory authorized representative.
   3. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 26 0533

SECTION 26 0553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

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 the following:

1. Identification for raceway and metal-clad cable.
2. Identification for conductors and communication and control cable.
3. Underground-line warning tape.
4. Warning labels and signs.
5. Instruction signs.
6. Equipment identification labels.
7. Miscellaneous identification products.

1.3 SUBMITTALS

A. Product Data: For each electrical identification product indicated.

1.4 QUALITY ASSURANCE

A. Comply with ANSI A13.1 and ANSI C2.

B. Comply with NFPA 70.

C. Comply with 29 CFR 1910.145.

1.5 COORDINATION

A. Coordinate identification names, abbreviations, colors, and other features with requirements in the Contract Documents, 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.

E. When identifying room numbers on labels or directories, coordinate with the Owner's final room numbering system, as the architectural room numbers are generally arbitrary and may not be final.

PART 2 - PRODUCTS

2.1 RACEWAY AND **METAL-CLAD 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 and cable size.

B. Color for Printed Legend:

1. Power Circuits: Black letters on an orange field.
2. Legend: Indicate system or service and voltage, if applicable.

C. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

D. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeves, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

E. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeves, 2 inches long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

2.2 CONDUCTOR AND COMMUNICATION- AND CONTROL-CABLE IDENTIFICATION MATERIALS

A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.

B. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

C. Aluminum Wraparound Marker Labels: Cut from 0.014-inch- thick aluminum sheet, with stamped, embossed, or scribed legend, and fitted with tabs and matching slots for permanently securing around wire or cable jacket or around groups of conductors.

D. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch, with stamped legend, punched for use with self-locking nylon tie fastener.

E. Write-On Tags: Polyester tag, 0.015 inch thick, with corrosion-resistant grommet and polyester or nylon tie for attachment to conductor or cable.

1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.

2.3 UNDERGROUND-LINE WARNING TAPE

A. Description: Permanent, bright-colored, continuous-printed, polyethylene tape.

1. Not less than 6 inches wide by 4 mils thick.
2. Compounded for permanent direct-burial service.
3. Embedded continuous metallic strip or core.
4. Printed legend shall indicate type of underground line.

2.4 WARNING LABELS AND SIGNS

A. Comply with NFPA 70 and 29 CFR 1910.145.

B. Baked-Enamel Warning Signs: Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application. 1/4-inch grommets in corners for mounting. Nominal size, 7 by 10 inches.

C. Metal-Backed, Butyrate Warning Signs: Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch galvanized-steel backing; and with colors, legend, and size required for application. 1/4-inch grommets in corners for mounting. Nominal size, 10 by 14 inches.

D. Warning label and sign shall include, but are not limited to, the following legends:

1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES."
3. More than 600V Warning: “DANGER – HIGH VOLTAGE – KEEP OUT.”
4. 480V Warning: “480 VOLTS.”
5. Phase Color-Coding of 208Y/120V panelboards: “PHASE A - BLACK, PHASE B RED, PHASE C BLUE, NEUTRAL WHITE, GROUND GREEN.”
6. Phase Color-Coding of 480Y/277V panelboards: “PHASE A - BROWN, PHASE B ORANGE, PHASE C YELLOW, NEUTRAL GRAY, GROUND GREEN.”

2.5 INSTRUCTION SIGNS

A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch thick for signs up to 20 sq. in. and 1/8 inch thick for larger sizes.

1. Engraved legend with black letters on white face.
2. Punched or drilled for mechanical fasteners.
3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.6 EQUIPMENT IDENTIFICATION LABELS

A. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. White letters on a dark-gray background. Minimum letter height shall be 3/8 inch.

B. Stenciled Legend: In nonfading, waterproof, black ink or paint. Minimum letter height shall be 1 inch.

2.7 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Cable Ties: Fungus-inert, self-extinguishing, 1-piece, self-locking, Type 6/6 nylon cable ties.

1. Minimum Width: 3/16 inch.
2. Tensile Strength: 50 lb, minimum.
3. Temperature Range: Minus 40 to plus 185 deg F.
4. Color: Black, except where used for color-coding.

B. Paint: Paint materials and application requirements are specified in Division 09 painting Sections.

1. Exterior Concrete, Stucco, and Masonry (Other Than Concrete Unit Masonry):

a. Semi-gloss Acrylic-Enamel Finish: Two finish coat(s) over a primer.

1) Primer: Exterior concrete and masonry primer.
2) Finish Coats: Exterior semi-gloss acrylic enamel.

2. Exterior Concrete Unit Masonry:

a. Semi-gloss Acrylic-Enamel Finish: Two finish coat(s) over a block filler.

1) Block Filler: Concrete unit masonry block filler.
2) Finish Coats: Exterior semi-gloss acrylic enamel.

3. Exterior Ferrous Metal:

a. Semi-gloss Alkyd-Enamel Finish: Two finish coat(s) over a primer.

1) Primer: Exterior ferrous-metal primer.
2) Finish Coats: Exterior Semi-gloss alkyd enamel.

4. Exterior Zinc-Coated Metal (except Raceways):

a. Semi-gloss Alkyd-Enamel Finish: Two finish coat(s) over a primer.

1) Primer: Exterior zinc-coated metal primer.
2) Finish Coats: Exterior Semi-gloss alkyd enamel.

5. Interior Concrete and Masonry (Other Than Concrete Unit Masonry):

a. Semi-gloss Alkyd-Enamel Finish: Two finish coat(s) over a primer.

1) Primer: Interior concrete and masonry primer.
2) Finish Coats: Interior Semi-gloss alkyd enamel.

6. Interior Concrete Unit Masonry:

a. Semi-gloss Acrylic-Enamel Finish: Two finish coat(s) over a block filler.

1) Block Filler: Concrete unit masonry block filler.
2) Finish Coats: Interior Semi-gloss acrylic enamel.

7. Interior Gypsum Board:

a. Semi-gloss Acrylic-Enamel Finish: Two finish coat(s) over a primer.

1) Primer: Interior gypsum board primer.
2) Finish Coats: Interior Semi-gloss acrylic enamel.

8. Interior Ferrous Metal:

a. Semi-gloss Acrylic-Enamel Finish: Two finish coat(s) over a primer.

1) Primer: Interior ferrous-metal primer.
2) Finish Coats: Interior Semi-gloss acrylic enamel.

9. Interior Zinc-Coated Metal (except Raceways):

a. Semi-gloss Acrylic-Enamel Finish: Two finish coat(s) over a primer.

1) Primer: Interior zinc-coated metal primer.
2) Finish Coats: Interior Semi-gloss acrylic enamel.

C. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 APPLICATION

A. Raceways and Duct Banks More Than 600 V Concealed within Buildings: 4-inch- wide black stripes on 10-inch centers over orange background that extends full length of raceway or duct and is 12 inches wide. Stencil legend "DANGER CONCEALED HIGH VOLTAGE WIRING" with 3-inch- high black letters on 20-inch centers. Stop stripes at legends. Apply to the following finished surfaces:

1. Floor surface directly above conduits running beneath and within 12 inches of a floor that is in contact with earth or is framed above unexcavated space.
2. Wall surfaces directly external to raceways concealed within wall.
3. Accessible surfaces of concrete envelope around raceways in vertical shafts, exposed in the building, or concealed above suspended ceilings.

B. Accessible Raceways and Metal-Clad Cables More Than 600 V: Identify with "DANGER-HIGH VOLTAGE" in black letters at least 2 inches high, with snap-around labels or stenciled legend. Repeat legend at 10-foot maximum intervals.

C. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits More Than 30A: Identify with orange snap-around label or stenciled legend adjacent to each junction box, pull box, and electrical enclosure.

D. Accessible Raceways and Cables of Auxiliary Systems: Identify the following systems with color-coded, snap-around, color-coding bands, or stenciled legend. Verify colors with owner and technology consultant prior to installation.

1. Fire Alarm System: Red.
2. Fire-Suppression Supervisory and Control System: Red and yellow.
3. Combined Fire Alarm and Security System: Red and blue.
4. Security System: Blue and yellow.

5. Mechanical and Electrical Supervisory System: Green and blue.
6. Telecommunication System: Green and yellow.
7. Control Wiring: Green and red.

E. Power-Circuit Conductor Identification: For primary and secondary conductors No. 4 AWG and larger in vaults, pull and junction boxes, manholes, and handholes use color-coding conductor tape, marker tape, or write-on tags. Identify source and circuit number of each set of conductors. For single conductor cables, identify phase in addition to the above.

F. Branch-Circuit Conductor Identification: Use marker tape or write-on tags in each junction or pull box. Identify each ungrounded conductor according to source and circuit number.

G. Conductors to Be Extended in the Future: Attach write-on tags or marker tape to conductors and list source and circuit number.

H. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, signal, sound, intercommunications, voice, and data 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 Operation and Maintenance Manual.

I. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable. Install underground-line warning tape for both direct-buried cables and cables in raceway.

J. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Comply with 29 CFR 1910.145 and apply baked-enamel warning signs or metal-backed, butyrate warning signs. Identify system voltage with black letters on an orange background. Apply to exterior of door, cover, or other access.

1. 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.

2. Equipment Requiring Workspace Clearance According to NFPA 70: Unless otherwise indicated, apply to door or cover of equipment but not on flush panelboards and similar equipment in finished spaces.
3. Equipment More Than 600 V: Apply to door or cover of equipment including, but not limited to, the following:
   a. Electrical switchgear.

4. Panelboards rated 208Y/120V or 480Y/277V: Apply phase color-code identification label to door or cover of equipment in including the following:
   a. Panelboards.
   b. Power Panels.
   c. Distribution Panels.
   d. Switchboards.
   e. Motor Control Centers.
5. Equipment Rated 480 V: Unless otherwise indicated, apply to door or cover of equipment. Apply to inside door or cover of flush panelboards and similar equipment in finished spaces.

6. All power distribution equipment: Apply arc flash labels required by code or other sections of the Specification.

K. Instruction Signs:

1. Operating Instructions: 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.
2. Emergency Operating Instructions: Install instruction signs with white legend on a red background with minimum 3/8-inch- high letters for emergency instructions at equipment used for power transfer.

L. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and 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. Labeling Instructions:

a. Indoor Equipment: 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 2 lines of text are required, use labels 2 inches high. For single-gang motor starting switches, use 3/8-inch high letters on 3/4-inch high by 2.25-inch wide label; for two-gang motor starting switches, use 3/8-inch high letters on 3/4-inch high by 4 inch wide label
b. Outdoor Equipment: Engraved laminated acrylic, melamine label, or stenciled legend 4 inches high.
c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.

2. Equipment to Be Labeled:

a. Panelboards, electrical cabinets, and enclosures.
b. Access doors and panels for concealed electrical items.
c. Electrical switchgear and switchboards.
d. Transformers.
e. Electrical substations.
f. Emergency system boxes and enclosures.
g. Motor-control centers.
h. Disconnect switches.
i. Enclosed circuit breakers.
j. Motor starters.
k. Push-button stations.
l. Power transfer equipment.
m. Contactors.
n. Remote-controlled switches, dimmer modules, and control devices.
o. Battery inverter units.
p. Battery racks.
q. Power-generating units.
r. Master clock and program equipment.
s. Intercommunication and call system master and staff stations.
t. Fire-alarm control panel and annunciators.
u. Security and intrusion-detection control stations, control panels, terminal cabinets, and racks.

v. Monitoring and control equipment.
w. Uninterruptible power supply equipment.
x. Terminals, racks, and patch panels for signal and control functions.

M. Electrical Energy Source Identification Labels: On each unit of equipment, install a unique source and circuit designation label that is consistent with wiring diagrams, schedules, and Operation and Maintenance Manuals. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system.

1. Labeling Instructions:

a. Indoor Equipment: Engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 3/8-inch high letters on 3/4-inch high label; where 2 lines of text are required, use labels 1.5 inches high.
b. Outdoor Equipment: Engraved, laminated acrylic or melamine label or stenciled legend.
c. Outlet, Device, Pull and Junction Boxes: Apply source and circuit to back of device box cover and to front of pull and junction box covers with indelible ink.

2. Equipment to be Labeled:

a. Panelboards.
b. Electrical switchgear, switchboards, and distribution panels.
c. Transformers.
d. Emergency system boxes and enclosures.
e. Disconnect switches.
f. Enclosed circuit breakers.
g. Motor starters.
h. Power transfer equipment.
i. Contactors.
j. Central battery inverter units.
k. Power-generating units.
l. Technology (voice and data) equipment racks and cabinets.
m. Master clock and program equipment.
n. Fire alarm control panel and power supplies.
o. Security and intrusion-detection control panels.
p. Uninterruptible power supply equipment.
q. Wiring devices boxes.
r. Junction and pull boxes.
s. Electrical devices (receptacles, switches etc.) shall be labeled with circuit number inside the coverplate of the device.

3.2 INSTALLATION

A. Verify identity of each item before installing identification products.

B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

C. Apply identification devices to surfaces that require finish after completing finish work.

D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device. Where used on electrical equipment and enclosures also use screws to fasten in place.

E. Attach non-adhesive signs and plastic labels with screws and auxiliary hardware appropriate to the location and substrate.

F. Fasten signs and labels to electrical equipment and enclosures with screws.

G. System Identification Color Banding for Raceways and Cables: Each color band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands 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.

H. Color-Coding for Phase and Voltage Level Identification, 600 V and Less: Use the colors listed below for ungrounded service, feeder, and branch-circuit conductors.

1. Color shall be factory applied or, for sizes larger than No. 6 AWG if authorities having jurisdiction permit, field applied.
2. Colors for 208Y/120-V Circuits (**For existing buildings, the Contractor shall field verify and match existing color schemes**):

   a. Phase A: Black.
   b. Phase B: Red.
   c. Phase C: Blue.
   d. Neutral: White.
   e. Ground: Green.

3. Colors for 480/277-V Circuits (**For existing buildings, the Contractor shall field verify and match existing color schemes**):

   a. Phase A: Brown.
   b. Phase B: Orange.
   c. Phase C: Yellow.
   d. Neutral: Gray.
   e. Ground: Green.

4. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 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.

I. Aluminum Wraparound Marker Labels and Metal Tags: Secure tight to surface of conductor or cable at a location with high visibility and accessibility.

J. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches overall.

K. Painted Identification: Prepare surface and apply paint according to Division 09 painting Sections.

L. Branch and Feeder Circuit Load Identification Labels: On each overcurrent protective device, install unique load designation label that is consistent with wiring diagrams, schedules, and Operation and Maintenance Manual.
1. Labeling Instructions:
   a. Panelboard Circuit Directories: Provide type-written or laser printed circuit directory on heavy card stock. Arrange in two columns with odd numbered circuits on left and even numbered circuits on right. Include panelboard identification and

installation date. Indicate spare circuit breakers: "SPARE". Install in metal frame with clear plastic cover. Coordinate with the Owner's final room numbering system.

b. Overcurrent Protective Devices Installed in Distribution Panels and Switchboards: Engraved, laminated acrylic or melamine labels. Unless otherwise indicated, provide a single line of text with 3/8-inch high letters on 3/4-inch high label; where 2 lines of text are required, use labels 1.5 inches high.

M. Independent Support Wire: Where independent support wires are permissible and utilized for securing electrical raceways, cable assemblies, boxes, cabinets, or fittings within ceiling cavities, they shall be distinguishable from ceiling support wires by color, tagging, or other effective means.

END OF SECTION 26 0553

SECTION 26 09 43 DIGITAL LIGHTING CONTROLS

PART 1 - GENERAL

1.1 Summary

A. Provide a Lighting Control Concept which meets the requirements of IECC 2018 and local codes and ordinances.

B. Sequence of Operation

1. Refer to the drawings for project specific scenes and control functions.

2. Upon a signal from the fire alarm system all light fixtures shall come up to full brightness.

3. Where power supplied to emergency egress light fixtures is from an alternate external source such as an inverter or an engine generator, upon loss of normal power the light fixtures shall come up to full brightness.

C. Section includes a digital lighting control system comprised of the following components:

1. Wired Digital Devices

a. Wall Stations

b. Graphic Wall Stations

c. Digital Key Switches

d. Auxiliary Input/Output Devices

e. Occupancy and Photocell Sensors

f. Wall Switch Sensors

g. Embedded Sensors

h. Power Packs and Secondary Packs

i. Control Integrated Luminaires

j. Relay and Dimming Panel

k. The digital lighting controls shall meet all the characteristics and performance requirements specified herein.

D. The contractor shall provide, install and verify proper operation of all equipment necessary for proper operation of the system as specified herein and as shown on applicable drawings.

1.2 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. Section 26 27 26 Wiring Devices

C. Section 26 51 00 Interior Lighting

1.3 Submittals

A. Submittal shall be provided including the following items.

1. Bill of Materials necessary to install the digital lighting control system.

2. Product Specification Sheets indicating general device descriptions, dimensions, electrical specifications, wiring details, and nomenclature.

3. Riser Diagrams showing device wiring connections of system backbone and typical per room/area type.

4. Other Diagrams and Operational Descriptions – as needed to indicate system operation or interaction with other system(s).

5. Contractor Startup/Commissioning Worksheet (must be completed prior to factory start-up).

6. Service Specification Sheets indicating general service descriptions, including startup, training, post-startup support, and service contract terms.

7. Hardware and Software Operation Manuals.

1.4 Approvals

A. Prior approval from owner's representative is required for products or systems manufactured by companies not specified in the Digital Lighting Controls section of this specification.

B. Any alternate product or system that has not received prior approval from the owner's representative at least 10 days prior to submission of a proposal package shall be rejected.

C. Alternate products or systems require submission of catalog datasheets, system overview documents and installation manuals to owner's representative.

1.5 Quality Assurance

A. Product Qualifications

1. System electrical components shall be listed or recognized by a nationally recognized testing laboratory (e.g., UL, ETL, or CSA) and shall be labeled with required markings as applicable.

2. System shall be listed as qualified under DesignLights Consortium Networked Lighting Control System Specification V2.0.

3. System luminaires and controls are certified by manufacturer to have been designed, manufactured and tested for interoperability.

4. All components shall be subjected to 100% end of line testing prior to shipment to the project site to ensure proper device operation.

5. All components and the manufacturing facility where product is manufactured must be RoHS compliant.

B. Installation and Startup Qualifications

1. System startup shall be performed by qualified personnel approved or certified by the manufacturer.

C. Service and Support Requirements

1. Phone Support: Toll free technical support shall be available.

2. Remote Support: The bidder shall offer a remote support capability.

3. Onsite Support: The bidder shall offer onsite support that is billable at whole day rates.

4. Service Contract: The bidder shall offer a Service Contract that packages phone, remote, and onsite support calls for the project. Response times for each type of support call shall be indicated in the terms of the service contract included in the bid package.

1.6 Project Conditions

A. Only install indoor equipment after the following site conditions are maintained:

1. Ambient Temperature: 14 to 105 degrees F (-10 to 40 degrees C)

2. Relative Humidity: less than 90% non-condensing

B. Equipment shall not be subjected to dust, debris, moisture, or temperature and humidity conditions exceeding the requirements indicated above or as marked on the product, at any point prior to installation.

C. Only properly rated equipment and enclosures, installed per the manufacturer's instructions, may be subjected to dust and moisture following installation.

1.7 Warranty

A. The manufacturer shall provide a minimum five-year warranty on all hardware devices supplied and installed. Warranty coverage shall begin on the date of shipment.

B. The hardware warranty shall cover repair or replacement any defective products within the warranty period.

1.8 Maintenance & Sustainability

A. The manufacturer shall make available to the owner new parts, upgrades, and/or replacements available for a minimum of 5 years following installation.

PART 2 - EQUIPMENT

2.1 Manufacturers

A. Acceptable Manufacturers

1. Acuity Brands Lighting, Inc.

B. Basis of Design System: **Acuity Controls nLight**

C. Other digital low voltage control systems should be submitted as an alternate bid option for pre-approval evaluation prior to final bid.

2.2 System Compliance

A. System components shall comply with UL 916 and UL 924 standards where applicable.

B. System components shall comply with CFR Title 47, Part 15 standards where applicable.

C. System components shall comply with ISED Canada RSS-247 standards where applicable.

D. All equipment shall be installed and connected in compliance with NFPA 70.

2.3 System Performance Requirements

A. System Architecture

1. System shall have an architecture that is based upon standalone lighting control zones using distributed intelligence.

2. Intelligent lighting control devices shall consist of one or more basic lighting control components: occupancy sensor, photocell sensor, relay, dimming output, contact closure input, analog 0-10V input, and manual wall station capable of indicating switching, dimming, and/or scene control. Combining one or more of these components into a single device enclosure shall be permissible so as to minimize overall device count of system.

3. Lighting control zones consisting of one or more luminaires and intelligent lighting control devices and shall be capable of providing automatic control from sensors (occupancy and/or photocell) and manual control from local wall stations without requiring connection to a higher-level system backbone; this capability is referred to as “distributed intelligence.”

a. Lighting control zones (wired and wireless) of at least 128 devices per zone shall be supported.

4. Lighting control devices shall have distributed intelligence programming stored in non-volatile memory, such that following any loss of power the lighting control zones shall operate according to their defined default settings and sequence of operations.

5. All system devices shall support firmware update, either remotely or from within the applications space, for purposes of upgrading functionality at a later date.

B. Wired Digital Control Zone Characteristics

1. Connections to devices within a wired lighting control zone shall be with a single type of low voltage network cable, which shall be compliant with CAT5e specifications or higher. To prevent wiring errors and provide cost savings, the use of mixed types of low voltage network cables shall not be permitted.

2. Devices in an area shall be connected via a “daisy-chain” topology; requiring all individual devices to be connected back to a central component in a “hub-and-spoke” topology shall not be permitted, so as to reduce the total amount of network cable required for each control zone.

3. System shall provide the option of having pre-terminated plenum rated low voltage network cabling supplied with hardware so as to reduce the opportunity for improper wiring and communication errors during system installation.

4. Following proper installation and provision of power, all devices connected together with low voltage network cable shall automatically form a functional lighting control zone without requiring any type of programming, regardless of the programming mechanism (e.g. software application, handheld remote, pushbutton). The “out of box” default sequence of operation is intended to provide typical sequence of operation so as to minimize the system startup and programming requirements and to also have functional lighting control operation prior to system startup and programming.

5. Control devices intended for control of egress and/or emergency light sources shall not require the use of additional, externally mounted UL924 shunting and/or 0-10V disconnect devices, so as to provide a compliant sequence of operation while reducing the overall installation and wiring costs of the system. The following types of wired digital control devices shall be provided for egress and/or emergency light fixtures:

    a. Low-Voltage power sensing: These devices shall automatically provide 100% light level upon detection of loss of power sensed via the low voltage network cable connection.

    b. UL924 Listed Line-Voltage power sensing: These devices shall be listed as emergency relays under the UL924 standard and shall automatically close the load control relay and provide 100% light output upon detection of loss of power sensed via line voltage connection to normal power.

6. Wired Wall stations shall provide the follow Scene Control Capabilities:

    a. Preset Scenes that can activate a specific combination of light levels across multiple local and global channels, as required.

b. Profile Scenes that can modify the sequence of operation for the devices in the area (group) in response to a button press. This capability is defined as supporting “Local Profiles” and is used to dynamically optimize the occupant experience and lighting energy usage. Wall stations shall be able to manually start and stop Local Profiles, or the local profile shall be capable of ending after a specific duration of time between 5 minutes and 12 hours. Parameters that shall be configurable and assigned to a Local Profile shall include, but not be limited to, fixture light level, occupancy time delay, response to occupancy sensors (including enabling/disabling response), response to daylight sensors (including enabling/disabling response), and enabling/disabling of wall stations.

c. 3-way / multi-way control: multiple wall stations shall be capable of controlling the same local and global control zones, so as to support “multi-way” preset scene and profile scene control.

C. Supported Sequence of Operations

1. Control Zones

a. Luminaires and intelligent lighting control devices installed in an area (also referred to as a group of devices) shall be capable of transmitting and tracking occupancy sensor, photocell sensor, and manual switch information within at least 48 unique control zones to support different and reconfigurable sequences of operation within the area. These shall also be referred to as local control zones.

2. Wall station Capabilities

a. Wall stations shall be provided to support the following capabilities:

.1 On/Off of a local control zone.

.2 Continuous dimming control of light level of a local control zone.

b. 3-way / multi-way control: multiple wall stations shall be capable of controlling the same local control zones, so as to support “multi-way” switching and/or dimming control.

3. Occupancy Sensing Capabilities

a. Occupancy sensors shall be configurable to control a local zone.

b. Multiple occupancy sensors shall be capable of controlling the same local zones. This capability combines occupancy sensing coverage from multiple sensors without consuming multiple control zones.

c. System shall support the following types of occupancy sensing sequence of operations:

.1 On/Off Occupancy Sensing

.2 Partial-On Occupancy Sensing

.3 Partial-Off Occupancy Sensing

.4 Vacancy Sensing (Manual-On / Automatic-Off)

d. On/Off, Partial-On, and Partial-Off Occupancy Sensing modes shall function according to the following sequence of operation:

.1 Occupancy sensors shall automatically turn lights on to a designated level when occupancy is detected. To support fine tuning of Partial-On sequences the designated occupied light level shall support at least 100 dimming levels.

.2 Occupancy sensors shall automatically turn lights off or to a dimmed state (Partial-Off) when vacancy occurs or if sufficient daylight is detected. To support fine tuning of Partial-Off sequences the designated unoccupied dim level shall support at least 100 dimming levels.

.3 To provide additional energy savings the system shall also be capable of combining Partial-Off and Full-Off operation by dimming the lights to a designated level when vacant and then turning the lights off completely after an additional amount of time.

.4 Photocell readings, if enabled in the Occupancy Sensing control zone, shall be capable of automatically adjusting the light level during occupied or unoccupied conditions as necessary to further reduce energy usage. Additional requirements and details for photocell sensing capabilities are indicated under *Photocell Sensing Capabilities.*

.5 The use of a wall station shall change the dimming level or turn lights off as selected by the occupant. The lights shall optionally remain in this manually-specified light level until the zone becomes vacant; upon vacancy the normal sequence of operation, as defined above, shall proceed.

e. Vacancy Sensing mode (also referred to as Manual-On / Automatic-Off) shall function according to the following sequence of operation:

.1 The use of a wall station is required turn lights on. The system shall be capable of programming the zone to turn on to either to a designated light level or the previous user light level. Initially occupying the space without using a wall station shall not result in lights turning on.

.2 Occupancy sensors shall automatically turn lights off or to a dimmed state (Partial-Off) when vacancy occurs or if sufficient daylight is detected. To support fine tuning of Partial-Off sequences the designated unoccupied dim level shall support at least 100 dimming levels.

.3 To provide additional energy savings and an enhanced occupant experience, the system shall also be capable of dimming the lights when vacant and then turning the lights off completely after an additional amount of time.

.4 To minimize occupant impact in case the area or zone is still physically occupied following dimming or shutoff of the lights due to detection of vacancy, the system shall support an “automatic grace period” immediately following detection of vacancy, during which time any detected occupancy shall result in the lights reverting to the previous level. After the grace period has expired, the use of a wall station is required to turn lights on.

.5 Photocell readings, if enabled in the Occupancy Sensing control zone, shall be capable of automatically adjusting the light level during occupied or unoccupied conditions as necessary to further reduce energy usage. Additional requirements and details for photocell sensing capabilities are indicated under *Photocell Sensing Capabilities.*

.6 At any time, the use of a wall station shall change the dimming level or turn lights off as selected by the occupant. The lights shall optionally remain in this manually-specified light level until the zone becomes vacant; upon vacancy the normal sequence of operation, as defined above, shall proceed.

f. To accommodate diverse types of environments, occupancy time delays before dimming or shutting off lights shall be specifiable for control zones between 15 seconds to 2 hours.

4. Photocell Sensing Capabilities (Automatic Daylight Sensing)

a. Photocell sensing devices shall be configurable to control a local zone.

b. The system shall support the following type of photocell-based control:

.1 Continuous Dimming: The control zone automatically adjusts its dimming output in response to photocell readings, such that a minimum light level consisting of both electric light and daylight sources is maintained at the task. The photocell response shall be configurable to adjust the photocell setpoint and dimming rates.

2.4 Wired Digital Devices

A. Wired Wall Switches, Dimmers, Scene Controllers

1. Devices shall recess into single-gang switch box and fit a standard GFI opening.

2. Communication and low voltage power shall be delivered to each device via standard low voltage network cabling with RJ-45 connectors.

3. All switches shall have the ability to detect when it is not receiving valid communication and blink its LED in a pattern to visually indicate a potential wiring issue.

4. Devices with mechanical pushbuttons shall provide tactile and LED user feedback.

5. Devices with mechanical pushbuttons shall be made available with custom button labeling.

6. Wall switches & dimmers shall support the following device options:

   a. Number of control zones: 1, 2 or 4

   b. Control Types Supported:

      .1 On/Off

      .2 On/Off/Dimming

      .3 On/Off/Dimming/Correlated Color Temperature Control for specific luminaire types

   c. Colors: White

7. Scene controllers shall support the following device options:

   a. Number of scenes: 1, 2 or 4

   b. Control Types Supported:

      .1 On/Off

      .2 On/Off/Dimming

      .3 Preset Level Scene Type

      .4 On/Off/Dimming/Preset Level for Correlated Color Temperature

      .5 Reprogramming of other devices within daisy-chained zone so as to implement user selected lighting scene. This shall support manual start/stop from the scene controller, or optionally programmed to automatically end after a user selectable duration between 5 minutes and 12 hours.

      .6 Selecting a lighting profile to be run by the system's upstream controller so as to implement a selected lighting profile across multiple zones. This shall support manual start/stop from the scene controller, or optionally programmed to automatically end after a user selectable duration between 5 minutes and 12 hours.

   c. Colors: White

B. Wired Digital Graphic Wall Stations

1. Device shall surface mount to single-gang switch box.

2. Device shall have a 3.5", capacitive full color touch screen.

3. Device shall be powered with Class 2 low voltage supplied locally via a directly wired power supply.

4. Device shall have a micro-USB style connector for local computer connectivity.

5. Communication shall be over standard low voltage network cabling with RJ-45 connectors.

6. Device shall enable user supplied screen saver image to be uploaded within one of the following formats: jpg, png, gif, bmp, tif.

7. Device shall enable configuration of all switches, dimmers, control zones, and lighting preset scenes via password protected setup screens.

8. Graphic wall stations shall support the following device options:

   a. Number of control zones: Up to 16

   b. Number of scenes: Up to 16

   c. Profile type scene duration: User configurable from 5 minutes to 12 hours

   d. Colors: White

C. Wired Digital Digital Key Switches

1. Devices shall recess into single-gang switch box and fit a standard GFI opening.

2. Communication and low voltage power shall be delivered to each device via standard low voltage network cabling with RJ-45 connectors.

3. All switches shall have the ability to detect when it is not receiving valid communication and blink its LED in a pattern to visually indicate a potential wiring issue.

4. Devices shall have LED user feedback to provide indication of on/off status of the programmed lights or scene, as well as indication of device power.

5. Digital key switches shall support the following device options:

   a. Control Types Supported:

      .1 On/Off

      .2 On/Off/Dimming

      .3 Preset Level Scene Type

      .4 Reprogramming of other devices within daisy-chained zone so as to implement user selected lighting scene. This shall support manual start/stop from the scene controller, or optionally programmed to automatically end after a user selectable duration between 5 minutes and 12 hours.

      .5 Selecting a lighting profile to be run by the system's upstream controller so as to implement a selected lighting profile across multiple zones. This shall support manual start/stop from the scene controller, or optionally programmed to automatically end after a user selectable duration between 5 minutes and 12 hours.

b. Colors: White

D. Wired Digital Auxiliary Input / Output (I/O) Devices

1. Devices shall be plenum rated and be inline wired, screw mountable, or have an extended chase nipple for mounting to a ½" knockout.

2. Communication and low voltage power shall be delivered to each device via standard low voltage network cabling with RJ-45 connectors.

3. Auxiliary Input/Output Devices shall be specified as an input or output device with the following options:

a. Contact closure or Pull High input

.1 Input shall be programmable to support maintained or momentary inputs that can activate local or global scenes and profiles, activate lights at a preconfigured level, ramp light level up or down, or toggle lights on/off.

b. 0-10V analog input

.1 Input shall be programmable to function as a daylight sensor.

c. RS-232/RS-485 digital input

.1 Input supports activation of up to 4 local or global scenes and profiles, and on/off/dimming control of up to 16 local control zones.

d. 0-10V dimming control output, capable of sinking up to 20mA of current

.1 Output shall be programmable to support all standard sequence of operations supported by system.

e. Digital control output via EldoLED LEDcode communication

.1 Output shall be programmable to support light intensity control, as well as optional correlated color temperature (CCT) control, of the connected luminaire.

E. Wired Occupancy and Photosensors

1. Occupancy sensors shall sense the presence of human activity within the desired space and fully control the on/off function of the lights.

2. Sensors shall utilize passive infrared (PIR) technology, which detects occupant motion, to initially turn lights on from an off state, thus preventing false on conditions. Ultrasonic or Microwave based sensing technologies shall not be accepted.

3. For applications where a second method of sensing is necessary to adequately detect maintained occupancy (such as in rooms with obstructions), a sensor with an additional "dual" technology shall be used.

4. Dual technology sensors shall have one of its two technologies not require motion to detect occupancy. Acceptable dual technology includes PIR/Microphonics (also known as Passive Dual Technology or PDT) which both looks for occupant motion and listens for sounds indicating occupants. Sensors where both technologies detect motion (PIR/Ultrasonic) shall not be acceptable.

5. All sensing technologies shall be acoustically passive, meaning they do not transmit sounds waves of any frequency (for example in the Ultrasonic range), as these technologies have the potential for interference with other electronic devices within the space (such as electronic white board readers). Acceptable detection technologies include Passive Infrared (PIR), and/or Microphonics technology. Ultrasonic or Microwave based sensing technologies shall not be accepted.

6. System shall have ceiling, fixture, recessed & corner mounted sensors available, with multiple lens options available customized for specific applications.

7. Communication and low voltage power shall be delivered to each device via standard low voltage network cabling with RJ-45 connectors.

8. All sensors shall have the ability to detect when it is not receiving valid communication and blink its LED in a pattern to visually indicate a potential wiring issue.

9. Sensor programming parameter shall be available and configurable remotely from the software and locally via the device push-button.

10. Ceiling mount occupancy sensors shall be available with zero or one integrated dry contact switching relays, capable of switching 1 amp at 24 VAC/VDC (resistive only).

11. Sensors shall be available with one or two occupancy “poles”, each of which provides a programmable time delay.

12. Sensors shall have optional features for photosensor/daylight override, automatic dimming control, and low temperature/high humidity operation.

13. Photosensor shall provide for an on/off set-point, and a dead band to prevent the artificial light from cycling. Delay shall be incorporated into the photocell to prevent rapid response to passing clouds.

14. Photosensor and dimming sensor’s set-point and dead band shall be automatically calibrated through the sensor’s microprocessor by initiating an “Automatic Set-point Programming” procedure. Min and max dim settings as well as set-point may be manually entered.

15. Dead band setting shall be verified and modified by the sensor automatically every time the lights cycle to accommodate physical changes in the space (i.e., furniture layouts, lamp depreciation, or lamp outages).

16. A dual zone option shall be available for On/Off Photocell, Automatic Dimming Control Photocell, or Combination units. The secondary daylight zone shall be capable of being controlled as an “offset” from the primary zone.

F. Wired Wall Switch Sensors

1. Devices shall recess into single-gang switch box and fit a standard GFI opening.

2. Communication and low voltage power shall be delivered to each device via standard low voltage network cabling with RJ-45 connectors.

3. All wall switch sensors shall have the ability to detect when it is not receiving valid communication and blink its LED in a pattern to visually indicate a potential wiring issue.

4. Devices with mechanical pushbuttons shall provide tactile user feedback.

5. Wall switches sensors shall support the following device options:

a. User Input Control Types Supported: On/Off or On/Off/Dimming

b. Occupancy Sensing Technology: PIR only or Dual Tech acoustic

c. Daylight Sensing Option: Inhibit Photosensor

d. Colors: White

G. Wired Embedded Sensors

1. Control system shall have embedded sensors consisting of occupancy sensors and/or dimming photocells that can be embedded into luminaire such that only the lens shows on luminaire face.

2. Occupancy sensor detection pattern shall be suitable for 7.5’ to 20’ mounting heights.

3. Embedded sensors shall support the following device options:

a. Occupancy Sensing technology: PIR only or Dual Tech acoustic

b. Daylight Sensing Option: Occupancy only, Daylight only, or combination Occupancy/Daylight sensor

H. Wired Power Packs and Secondary Packs

1. Power Packs shall incorporate one optional Class 1 relay, optional 0-10 VDC dimming output, and contribute low voltage Class 2 power to the rest of the system.

2. Power Packs shall accept 120 or 277 VAC (or optionally 347 VAC) and carry a plenum rating.

3. Secondary Packs shall incorporate the relay and 0-10 VDC or line voltage dimming output, but shall not be required to contribute system power.

4. Power Supplies shall provide system power only, but are not required to switch line voltage circuit.

5. Auxiliary Relay Packs shall switch low voltage circuits only, capable of switching 1 amp at 40 VAC/VDC (resistive only).

6. Communication shall be delivered to each device via standard low voltage network cabling with RJ-45 connectors. Secondary packs shall receive low voltage power via standard low voltage network cable.

7. Power Pack programming parameters shall be available and configurable remotely from the software and locally via the device push-button.

8. Power Pack shall securely mount through a threaded ½ inch chase nipple or be capable of being secured within a luminaire ballast/driver channel. Plastic clips into junction box shall not be accepted. All Class 1 wiring shall pass through chase nipple into adjacent junction box without any exposure of wire leads. Note: UL Listing under Energy Management or Industrial Control Equipment automatically meets this requirement, whereas Appliance Control Listing does not meet this safety requirement.

9. When required by local code, Power Pack must install inside standard electrical enclosure and provide UL recognized support to junction box. All Class 1 wiring is to pass through chase nipple into adjacent junction box without any exposure of wire leads.

10. Power/Secondary Packs shall be available with the following options:

    a. Power Pack capable of full 16-Amp switching of all normal power lighting load types, with optional 0-10V dimming output capable of up to 100mA of sink current.

    b. Secondary Pack with UL924 listing for switching of full 16-Amp Emergency Power circuits, with optional 0-10V dimming output capable of up to 100mA of sink current.

    c. Power and Secondary Packs capable of full 20-Amp switching of general-purpose receptacle (plug-load) control.

    d. Secondary Pack capable of full 16-Amp switching of all normal power lighting load types.

    e. Secondary Pack capable of 5-Amps switching and dimming 120 VAC incandescent lighting loads or 120/277 VAC line voltage dimmable fluorescent ballasts (2-wire and 3-wire versions).

    f. Secondary Pack capable of 5-Amps switching and dimming of 120/277 VAC magnetic low voltage transformers.

    g. Secondary Pack capable of 4-Amps switching and dimming of 120 VAC electronic low voltage transformers.

    h. Secondary Pack capable of louver/damper motor control for skylights.

    i. Secondary Pack capable of providing a pulse on/pulse off signal for purposes of controlling shade systems via relay inputs.

j. Secondary Pack capable of switching 1 amp at 40 VAC/VDC (resistive only) with the intent to provide relay signal to auxiliary system (e.g. BMS).

k. Power Supply capable of providing auxiliary bus power (no switched or dimmed load).

I. Wired Relay and Dimming Panel

1. Relay and dimming panel shall be available with 4, 8, 12, 16, 24, 32, 40 or 48 individual relays per panel, with an equal number of individual 0-10V dimming outputs.

2. Optional Field Configurable Relays (FCR) used shall have the following required properties:

a. Configurable in the field to operate with single-, double-, or triple-pole relay groupings.

b. Configurable in the field to operate with normally closed or normally open behavior.

c. Provides visual status of current state and manual override control of each relay.

d. Listed for the following minimum ratings:

.1 40A @ 120-480VAC Ballast

.2 16A @ 120-277VAC Electronic

.3 20A @ 120-277VAC Tungsten

.4 20A @ 48VDC Resistive

.5 2HP @ 120VAC

.6 3HP @ 240-277VAC

.7 65kA SCCR @ 480VAC

3. 0-10 dimming outputs shall support a minimum of 100mA sink current per output.

4. Relay and dimming outputs shall be individually programmable to support all standard sequence of operations as defined in this specification.

5. Panel shall be UL924 listed for control of emergency lighting circuits.

6. Panel shall power itself from an integrated 120-277 VAC or optional 347VAC supply.

7. Panel shall provide a configurable low-voltage sensor input with the following properties:

a. Configurable to support any of the following input types:

.1 Indoor Photocell

.2 Outdoor Photocell

.3 Occupancy Sensor

.4 Contact Closure

b. Low voltage sensor input shall provide +24VDC power for the sensor so that additional auxiliary power supplies are not required.

c. Sensor input supports all standard sequence of operations as defined in this specification.

8. Panel shall provide a contact closure input for each group of 8-relays that acts as a panel override to activate the normally configured state of all relays (i.e., normally open or normally closed) in the panel. This input is intended to provide an interface to alarm systems, fire panels, or BMS system to override the panel.

9. Panel shall supply current limited low voltage power to other control devices connected via low voltage network cable.

10. Panel shall be available with NEMA 1 rated enclosure with the following mounting and cover options:

a. Surface-mounted for all panel sizes

b. Flush-mounted for up to 16 relay panel sizes

c. Screw-fastened for up to 16 relay panel sizes

d. Hinged cover with keyed lock for all panel sizes

11. Surface-mounted screw cover options for 8 and 16 relay panel sizes shall be plenum rated

12. Panel shall be rated from 0-50C for 8 and 16 enclosure sizes, and 0-45C for 32 and 48 enclosure sizes.

PART 3 - EXECUTION

3.1 Installation Requirements

A. Installation Procedures and Verification

1. The successful bidder shall review all required installation and pre-startup procedures with the manufacturer’s representative through pre-construction meetings.

2. The successful bidder shall install and connect the digital lighting control system components according to the manufacturer’s installation instructions, wiring diagrams, the project submittals and plans specifications.

3. The successful bidder shall be responsible for testing of all low voltage network cable included in the bid. Bidder is responsible for verification of the following minimum parameters:

a. Wire Map (continuity, pin termination, shorts and open connections, etc.)

b. Length

c. Insertion Loss

B. Documentation and Deliverables

1. The installing contractor shall be responsible for documenting installed location of all devices. This includes responsibility to provide as-built plan drawing showing device address barcodes corresponding to locations of installed equipment.

a. As-Built floor plan drawings showing device address locations required above. All documentation shall remain legible when reproducing\scanning drawing files for electronic submission.

b. As-Built electrical lighting drawings (reflected ceiling plan) in PDF and CAD format. Architectural floor plans shall be based on as-built conditions.

3.2 System Startup

A. Upon completion of installation by the installer, including completion of all required verification and documentation required by the manufacturer, the system shall be started up and programmed.

1. For CAT5 wired devices, low voltage network cable testing shall be performed prior to system startup.

B. System start-up and programming shall include:

1. Verifying operational communication to all system devices.

2. Programming the devices into functional control zones to meet the required sequence of operation.

3. Programming and verifying all sequence of operations.

C. Initial start-up and programming is to occur on-site and shall be completed by equipment manufacturer.

3.3 Project Turnover

A. System Documentation

1. Submit software database file with desired device labels and notes completed.

2. Installing contractor to grant access to the owner for the programming database, if requested.

B. Owner Training

1. Provide onsite training for owner and designated attendees. Training shall be a minimum of 4 hours or longer as recommended by manufacturer.

END OF SECTION

SECTION 26 2200 - LOW-VOLTAGE TRANSFORMERS

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 the following types of dry-type transformers rated 600 V and less, with capacities up to 1000 kVA:

1. Distribution transformers.
2. Buck-boost transformers.

1.3 SUBMITTALS

A. Product Data: Include rated nameplate data, capacities, weights, dimensions, minimum clearances, installed devices and features, and performance for each type and size of transformer indicated.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

1. Wiring Diagrams: Power, signal, and control wiring.

C. Manufacturer Seismic Qualification Certification: Submit certification that transformers, accessories, and components will withstand seismic forces defined in Division 26 Section “Vibration and Seismic Controls for Electrical Systems”. Include the following:

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."
b. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

D. Operation and Maintenance Data: For transformers to include in emergency, operation and maintenance methods.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain each transformer type through one source from a single manufacturer.

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 IEEE C57.12.91, "Test Code for Dry-Type Distribution and Power Transformers."

1.5 DELIVERY, STORAGE, AND HANDLING

A. Temporary Heating: Apply temporary heat according to manufacturer's written instructions within the enclosure of each ventilated-type unit, throughout periods during which equipment is not energized and when transformer is not in a space that is continuously under normal control of temperature and humidity.

1.6 COORDINATION

A. Coordinate size and location of concrete bases with actual transformer provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.

B. Coordinate installation of wall-mounting and structure-hanging supports with actual transformer provided.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eaton Electrical Inc.; Cutler-Hammer Products.
2. Federal Pacific Transformer Company; Division of Electro-Mechanical Corp.
3. General Electric Company.
4. Siemens Energy & Automation, Inc.
5. Square D; Schneider Electric.

2.2 GENERAL TRANSFORMER REQUIREMENTS

A. Description: Factory-assembled and -tested, air-cooled units for 60-Hz service.

B. Cores: Grain-oriented, non-aging silicon steel.

C. Coils: Continuous windings without splices except for taps.

1. Internal Coil Connections: Brazed or pressure type.
2. Coil Material: Copper.

2.3 DISTRIBUTION TRANSFORMERS

A. Comply with NEMA ST 20, and list and label as complying with UL 1561.

B. Provide transformers that are constructed to withstand seismic forces specified in Division 26 Section “Vibration and Seismic Controls for Electrical Systems”.

C. Cores: One leg per phase.

D. Indoor Enclosures: Ventilated, NEMA 250, Type 2.

1. Core and coil shall be encapsulated within resin compound, sealing out moisture and air.

E. Outdoor Enclosures: Ventilated or totally enclosed, nonventilated, NEMA 250, Type 3R.

1. Core and coil shall be encapsulated within resin compound, sealing out moisture and air.

F. Transformer Enclosure Finish: Comply with NEMA 250.

1. Finish Color: ANSI 61 gray.

G. Taps for Transformers Smaller Than 3 kVA: None.

H. Taps for Transformers 7.5 to 24 kVA: Two 5 percent taps below rated voltage.

I. Taps for Transformers: 25 kVA and Larger: Two 2.5 percent taps above and four 2.5 percent taps below normal full capacity.

J. Insulation Class: 220 deg C, UL-component-recognized insulation system with a maximum of 150 deg C rise above 40 deg C ambient temperature.

K. Energy Efficiency for Transformers Rated 15 kVA and Larger:

1. Complying with NEMA TP 1, Class 1 efficiency levels.
2. Tested according to NEMA TP 2.

L. K-Factor Rating: Transformers indicated to be K-factor rated shall comply with UL 1561 requirements for nonsinusoidal load current-handling capacity to the degree defined by designated K-factor.

1. Unit shall not overheat when carrying full-load current with harmonic distortion corresponding to designated K-factor.
2. Indicate value of K-factor on transformer nameplate.

M. Wall Brackets: Manufacturer's standard brackets.

N. Low-Sound-Level Requirements: Maximum sound levels, when factory tested according to IEEE C57.12.91, as follows:

1. 9 kVA and Less: 37 dBA.
2. 30 to 50 kVA: 42 dBA value.
3. 51 to 150 kVA: 47 dBA value.
4. 151 to 300 kVA: 52 dBA value.
5. 301 to 500 kVA: 57 dBA value.
6. 501 to 750 kVA: 59 dBA value.

7. 751 to 1000 kVA: 61 dBA value.

2.4 BUCK-BOOST TRANSFORMERS

A. Description: Self-cooled, two-winding dry type, rated for continuous duty and with wiring terminals suitable for connection as autotransformer. Transformers shall comply with NEMA ST 1 and shall be listed and labeled as complying with UL 506 or UL 1561.

B. Enclosure: Ventilated: NEMA 250, Type 2.

1. Finish Color: ANSI 61 gray.

2.5 VIBRATION MOUNTINGS

A. Description: Vibration isolators and mounting rails to isolate transformer from structure, reducing transmitted noise.

B. Vibration Isolators for Floor and Wall Mounted Transformers: Provide steel housed open spring isolators seated in rubber with provisions for leveling and bolting to mounting rails and concrete base or wall brackets.

C. Mounting Rails: Provide steel channels. To insure adequate stiffness, height of channel shall be a minimum of 8 percent of longest channel dimension.

D. Vibration Isolators for Suspended Transformers: Provide steel spring and rubber isolation hangers with provisions for bolting to trapeze hangers.

E. Vibration isolator manufacturer shall select units suitable for transformers indicated. Vibration isolator manufacturer shall determine quantity of units, but not less than four per transformer.

2.6 IDENTIFICATION DEVICES

A. Nameplates: Engraved, laminated-plastic or metal nameplate for each transformer, mounted with corrosion-resistant screws. Nameplates and label products are specified in Division 26 Section "Identification for Electrical Systems."

2.7 SOURCE QUALITY CONTROL

A. Test and inspect transformers according to IEEE C57.12.91.

B. Factory Sound-Level Tests: Conduct sound-level tests on equipment for this Project.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions for compliance with enclosure- and ambient-temperature requirements for each transformer.

B. Verify that field measurements are as needed to maintain working clearances required by NFPA 70 and manufacturer's written instructions.

C. Examine walls, floors, roofs, and concrete bases for suitable mounting conditions where transformers will be installed.

D. Verify that ground connections are in place and requirements in Division 26 Section "Grounding and Bonding for Electrical Systems" have been met. Maximum ground resistance shall be 5 ohms at location of transformer.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install wall-mounting transformers level and plumb with wall brackets fabricated by transformer manufacturer.

1. Brace wall-mounting transformers as specified in Division 26 Section “Vibration and Seismic Controls for Electrical Systems”.

B. Construct concrete bases and anchor floor-mounting transformers according to manufacturer’s written instructions, seismic codes applicable to Project and requirements in Division 26 Section “Vibration and Seismic Controls for Electrical Systems”.

C. Install distribution transformers 15 kVA and larger on vibration mountings.

3.3 CONNECTIONS

A. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."

B. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

C. Make connections to transformers using flexible metallic conduit of adequate length to absorb vibration and movement.

3.4 ADJUSTING

A. Record transformer secondary voltage at each unit for at least 48 hours of typical occupancy period. Adjust transformer taps to provide optimum voltage conditions at secondary terminals. Optimum is defined as not exceeding nameplate voltage plus 10 percent and not being lower than nameplate voltage minus 3 percent at maximum load conditions. Submit recording and tap settings as test results.

B. Connect buck-boost transformers to provide nameplate voltage of equipment being served, plus or minus 5 percent, at secondary terminals.

C. Output Settings Report: Prepare a written report recording output voltages and tap settings.

3.5 CLEANING

A. Vacuum dirt and debris; do not use compressed air to assist in cleaning.

END OF SECTION 16461

SECTION 26 2416 - PANELBOARDS

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. Distribution panelboards.
2. Lighting and appliance branch-circuit panelboards.

1.3 DEFINITIONS

A. SVR: Suppressed voltage rating.

B. SPD: Surge protective device.

1.4 SUBMITTALS

A. Product Data: For each type of panelboard, switching and overcurrent protective device, transient voltage suppression device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

B. Shop Drawings: For each panelboard 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 bus configuration, current, and voltage ratings.
4. Short-circuit current rating of panelboards and overcurrent protective devices.
5. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
6. Include wiring diagrams for power, signal, and control wiring.
7. Include time-current coordination curves for each type and rating of overcurrent protective device included in panelboards. Submit on translucent log-log graft paper; include selectable ranges for each type of overcurrent protective device.

C. Operation and Maintenance Data: For panelboards and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:
1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
2. Time-current curves, including selectable ranges for each type of overcurrent protective device that allows adjustments.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain panelboards, overcurrent protective devices, components, and accessories from single source from single manufacturer.

B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for panelboards including clearances between panelboards 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 a qualified testing agency, and marked for intended location and application.

D. Comply with NEMA PB 1.

E. Comply with NFPA 70.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Handle and prepare panelboards for installation according to NEMA PB 1.

1.7 PROJECT CONDITIONS

A. Environmental Limitations:
1. Do not deliver or install panelboards until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above panelboards is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
2. Rate equipment for continuous operation under the following conditions unless otherwise indicated:
   a. Ambient Temperature: Not exceeding 23 deg F to plus 104 deg F.
   b. Altitude: Not exceeding 6600 feet.

1.8 COORDINATION

A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

B. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.

1.9 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace transient voltage suppression devices that fail in materials or workmanship within specified warranty period.
1. Warranty Period: Two years from date of Substantial Completion.

1.10 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Keys: Two spares for each type of panelboard cabinet lock.
   2. Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PANELBOARDS

A. Enclosures: Flush- and surface-mounted cabinets. Comply with UL 67.
   1. Rated for environmental conditions at installed location.
      a. Indoor Dry and Clean Locations: NEMA 250, Type 1.
      b. Outdoor Locations: NEMA 250, Type 3R.
      c. Wash-Down Areas and Kitchens: NEMA 250, Type 4X, stainless steel.
      d. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.
      e. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.
   2. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box.
   3. Finishes:
      a. Panels and Trim: Steel, factory finished immediately after cleaning and pretreating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.
      b. Back Boxes: Galvanized steel.
   4. Directory Card: Inside panelboard door, mounted in metal frame with transparent protective cover.

B. Phase, Neutral, and Ground Buses:
   1. Material: Hard-drawn copper, 98 percent conductivity.
   2. Main bus bars, neutral and ground, shall be sized in accordance with U.L. Standards to limit temperature rise on any current carrying part to the maximums as indicated in UL67.
   3. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.
   4. Isolated Ground Bus: Adequate for branch-circuit isolated ground conductors; insulated from box.
   5. Extra-Capacity Neutral Bus: Neutral bus rated 200 percent of phase bus and UL listed as suitable for nonlinear loads.

C. Conductor Connectors: Suitable for use with conductor material and sizes.
   1. Material: Hard-drawn copper, 98 percent conductivity.
   2. Main and Neutral Lugs: Mechanical type.
   3. Ground Lugs and Bus-Configured Terminators: Mechanical type.
   4. Feed-Through Lugs: Mechanical type, suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.
   5. Subfeed (Double) Lugs: Mechanical type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device.
   6. Extra-Capacity Neutral Lugs: Rated 200 percent of phase lugs mounted on extra-capacity neutral bus.

D. Service Equipment Label: Labeled for use as service equipment for panelboards or load centers with one or more main service disconnecting and overcurrent protective devices.

E. Future Devices: Mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.

F. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals.

2.2 DISTRIBUTION PANELBOARDS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

B.
1. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
2. Square D; a brand of Schneider Electric.

C. Panelboards: NEMA PB 1, power and feeder distribution type.

D. Mains: Refer to Drawings for Circuit breaker, Fused switch, or Lugs only.
1.

E. Branch Overcurrent Protective Devices for Circuit Breaker Frame Sizes 125A and Smaller: Bolt-on circuit breakers.

F. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes Larger Than 125A: Bolt-on circuit breakers; plug-in circuit breakers where individual positive-locking device requires mechanical release for removal.

G. Branch Overcurrent Protective Devices: Fused switches.

H. Contactors in Main Bus: NEMA ICS 2, Class A, electrically held general-purpose controller, with same short-circuit interrupting rating as panelboard.
1. Internal Control-Power Source: Control-power transformer, with fused primary and secondary terminals, connected to main bus ahead of contactor connection.

2.3 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

B.
1. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
2. Square D; a brand of Schneider Electric.

C. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.

D. Mains: Refer to Drawings for Circuit breaker or lugs only.

E. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.

F. Contactors in Main Bus: NEMA ICS 2, Class A, electrically held general-purpose controller, with same short-circuit interrupting rating as panelboard.
   1. Internal Control-Power Source: Control-power transformer, with fused primary and secondary terminals, connected to main bus ahead of contactor connection.
   2. Panel door in a door cover is recommended for all lighting and appliance panels. They allow for easier maintenance. Be aware of a slight upcharge. Verify cost with the manufacturer, if it is a concern. Delete first sentence to eliminate door in a door.

G. Doors: Provide each panel with a door in a door cover. Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

2.4 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

B.
   1. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
   2. Square D; a brand of Schneider Electric.

C. Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with interrupting capacity to meet available fault currents.
   1. Thermal-Magnetic Circuit Breakers: Inverse time-current 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.
   2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic tip element with front-mounted, field-adjustable trip setting.
   3. Electronic trip circuit breakers with rms-sensing; field-replaceable rating plug or field-replicable electronic trip; and the following field-adjustable settings:
      a. Instantaneous trip.
      b. Long- and short -time pickup levels.
      c. Long- and short-time time adjustments.
      d. Ground-fault pickup level, time delay, and I^2t response.
   4. Current-Limiting Circuit Breakers: Frame sizes 400A and smaller; let-through ratings less than NEMA FU 1, RK-5.
   5. GFCI Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip).
   6. Molded-Case Circuit-Breaker (MCCB) Features and Accessories:
      a. Standard frame sizes, trip ratings, and number of poles.
      b. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.
      c. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge (HID) lighting circuits.
      d. Shunt Trip: 120-V trip coil energized from separate circuit, set to trip at 55 percent of rated voltage.
      e. Multipole units enclosed in a single housing or factory assembled to operate as a single unit.
      f. Handle Padlocking Device: Fixed attachment, for locking circuit-breaker handle in on position.

D. Fused Switch: NEMA KS 1, Type HD; clips to accommodate specified fuses, lockable handle.
   1. Fuses, and Spare-Fuse Cabinet: Comply with requirements specified in Division 26 Section “Fuses”.

2. Fused Switch Features and Accessories: Standard ampere ratings and number of poles.

2.5 ACCESSORY COMPONENTS AND FEATURES

A. Accessory Set: Include tools and miscellaneous items required for overcurrent protective device test, inspection, maintenance, and operation.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Receive, inspect, handle, and store panelboards according to NEMA PB 1.1.

B. Examine panelboards before installation. Reject panelboards that are damaged or rusted or have been subjected to water saturation.

C. Examine elements and surfaces to receive panelboards 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 INSTALLATION

A. Install panelboards and accessories according to NEMA PB 1.1.

B. Equipment Mounting: Install floor-mounted distribution panelboards on concrete bases, 4-inch nominal thickness. Comply with requirements for concrete base specified in Division 03 Section "Cast-in-Place Concrete".
   1. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around full perimeter of base.
   2. For panelboards, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
   3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
   4. Install anchor bolts to elevations required for proper attachment to panelboards.
   5. Attach panelboard to the vertical finished or structural surface behind the panelboard.

C. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from panelboards.

D. Mount top of trim 90 inches above finished floor unless otherwise indicated. If necessary, lower mounting height to insure the operating handle of the top-most switch or circuit breaker, in on position, is not higher than 79 inches (2000 mm) above finished floor.

E. Mount panelboard cabinet plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.

F. Install overcurrent protective devices and controllers not already factory installed.
   1. Set field adjustable, circuit-breaker trip ranges.

G. Install filler plates in unused spaces.

H. Where panelboards are located in finished spaces, stub four 1-inch empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Where panelboards are located above raised floor space, stub four 1-inch empty conduits into raised floor space.

I. Arrange conductors in gutters into groups and bundle and wrap with wire ties after completing load balancing.

J. Comply with NECA 1.

3.3 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with Division 26 Section "Identification for Electrical Systems."

B. Create a directory to indicate installed circuit loads after balancing panelboard loads; incorporate Owner's final room designations. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.
   1. For existing panelboards, replace existing directories with new to indicate new and existing circuits.

C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

D. Device Nameplates: Label each branch circuit device in distribution panelboards with a nameplate complying with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

3.4 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Acceptance Testing Preparation:
   1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
   2. Test continuity of each circuit.

C. Tests and Inspections:
   1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
   2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

D. Panelboards will be considered defective if they do not pass tests and inspections.

3.5 ADJUSTING

A. Adjust moving parts and operable component to function smoothly, and lubricate as recommended by manufacturer.

B. Set field-adjustable circuit-breaker trip ranges. as specified in Division 26 Section “Overcurrent Protective Device Coordinate Study.”

C. Load Balancing: After Substantial Completion, but not more than 60 days after Final Acceptance, measure load balancing and make circuit changes.
   1. Measure as directed during period of normal system loading.
   2. Perform load-balancing circuit changes outside normal occupancy/working schedule of the facility and at time directed. Avoid disrupting critical 24-hour services such as fax machines and on-line data processing, computing, transmitting, and receiving equipment.
   3. After circuit changes, recheck loads during normal load period. Record all load readings before and after changes and submit test records.
   4. Tolerance: Difference exceeding 20 percent between phase loads, within a panelboard, is not acceptable. Rebalance and recheck as necessary to meet this minimum requirement.

3.6 PROTECTION

A. Temporary Heating: Apply temporary heat to maintain temperature according to manufacturer's written instructions.

END OF SECTION 26 2416

SECTION 26 2726 - 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. This Section includes the following:

1. Receptacles, receptacles with integral GFCI, and associated device plates.
2. Twist-locking receptacles.
3. Isolated-ground receptacles.
4. Snap switches.
5. Pendant cord-connector devices.
6. Cord and plug sets.
7. Floor service outlets
8. Poke-through assemblies
9. Service poles
10. Multioutlet assemblies.

B. Related Sections include the following:

1. Division 27 Section "Communications Horizontal Cabling" for workstation outlets.

1.3 DEFINITIONS

A. EMI: Electromagnetic interference.

B. GFCI: Ground-fault circuit interrupter.

C. Pigtail: Short lead used to connect a device to a branch-circuit conductor.

D. RFI: Radio-frequency interference.

E. UTP: Unshielded twisted pair.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: One for each type of device and wall plate specified, in each color specified.

C. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing label warnings and instruction manuals that include labeling conditions.

1.5 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.

1.6 COORDINATION

A. Receptacles for Owner-Furnished Equipment: Match plug configurations.

1. Cord and Plug Sets: Match equipment requirements.

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. Arrow Hart Wiring Devices; a division of Cooper Industries, Inc. (Cooper).
2. Hubbell Incorporated; Wiring Device-Kellems (Hubbell).
3. Leviton Mfg. Company Inc. (Leviton).
4. Legrand Pass & Seymour.

2.2 STRAIGHT BLADE RECEPTACLES

A. Convenience 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:
   a. Leviton; 5351 (single), 5362 (duplex).

B. Tamper-Resistant 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:
   a. Leviton; 5362-SG.

2. Description: Labeled to comply with NFPA 70.

C. USB Combination Receptacle: Provide duplex receptacle as specified above, along with two integral USB charging ports (1 USB-A, 1 USB-C). Each USB port shall be rated 2.1A minimum at 5VDC, and shall be compatible with USB 2.0 & 3.0 devices.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Leviton M58AC

2.3 GFCI RECEPTACLES

A. General Description: Straight blade, tamper-resistant, feed-through type. Comply with NEMA WD 1, NEMA WD 6, UL 498, and UL 943, Class A, and include indicator light that is lighted when device is tripped.

B. Duplex GFCI Convenience Receptacles, 125V, 20A:

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Leviton ; G5362T.

C. Duplex GFCI Weather and Tamper Resistant Receptacles, 125V, 20A:

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Leviton ; G5362WT.

2.4 TWIST LOCKING RECEPTACLES

A. Single Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration L5-20R, and UL 498.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Arrow Hart Cooper; CWL520R.
   b. Hubbell; HBL2310.
   c. Leviton; 2310.
   d. Legrand Pass & Seymour; L520-R.

2.5 PENDANT CORD-CONNECTOR DEVICES

A. Description: Matching, locking-type plug and receptacle body connector; NEMA WD 6 configurations L5-20P and L5-20R (or as indicated on Drawings), heavy-duty grade.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Arrow Hart Cooper; CWL520P, CWL520C with I-Grip Strain Relief

2. Description
   a. Body: Nylon with screw-open cable-gripping jaws and provision for attaching external cable grip.
   b. External Cable Grip: Woven wire-mesh type made of high-strength galvanized-steel wire strand, matched to cable diameter, and with attachment provision designed for corresponding connector.

2.6 CORD AND PLUG SETS

A. Description: Match voltage and current ratings and number of conductors to requirements of equipment 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.
2. Plug: Nylon body and integral cable-clamping jaws. Match cord and receptacle type for connection.

2.7 SNAP SWITCHES

A. Comply with NEMA WD 1 and UL 20.

B. Switches, 120/277 V, 20 A:

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Arrow Hart Cooper; AH1221 (single pole), AH1222 (two pole), AH1223 (three way), AH1224 (four way).
   b. Hubbell; HBL1221 (single pole), HBL1222 (two pole), HBL1223 (three way), HBL1224 (four way).
   c. Leviton; 1221-2 (single pole), 1222-2 (two pole), 1223-2 (three way), 1224-2 (four way).
   d. Pass & Seymour; PS20AC1 (single pole), PS20AC2 (two pole), PS20AC3 (three way), PS20AC4 (four way).
2. Description: Industrial extra heavy-duty specification grade switches.

C. Illuminated Switches, 20 A:

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Arrow Hart Cooper; AH1221LT for 120/277V.
   b. Hubbell; HBL1221IL for 120/277V.
   c. Leviton; 1221-LH for 120V, 1221-7L for 277V.
   d. Pass & Seymour; PS20AC1 for 120/277V.

2. Description: Single pole, with neon-lighted handle, illuminated when switch is “OFF”. Refer to “FINISHES” herein for color.

D. Pilot Light Switches, 20 A:

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Arrow Hart Cooper; AH1221PL for 120 V and 277 V.
   b. Hubbell; HPL 1221PL for 120 V and 277 V.
   c. Leviton; 1221-PLR for 120 V, 1221-7PLR for 277 V.
   d. Pass & Seymour; PS20AC1-RPL for 120 V, PS20AC1-RPL7 for 277 V.

2. Description: Single pole, with red 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. Arrow Hart Cooper; AH1221L.
b. Hubbell; HBL1221L.
c. Leviton; 1221-2L.
d. 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. Arrow Hart Cooper; 1995.
b. Hubbell; HBL1557.
c. Leviton; 1257.
d. 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. Arrow Hart Cooper; 1995L.
b. Hubbell; HBL1557L.
c. Leviton; 1257L.
d. Pass & Seymour; 1251L.

2.8 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. For high abuse areas, vinyl wallcovering, and wood finished walls: 0.035-inch-thick, satin-finished type 302 stainless steel.
3. For other interior spaces: 0.035-inch-thick Smooth, white 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 “in-use” cover.

2.9 FLOOR SERVICE FITTINGS

A. Type: Modular, flush flap-type, dual-service units suitable for wiring method used, except in kitchens use modular, above-floor, dual-service units suitable for wiring method used.

B. Compartments: Barrier separates power from voice and data communication cabling.

C. Service Plate: Refer to plans.

D. Carpet Flange: Refer to plans.

E. Power Receptacle: NEMA WD 6 configuration 5-20R, white finish, unless otherwise indicated.

F. Voice and Data Communication Outlet: Standard, single-gang device opening capable of accepting 1-6 per duplex frame (by others). Verify requirements with technology consultant. Provide finishing plate.

2.10 POKE-THROUGH ASSEMBLIES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Hubbell Incorporated; Wiring Device-Kellems.
2. Pass & Seymour/Legrand; Wiring Devices & Accessories.
3. Square D/ Schneider Electric.
4. Thomas & Betts Corporation.
5. Wiremold Company (The).

B. Description: Factory-fabricated and -wired assembly of below-floor junction box with multichanneled, through-floor raceway/firestop unit and detachable matching floor service outlet assembly.

1. Service Outlet Assembly: As Indicated on Drawings.
2. Size: Selected to fit nominal 4-inch cored holes (or as otherwise indicated on plans) in floor and matched to floor thickness.
3. Fire Rating: Unit is listed and labeled for fire rating of floor-ceiling assembly.
4. Closure Plug: Arranged to close unused cored openings and reestablish fire rating of floor.
5. Wiring Raceways and Compartments: For a minimum of four No. 12 AWG conductors and a minimum of four, 4-pair, Category 5e voice and data communication cables.

2.11 MULTIOUTLET ASSEMBLIES

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Hubbell Incorporated; Wiring Device-Kellems.
2. Wiremold Company (The).

B. Components of Assemblies: Products from a single manufacturer designed for use as a complete, matching assembly of raceways and receptacles.

C. Raceway Material: Metal, with manufacturer's standard finish.

D. Wire: No. 12 AWG.

2.12 SERVICE POLES

A. Description: Factory-assembled and -wired units to extend power and voice and data communication from distribution wiring concealed in ceiling to devices or outlets in pole near floor.

1. Poles: Nominal 2.5-inch-square cross section, with height adequate to extend from floor to at least 6 inches above ceiling, and with separate channels for power wiring and voice and data communications cabling.
2. Mounting: Ceiling trim flange with concealed bracing arranged for positive connection to ceiling supports, with pole foot and carpet pad attachment.
3. Finishes: Selected by the Architect/Engineer from manufacturer's standard painted finish and trim combinations.
4. Wiring: Sized for minimum of five No.12 AWG power and ground conductors and a minimum of four, 4-pair, Category 5 voice and data communication cables.
5. Power Receptacles: Two duplex, 20-A, heavy-duty, NEMA WD 6 configuration 5-20R units.
6. Voice and Data Communication Outlets: Blank insert with bushed cable opening. Provide trim plates.

2.13 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.

2. Wiring Devices Connected to Emergency Power System: Red.
3. Isolated-Ground Receptacles: Gray with orange triangle designation on face.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1, including the mounting heights listed in that standard, unless otherwise noted.

B. 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.

C. 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.

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.

D. 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.

E. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles down, and on horizontally mounted receptacles to the left.

F. 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.

G. Dimmers:

1. Install dimmers within terms of their listing.
2. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' device listing conditions in the written instructions.

H. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical. Group adjacent switches under single, multigang wall plates.

I. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.

J. Provide Tamper-Resistant type receptacles in all facilities frequented by children as described by NFPA 70, including:
1. Child Care Facilities, Preschools, Elementary Education Facilities,
2. Dwelling Units,

3. Business Offices, Corridors, Waiting Rooms and the like in Clinics, Medical and Dental Offices and Outpatient Facilities;
4. Assembly Occupancies (Transportation Waiting, Gymnasiums, Skating Rinks, Auditoriums;
5. Dormitories

3.2 IDENTIFICATION

A. Comply with Division 26 Section "Identification for Electrical Systems."

1. Receptacles and switches: Identify panelboard and circuit number from which served. Use durable wire marker on the back (inside) of the cover plate.

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

1. Test Instruments: Use instruments that comply with UL 1436.
2. 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 above five percent 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.

END OF SECTION 26 2726

SECTION 26 2813 - FUSES

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. Cartridge fuses rated 600-V ac and less for use in control circuits, enclosed switches and panelboards, switchboards and enclosed controllers, and motor-control centers.

1.3 SUBMITTALS

A. Operation and Maintenance Data: For fuses to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:

1. Ambient temperature adjustment information.
2. Current-limitation curves for fuses with current-limiting characteristics.
3. Time-current coordination curves (average melt) and current-limitation curves (instantaneous peak let-through current) for each type and rating of fuse.
4. Coordination charts and tables and related data.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain fuses, for use within a specific product or circuit, from single source from single manufacturer.

B. 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.

Comply with NEMA FU 1 for cartridge fuses.

D. Comply with NFPA 70.

1.5 PROJECT CONDITIONS

A. Where ambient temperature to which fuses are directly exposed is less than 40 deg F or more than 100 deg F, apply manufacturer’s ambient temperature adjustment factor to fuse ratings.

1.6 COORDINATION

A. Coordinate fuse ratings with utilization equipment nameplate limitations of maximum fuse size and with system short-circuit current levels.

1.7 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Cooper Bussmann, Inc.
2. Ferraz Shawmut, Inc.
3. Littelfuse, Inc.

2.2 CARTRIDGE FUSES

A. Characteristics: NEMA FU 1, nonrenewable cartridge fuses with voltage ratings consistent with circuit voltages.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine fuses before installation. Reject fuses that are moisture damaged or physically damaged.

B. Examine holders to receive fuses for compliance with installation tolerances and other conditions affecting performance, such as rejection features.

C. Examine utilization equipment nameplates and installation instructions. Install fuses of sizes and with characteristics appropriate for each piece of equipment.

D. Evaluate ambient temperatures to determine if fuse rating adjustment factors must be applied to fuse ratings.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 FUSE APPLICATIONS

A. Cartridge Fuses:

1. Service Entrance: Class L, time delay.
2. Feeders: Class L, time delay for feeders over 600 amps, Class RK1, time delay for smaller feeders.
3. Motor Branch Circuits: Class RK1, time delay.
4. Other Branch Circuits: Class RK1, time delay.
5. Control Circuits: Class CC, time delay.

3.3 INSTALLATION

A. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.

3.4 IDENTIFICATION

A. Install labels complying with requirements for identification specified in Division 26 Section "Identification for Electrical Systems" and indicating fuse replacement information on inside door of each fused switch and adjacent to each fuse block, socket, and holder.

END OF SECTION 26 2813

SECTION 26 2816 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

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:

1. Fusible switches.
2. Nonfusible switches.
3. Molded-case circuit breakers (MCCBs).
4. Molded-case switches.
5. Enclosures.

1.3 SUBMITTALS

A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.

1. Enclosure types and details for types other than NEMA 250, Type 1.
2. Current and voltage ratings.
3. Short-circuit current ratings (interrupting and withstand, as appropriate).
4. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices, accessories, and auxiliary components.
5. Include time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device.

B. Field quality-control reports.

1. Test procedures used.
2. Test results that comply with requirements.
3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

C. Operation and Maintenance Data: For enclosed switches and circuit breakers to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:

1. Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers.
2. Time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single source from single manufacturer.

B. 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.

C. Comply with NFPA 70.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:

1. Ambient Temperature: Not less than minus 22 deg F and not exceeding 104 deg F.
2. Altitude: Not exceeding 6600 feet.

B. 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 Construction Manager no fewer than five 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 Construction Manager's written permission.
4. Comply with NFPA 70E.

1.6 COORDINATION

A. 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.

1.7 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.

PART 2 - PRODUCTS

2.1 FUSIBLE SWITCHES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
3. Siemens Energy & Automation, Inc.
4. Square D; a brand of Schneider Electric.

B. Type HD, Heavy Duty, Single Throw, 240-V or 600-V ac as required, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate specified fuses, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

C. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
3. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
4. Lugs: Mechanical type, suitable for number, size, and conductor material.

2.2 NONFUSIBLE SWITCHES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
3. Siemens Energy & Automation, Inc.
4. Square D; a brand of Schneider Electric.

B. Type HD, Heavy Duty, Single Throw, 240-V or 600-V ac as required, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
3. Lugs: Mechanical type, suitable for number, size, and conductor material.

2.3 MOLDED-CASE CIRCUIT BREAKERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
3. Siemens Energy & Automation, Inc.
4. Square D; a brand of Schneider Electric.

B. General Requirements: Comply with UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents.

C. Thermal-Magnetic Circuit Breakers: Inverse time-current 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.

D. Electronic Trip Circuit Breakers: Field-replaceable rating plug, rms sensing, with the following field-adjustable settings:

1. Instantaneous trip.
2. Long- and short-time pickup levels.
3. Long- and short-time time adjustments.
4. Ground-fault pickup level, time delay, and I^2t response.

E. Features and Accessories:

1. Standard frame sizes, trip ratings, and number of poles.
2. Lugs: Mechanical type, suitable for number, size, trip ratings, and conductor material.
3. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge lighting circuits.
4. Shunt Trip: Trip coil energized from separate circuit, with coil-clearing contact.
5. The external operating mechanism shall be provided, from the factory, with the capability of locking the electrical contacts in the open position. The locking mechanism shall be key operated.

2.4 MOLDED-CASE SWITCHES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
3. Siemens Energy & Automation, Inc.
4. Square D; a brand of Schneider Electric.

B. General Requirements: MCCB with fixed, high-set instantaneous trip only, and short-circuit withstand rating equal to equivalent breaker frame size interrupting rating.

C. Features and Accessories:

1. Standard frame sizes and number of poles.
2. Lugs: Mechanical type, suitable for number, size, trip ratings, and conductor material.
3. The external operating mechanism shall be provided, from the factory, with the capability of locking the electrical contacts in the open position. The locking mechanism shall be key operated.

2.5 ENCLOSURES

A. Enclosed Switches and Circuit Breakers: NEMA AB 1, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.

1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.
2. Outdoor Locations: NEMA 250, Type 3R.
3. Kitchen or Wash-Down Areas: NEMA 250, Type 4X, stainless steel.
4. Other Wet or Damp, Indoor Locations: NEMA 250, Type 4.
5. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with 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. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.

B. Comply with mounting and anchoring requirements specified in Division 26 Section "Vibration and Seismic Controls for Electrical Systems."

C. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

D. Install fuses in fusible devices.

E. Comply with NECA 1.

3.3 IDENTIFICATION

A. Comply with requirements in Division 26 Section "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.

3.4 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Acceptance Testing Preparation:

1. Test insulation resistance for each enclosed switch and circuit breaker, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

C. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
3. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.

D. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 ADJUSTING

A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

B. Set field-adjustable circuit-breaker trip ranges as specified in Division 26 Section "Overcurrent Protective Device Coordination Study".

END OF SECTION 26 2816

SECTION 26 43 13 - SURGE PROTECTION 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. Section includes field-mounted SPDs for low-voltage (120 to 600 V) power distribution and control equipment. This specification is for external field-mounted only surge protective devices. Devices mounted internal to the switchgear or panelboards will not be accepted.

B. Related Requirements:

1. Section 26 24 13 Switchboards
2. Section 26 24 16 Panelboards
3. Section 26 05 26 Grounding and Bonding for Electrical Systems

1.3 DEFINITIONS

A. Inominal: Nominal discharge current.

B. MCOV: Maximum continuous operating voltage.

C. Mode(s), also Modes of Protection: The pair of electrical connections where the VPR applies.

D. MOV: Metal-oxide varistor; an electronic component with a significant non-ohmic current-voltage characteristic.

E. OCPD: Overcurrent protective device.

F. SCCR: Short-circuit current rating.

G. SPD: Surge protective device.

H. VPR: Voltage protection rating.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
2. Copy of UL Category Code VZCA certification, as a minimum, listing the tested values for VPRs, Inominal ratings, MCOVs, type designations, OCPD requirements, model numbers, system voltages, and modes of protection.

1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

B. Warranties: Provide manufacturer's certificates of warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For SPDs to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent testing 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.

1. 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. Source Limitations: Obtain suppression devices and accessories through one source from a single manufacturer.

C. Product Options: Drawings indicate size, dimensional requirements, and electrical performance of suppressors and are based on the specific system indicated. Refer to Division 01 Section "Product Requirements."

D. 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.

E. Comply with IEEE C62.41, "IEEE Guide for Surge Voltages in Low Voltage AC Power Circuits," and test devices according to IEEE C62.45, "IEEE Guide on Surge Testing for Equipment Connected to Low-Voltage AC Power Circuits."

F. Comply with NEMA LS 1, "Low Voltage Surge Protection Devices."

G. Comply with UL 1283, "Electromagnetic Interference Filters," and UL 1449, 3rd edition, "Surge Protection Devices".

1.8 PROJECT CONDITIONS

A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Architect not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Architect's written permission.

B. Service Conditions: Rate surge protection devices for continuous operation under the following conditions, unless otherwise indicated:

1. Maximum Continuous Operating Voltage: Not less than 115 percent of nominal system operating voltage.
2. Operating Temperature: 30 to 120 deg F.

3. Humidity: 0 to 85 percent, noncondensing.
4. Altitude: Less than 20,000 feet above sea level.

1.9 COORDINATION

A. Coordinate location of field-mounted surge suppressors to allow adequate clearances for maintenance.

B. Coordinate surge protection devices with Division 26 Section "Electrical Power Monitoring and Control."

1.10 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to replace or replace SPDs that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

2. Special Warranty for Cord-Connected, Plug-in Surge Suppressors: Manufacturer's standard form in which manufacturer agrees to repair or replace electronic equipment connected to circuits protected by surge suppressors.

1.11 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

B. Replaceable Protection Modules: One of each size and type installed.

PART 2 - PRODUCTS

2.1 GENERAL SPD REQUIREMENTS

A. SPD with 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.

C. Comply with UL 1449.

D. MCOV of the SPD shall be the nominal system voltage.

2.2 SERVICE ENTRANCE SUPPRESSOR

A. Manufacturers: Subject to compliance with requirements, provide Externally Mounted SPD by one of the following::

1. Emerson Electric Co.
2. Current Technology.
3. ERICO Critech.

B. SPDs: Comply with UL 1449, Type 2.

C. SPDs: Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 1449, Type 2

1. SPDs with the following features and accessories:
   a. Internal thermal protection that disconnects the SPD before damaging internal suppressor components.
   b. Fabrication using bolted compression lugs for internal wiring.
   c. Redundant suppression circuits.
   d. Redundant replaceable modules.
   e. Arrangement with copper bus bars and for bolted connections to phase buses, neutral bus, and ground bus.
   f. Arrangement with wire connections to phase buses, neutral bus, and ground bus.
   g. Indicator light display for protection status.
   h. Form-C contacts rated at 5 A and 250-V ac, one normally open and one normally closed, for remote monitoring of protection status.
   i. Surge counter.

D. Comply with UL 1283.

E. Peak Surge Current Rating: The minimum single-pulse surge current withstand rating per mode shall not be less than 200kA. .

F. Protection modes and UL 1449 VPR for grounded wye circuits with 480Y/277 V, three-phase, four-wire circuits shall not exceed the following:

1. Line to Neutral: 1200 V for 480Y/277 V, 700 V for 208Y/120 V.
2. Line to Ground: 1200 V for 480Y/277 V, 1200 V for 208Y/120 V.
3. Line to Line: 2000 V for 480Y/277 V, 1000 V for 208Y/120 V.

G. Protection modes and UL 1449 VPR for 240/120 V, single-phase, three-wire circuits shall not exceed the following:

1. Line to Neutral: 700 V.
2. Line to Ground:700 V.
3. Line to Line: 1000 V.

H. SCCR: Equal or exceed200 kA.

I. Inominal Rating: 20 kA.

2.3 PANEL SUPPRESSORS

A. Manufacturers: Subject to compliance with requirements, provide Externally Mounted SPD by one of the following:

B. Externally Mounted Devices

1. Emerson Electric Co.
2. Current Technology
3. ERICO Critech.

C. SPDs: Comply with UL 1449, Type 2.

D. SPDs: Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 1449, Type 2

1. SPDs with the following features and accessories:
   a. Internal thermal protection that disconnects the SPD before damaging internal suppressor components.
   b. Fabrication using bolted compression lugs for internal wiring.
   c. Redundant suppression circuits.
   d. Redundant replaceable modules.
   e. Arrangement with copper bus bars and for bolted connections to phase buses, neutral bus, and ground bus.
   f. Arrangement with wire connections to phase buses, neutral bus, and ground bus.
   g. Indicator light display for protection status.
   h. Form-C contacts rated at 5 A and 250-V ac, one normally open and one normally closed, for remote monitoring of protection status. Surge Counter

E. Peak Surge Current Rating: The minimum single-pulse surge current withstand rating per mode shall not be less than 80kA. .

F. Comply with UL 1283.

G. Protection modes and UL 1449 VPR for grounded wye circuits with 208Y/120 V, three-phase, four-wire circuits shall not exceed the following:

1. Line to Neutral: 700 V for 208Y/120 V.
2. Line to Ground: 700 V for 208Y/120 V.
3. Neutral to Ground: 700 V for 208Y/120 V.
4. Line to Line: 1200 V for 208Y/120 V

H. Protection modes and UL 1449 VPR for 240/120-V, single-phase, three-wire circuits shall not exceed the following:

1. Line to Neutral: 700 V.
2. Line to Ground: 700 V.
3. Neutral to Ground: 700 V.
4. Line to Line: 1200 V.

I. SCCR: Equal or exceed 200 kA.

J. Inominal Rating: 20 kA

2.4 ENCLOSURES

A. Indoor Enclosures: NEMA 250, Type 1.

B. Outdoor Enclosures: NEMA 250, Type 4X.

2.5 CONDUCTORS AND CABLES

A. Power Wiring: Same size as SPD leads, complying with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1.

B. Install an OCPD or disconnect as required to comply with the UL listing of the SPD.

C. Install SPDs with conductors between suppressor and points of attachment as short and straight as possible, and adjust circuit-breaker positions to achieve shortest and straightest leads. Do not splice and extend SPD leads unless specifically permitted by manufacturer. Do not exceed manufacturer's recommended lead length. Do not bond neutral and ground.

D. Use crimped connectors and splices only. Wire nuts are unacceptable.

E. Wiring:

1. Power Wiring: Comply with wiring methods in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
2. Controls: Comply with wiring methods in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.2 FIELD QUALITY CONTROL

A. Perform the following tests and inspections with the assistance of a factory-authorized service representative.

1. Compare equipment nameplate data for compliance with Drawings and Specifications.
2. Inspect anchorage, alignment, grounding, and clearances.
3. Verify that electrical wiring installation complies with manufacturer's written installation requirements.

B. An SPD will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.3 STARTUP SERVICE

A. Complete startup checks according to manufacturer's written instructions.

B. Do not perform insulation-resistance tests of the distribution wiring equipment with SPDs installed. Disconnect SPDs before conducting insulation-resistance tests, and reconnect them immediately after the testing is over.

C. Energize SPDs after power system has been energized, stabilized, and tested.

3.4 DEMONSTRATION

END OF SECTION 26 43 13

SECTION 26 5100 - INTERIOR LIGHTING

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 the following:

1. Interior lighting fixtures, lamps, ballasts and drivers.
2. Emergency lighting units.
3. Exit signs.
4. Lighting fixture supports.

B. Related Sections include the following:
1. Division 26 Section "Digital Lighting Controls"

1.3 DEFINITIONS

A. BF: Ballast factor.

B. CRI: Color-rendering index.

C. CU: Coefficient of utilization.

D. HID: High-intensity discharge.

E. LED: Light Emitting Diode

F. LER: Luminaire efficacy rating.

G. Luminaire: Complete lighting fixture, including ballast housing if provided.

H. RCR: Room cavity ratio.

1.4 SUBMITTALS

A. Product Data: For each type of lighting fixture, arranged in order of fixture designation. Include data on features, accessories, finishes, and the following:

1. Physical description of lighting fixture including dimensions.
2. Photometry data for luminaire to include:
   a. Candlepower distribution diagram and chart
   b. Zonal lumen summary chart & luminaire efficiency percentage
   c. Delivered lumen data for LED luminaires

d. Total luminaire wattage
3. Emergency lighting units including battery and charger.
4. Ballast or driver, including BF.
5. Energy-efficiency data.
6. Life, output, and energy-efficiency data for lamps or light sources.

B. Shop Drawings: Show details of nonstandard or custom lighting fixtures. Indicate dimensions, weights, methods of field assembly, components, features, and accessories.

1. Wiring Diagrams: Power and control wiring.

C. Field quality-control test reports.

D. Operation and Maintenance Data: For lighting equipment and fixtures to include in emergency, operation, and maintenance manuals.

1. Provide a list of all lamp types used on Project; use ANSI and manufacturer's codes. Include manufacturer's name, wattage, CRI, life & color temperature.

E. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

A. 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.

B. Comply with NFPA 70.

C. FMG Compliance: Lighting fixtures for hazardous locations shall be listed and labeled for indicated class and division of hazard by FMG.

1.6 COORDINATION

A. Coordinate layout and installation of lighting fixtures and suspension system with other construction that penetrates ceilings or is supported by them, including HVAC equipment, fire-suppression system, and partition assemblies.

1. Create 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:

a. Lighting fixtures.
b. Suspended ceiling components.
c. Partitions and millwork that penetrate the ceiling or extends to within 12 inches (305 mm) of the plane of the luminaires.
d. Ceiling-mounted projectors.
e. Structural members to which suspension systems for lighting fixtures will be attached.
f. Access panels.
g. Other items in finished ceiling including, but not limited to the following:
1) Air outlets and inlets.
2) Speakers.
3) Sprinklers.

4) Smoke and fire detectors.
5) Occupancy sensors.

1.7 WARRANTY

A. Special Warranty for Emergency Lighting Batteries: Manufacturer's standard form in which manufacturer of battery-powered emergency lighting unit agrees to repair or replace components of rechargeable batteries that fail in materials or workmanship within specified warranty period.

1. Warranty Period for Emergency Lighting Unit Batteries: Ten years from date of Substantial Completion. Full warranty shall apply for first year, and prorated warranty for the remaining nine years.
2. Warranty Period for Emergency Fluorescent Ballast and Self-Powered Exit Sign Batteries: Seven years from date of Substantial Completion. Full warranty shall apply for first year, and prorated warranty for the remaining six years.

B. Special Warranty for Ballasts: Manufacturer's standard form in which ballast manufacturer agrees to repair or replace ballasts that fail in materials or workmanship within specified warranty period.

1. Warranty Period for Electronic Ballasts: Five years from date of Substantial Completion.
2. Warranty Period for Electromagnetic Ballasts: Three years from date of Substantial Completion.

C. Special Warranty for Fluorescent Lamps: Manufacturer's standard form, made out to Owner and signed by lamp manufacturer agreeing to replace lamps that fail in materials or workmanship, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.

1. Warranty Period: One year(s) from date of Substantial Completion.

D. Special Warranty for LED Sources and Drivers: Manufacturer's standard form, made out to Owner and signed by manufacturer agreeing to replace LED sources or drivers that fail in materials or workmanship, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.

1. Warranty Period: Five year(s) from date of Substantial Completion.

1.8 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Lamps: 10 for every 100 of each type and rating installed. Furnish at least one of each type.
2. Plastic Diffusers and Lenses: 1 for every 100 of each type and rating installed. Furnish at least one of each type.
3. Ballasts/Drivers: 1 for every 100 of each type and rating installed. Furnish a minimum of one of each type.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In Interior Lighting Fixture Schedule where titles below are column or row headings that introduce lists, the following requirements apply to product selection:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 LIGHTING FIXTURES AND COMPONENTS, GENERAL REQUIREMENTS

A. Recessed Fixtures: Comply with NEMA LE 4 for ceiling compatibility for recessed fixtures.

B. Fluorescent, HID, Incandescent, and LED Fixtures: Comply with UL 1598.

C. Metal Parts: Free of burrs and sharp corners and edges.

D. Sheet Metal Components:

1. Steel, minimum 22 gauge for troffers, unless otherwise indicated.
2. Form and support to prevent warping and sagging.

E. Doors, Frames, and Other Internal Access:

1. Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools.
2. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.
3. Spring loaded cam latches.
4. Designed and fabricated to include reinforcing to prevent warping.

F. All metal parts shall be painted after fabrication.

G. Plastic Diffusers, Covers, and Globes:

1. Acrylic Lighting Diffusers: 100 percent virgin acrylic plastic. High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.

a. Lens Thickness: At least 0.125 inch (3.175 mm) minimum unless different thickness is indicated.
b. UV stabilized.

2. Glass: Annealed crystal glass, unless otherwise indicated.

H. Provide integral accessible disconnecting means for fluorescent luminaires that utilize double-ended lamps and contain ballast(s) that can be serviced in place or ballasted luminaires that are supplied from multi-wire branch circuits and contain ballast(s) that can be serviced in place.

I. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps, ballasts, and drivers. Labels shall be located where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.

1. Labels shall include the following lamp and ballast characteristics:

    a. "USE ONLY" and include specific lamp type.
    b. Lamp diameter code (i.e. T-4, T-5, T-8), tube configuration (i.e. twin, quad, triple), base type, and nominal wattage for fluorescent and compact fluorescent luminaries.
    c. Lamp type, wattage, bulb type (i.e. ED17, BD56) and coating (clear or coated) for HID luminaires.
    d. Start type (i.e. programmed rapid start) for fluorescent and compact fluorescent luminaires.
    e. ANSI ballast type (i.e. M98, M57) for HID luminaires.
    f. CCT and CRI for all luminaires.

2.3 LED SOURCES

A. Comply with ANSI/UL 1993-2009 AND ANSI/UL 8750-2008, "Light Emitting Diode (LED) for Use in Lighting Products". Photometric testing data shall be in accordance with IESNA LM-79. Lumen maintenance depreciation measurements shall be in accordance with IESNA LM-80, while long term lumen maintenance estimations shall be in accordance with IESNA TM-21.

B. LED sources shall have a color temperature of 3500K and a minimum CRI of 80, with an R9 value of >50.

C. LED sources shall start and operate in 0°F to 40°F ambient.

D. LED sources shall be designed for ease of component replacement and end-of-life disassembly from room side. All internal components shall be assembled and pre-wired using modular electrical connections.

E. LED sources shall be RoHS compliant (Restriction of Hazardous Substances).

F. LED sources shall be binned to a 3 step MacAdam ellipse (SDCM: Standard Deviation Color Matching) of the 3500K Planckian Locus to ensure color consistency.

G. LED products must have a minimum 5 year warranty for replacement of all components, including LED board or driver.

2.4 DRIVERS FOR DIMMER CONTROLLED LED FIXTURES

A. 10% Dimmable Driver for LED Fixtures – Description: Electronic driver shall be designed for type and quantity of LED fixtures served and for full light output. Comply with NEMA SSL 1, UL 8750, ANSI C62.41, Category A and the following:

    1. Dimming Range: 100% to 10% of rated lumens with continuous, flicker-free 0-10V dimming.
    2. Operating Voltage: 120-277V at 50/60Hz.
    3. Rated Lifetime: 50,000 hours at drive case temperature of 149 deg F.
    4. Sound Rating: Class A.
    5. Starting Temperature: Shall start the lamp(s) at 32°F or higher.
    6. Total Harmonic Distortion Rating: Less than 20 percent.
    7. Standby Power Consumption: Less than 1.0 watt.
    8. Power Factor: 0.90 or higher.

9. Inrush Current: Less than 2 amps. Inrush current limiting circuitry eliminates circuit breaker tripping, switch arcing, and relay failure.
10. Transient Voltage Protection: Follow ANSI C62.41 to provide Category A rating or better.
11. Open circuit protected and short circuit protected.
12. LEDs turn on to any dimmed level without going to full brightness.
13. Nonvolatile memory restores all driver settings after power failure.
14. Turn-on time: Less than 1 second.
15. RFI Requirements: Labeled for radio frequency interference (RFI) requirements of FCC Title 47 Part 15.

B. 3-Wire Control, 1% Dimmable Driver for LED Fixtures – Description: Electronic driver shall be designed for type and quantity of LED fixtures served and for full light output. Comply with UL 8750, ANSI C62.41, Category A and the following:

1. Products:

   a. Lutron Hi-Lume A-Series L3D.

2. Dimming Range: 100% to 1% of rated lumens with continuous, flicker-free dimming.
3. Operating Voltage: 120-277V at 50/60Hz.
4. Output Power: 5 to 40 watts.
5. Rated Lifetime: 50,000 hours at drive case temperature of 149 deg F.
6. Sound Rating: Class A.
7. Starting Temperature: Shall start the lamp(s) at 32°F or higher.
8. Total Harmonic Distortion Rating: Less than 20 percent at 40 watts.
9. Standby Power Consumption: Less than 1.0 watt.
10. Power Factor: 0.90 or higher at 40 watts.
11. Inrush Current: Less than 2 amps. Inrush current limiting circuitry eliminates circuit breaker tripping, switch arcing, and relay failure.
12. Transient Voltage Protection: Follow ANSI C62.41 to provide Category A rating or better.
13. Open circuit protected and short circuit protected.
14. LEDs turn on to any dimmed level without going to full brightness.
15. Nonvolatile memory restores all driver settings after power failure.
16. Turn-on time: Less than 1 second.
17. Maximum Driver-to-LED Light Engine Wire Length: Less than 10 feet.
18. Driver Output: Provide constant current driver with pulse width modulation (PWM) dimming, constant current driver with constant current reduction (CCR) dimming, or constant voltage driver with pulse width modulation (PWM) dimming as required by the LED fixture manufacturer.

2.5

2.5 EXIT SIGNS

A. Description: Comply with UL 924; for sign colors, visibility, luminance, and lettering size, comply with authorities having jurisdiction.

B. Internally Lighted Signs:

1. Lamps for AC Operation: LEDs, 50,000 hours minimum rated lamp life.
2. Self-Powered Exit Signs (Battery Type): Integral automatic charger in a self-contained power pack.

a. Battery: Sealed, maintenance-free, nickel-cadmium type.
b. Charger: Fully automatic, solid-state type with sealed transfer relay.
c. Operation: Relay automatically energizes lamp from battery when circuit Voltage drops to 80 percent of nominal Voltage or below. When normal Voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
d. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
e. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
f. Universal mounting unless a specific mounting is indicated.
g. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by a flashing red LED.

2.6 EMERGENCY LIGHTING UNITS

A. Description: Self-contained units complying with UL 924.

1. Battery: Sealed, maintenance-free, lead-acid type.
2. Charger: Fully automatic, solid-state type with sealed transfer relay.
3. Operation: Relay automatically turns lamp on when power supply circuit Voltage drops to 80 percent of nominal Voltage or below. Lamp automatically disconnects from battery when Voltage approaches deep-discharge level. When normal Voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
4. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
5. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
6. Wire Guard: Where indicated on Drawings, provide heavy-chrome-plated wire guard protects lamp heads or fixtures.
7. Integral Time-Delay Relay: Holds unit on for fixed interval of 15 minutes when power is restored after an outage.
8. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by a flashing red LED.

2.7 LIGHTING FIXTURE SUPPORT COMPONENTS

A. Comply with Division 26 Section "Hangers and Supports for Electrical Systems" for channel- and angle-iron supports and nonmetallic channel and angle supports.

B. Single-Stem Hangers: 1/2-inch (13-mm) steel tubing with swivel ball fittings and ceiling canopy. Finish same as fixture.

C. Twin-Stem Hangers: Two, 1/2-inch (13-mm) steel tubes with single canopy designed to mount a single fixture. Finish same as fixture.

D. Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated steel, 12 gage (2.68 mm).

E. Wires for Humid Spaces: ASTM A 580/A 580M, Composition 302 or 304, annealed stainless steel.

F. Rod Hangers: 3/16-inch (5-mm) minimum diameter, cadmium-plated, threaded steel rod.

G. Hook Hangers: Integrated assembly matched to fixture and line Voltage and equipped with threaded attachment, cord, and locking-type plug.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Lighting fixtures: Set level, plumb, and square with ceilings and walls. Install lamps in each fixture.

B. Support for Lighting Fixtures in or on Grid-Type Suspended Ceilings: Use grid as a support element.

1. Fixtures with Same Dimensions As Ceiling Grid:
   a. Install a minimum of four ceiling support system rods or wires for each fixture. Locate not more than 6 inches (150 mm) from lighting fixture corners.
   b. Support Clips: Fasten to lighting fixtures and to ceiling grid members at or near each fixture corner with clips that are UL listed for the application.
2. Fixtures of Sizes Less Than Ceiling Grid: Install as indicated on reflected ceiling plans or center in acoustical panel, and support fixtures independent of acoustical panel with at least two 3/4-inch (20-mm) metal channels spanning and secured to ceiling tees.
3. **Install at least one independent support system, rod or wire, from structure to a tab on lighting fixture. Support system shall have breaking strength of the weight of fixture at a safety factor of 3.**

C. Suspended Lighting Fixture Support:

1. Pendants and Rods: Where longer than 48 inches (1200 mm), brace to limit swinging.
2. Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers.
3. Continuous Rows: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of fixture chassis, including one at each end.
4. Do not use grid as support for pendant luminaires. Connect support wires or rods to building structure.

D. Adjust aimable lighting fixtures to provide required light intensities. Coordinate aiming requirements with [Architect].

E. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

F. Clean lamps, lenses, and reflectors of all dirt, debris, paint, and finger prints prior to Substantial Completion of Work.

G. Lamps, ballasts and drivers shall be in working order at the time of Substantial Completion of Work.

H. Remote Mounting of drivers and Ballasts: Distance between the driver/ballast and the fixture shall not exceed that recommended by ballast manufacturer. Verify with manufacturers for maximum distances.

3.2 FIELD QUALITY CONTROL

A. Test for Emergency Lighting: Interrupt normal power supply to demonstrate proper operation. Verify transfer from normal power to emergency source (battery, generator, etc) and retransfer to normal.

3.3 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting aimable luminaires to suit actual occupied conditions. Provide one visit to Project during other-than-normal occupancy hours for this purpose. Some of this work may be required after dark.

END OF SECTION 26 5100

SECTION 28 31 11 - DIGITAL, ADDRESSABLE FIRE-ALARM SYSTEM

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. Delegated Design
1. This specification is a performance-based specification and the Contractor shall be fully responsible for designing and providing the Fire Alarm System necessary to meet the specified requirements and as required by the codes associated with the building.
2. The Contract Drawings are diagrammatic and are intended to establish basic dimension of units, sight lines, device locations and profiles of units. The Contractor shall provide engineered shop drawings for review and submission to the authority having jurisdiction. Field verify and coordinate with other trades, the device and equipment locations, and cable/circuit routing.
3. **Fire alarm system for renovation areas shall be similar to existing building with all work as required for a code compliant system. The contractor shall provide a design performed by a licensed individual currently holding a "Fire Alarm Planning Superintendent" license (APS) issued by the Texas State Fire Marshal's Office and which is certified NICET Level III or higher. The specification for fire alarm system on the contract drawings and documents was performed with the endeavor to comply with applicable national, state and local building and fire codes and shall serve as minimum basis for planning. Contractor is responsible for shop drawings illustrating a complete fire alarm system that complies with NFPA 72, NFPA 90a, and local IFC and IBC and shall provide all required components. Submittals shall include final device layout, all required circuit pathways, and system calculations (battery power, voltage drop, and speaker dB loss).**

B. Section Includes:
1. Fire-alarm control unit extender panel.
2. Manual fire-alarm boxes.
3. System smoke detectors.
4. Heat detectors.
5. Notification appliances.
6. Magnetic door holders.
7. Remote annunciator.
8. Programming of remote annunciator
9. Addressable interface device.
10. Digital alarm communicator transmitter.
11. Radio alarm transmitter.

1.3 DEFINITIONS

A. LED: Light-emitting diode.

B. NAC: Notification Appliance Circuit.

C. NICET: National Institute for Certification in Engineering Technologies.

1.4 SYSTEM DESCRIPTION

A. Noncoded addressable system, with automatic sensitivity control of certain smoke detectors and multiplexed signal transmission, dedicated to fire-alarm service only. Existing fire alarm system shall be modified as required to incorporate the renovation areas. Component descriptions below are to establish a general level system – match existing building standards where feasible and allowed by applicable codes.

1.5 SUBMITTALS

A. General Submittal Requirements:
   1. Submittals shall be approved by authorities having jurisdiction prior to submitting them to Architect.
   2. Shop Drawings shall be prepared by persons with the following qualifications:
      a. Trained and certified by manufacturer in fire-alarm system design.
      b. NICET-certified, Level III minimum with APS license.
      c. Licensed by the State of Texas.

B. Product Data: For each type of product indicated.

C. Shop Drawings: For fire-alarm system. Include plans, elevations, sections, details, and attachments to other work.
   1. Comply with recommendations in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA 72.
   2. Include voltage drop calculations for notification appliance circuits.
   3. Include battery-size calculations.
   4. Include performance parameters and installation details for each detector, verifying that each detector is listed for complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
   5. Include plans, sections, and elevations of heating, ventilating, and air-conditioning ducts, drawn to scale and coordinating installation of duct smoke detectors and access to them. Show critical dimensions that relate to placement and support of sampling tubes, detector housing, and remote status and alarm indicators. Locate detectors according to manufacturer's written recommendations.
   6. Include voice/alarm signaling-service equipment rack or console layout, grounding schematic, amplifier power calculation, and single-line connection diagram.
   7. Retain subparagraph below for projects where routing of cable or conduit is critical and only outlet locations are shown on Drawings. Delete reference to device addresses if shown on Drawings.
   8. Include floor plans to indicate final outlet locations showing address of each addressable device. Show size and route of cable and conduits.
   9. Data to indicate that the amplifiers have sufficient capacity to simultaneously drive all notification speakers at the maximum rating plus 20 percent spare capacity. Annotate data for each circuit on the drawings.
   10. Provide voltage drop calculations on NAC circuits.
   11.

D. Delegated-Design Submittal: For notification and initiation appliances, in addition to submittals listed above, indicate compliance with performance requirements and design criteria, including analysis data signed and sealed by the qualified APS responsible for their preparation.
   1. Drawings showing the location of each notification and initiation appliance, ratings of each, and installation details as needed to comply with listing conditions of the device.
   2. Design Calculations: Calculate requirements for selecting the spacing and sensitivity of detection, complying with NFPA 72. Calculate spacing and intensities for strobe signals and sound-pressure levels for audible appliances.
   3. Indicate audible appliances required to produce signal per NFPA 72.

E. Qualification Data: For qualified Installer.

F. Field quality-control reports.

G. Operation and Maintenance Data: For fire-alarm systems and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:
   1. Comply with the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.

2. Provide "Record of Completion Documents" according to NFPA 72 article "Permanent Records" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter.
3. Copy of site-specific program.
4. Provide "Maintenance, Inspection and Testing Records" according to NFPA 72 article of the same name and include the following:
   a. Frequency of testing of installed components.
   b. Frequency of inspection of installed components.
   c. Requirements and recommendations related to results of maintenance.
   d. Manufacturer's user training manuals.
5. Manufacturer's required maintenance related to system warranty requirements.
6. Abbreviated operating instructions for mounting at fire-alarm control panel.
7. Copy of NFPA 25.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Personnel shall be trained and certified by manufacturer for installation of units required for this Project, with a minimum NICET certification of Fire Alarm Level II.

B. Source Limitations for Fire-Alarm System and Components: Obtain fire-alarm system from single source from single manufacturer. 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.

1.7 WARRANTY

A. Special Warranty for Fire Alarm System: Manufacturer’s standard form in which manufacturer agrees to repair or replace products that fail in materials or workmanship within specified warranty period. Manufacturer may exclude lightning damage, vandalism, abuse, or unauthorized repairs or alterations from special warranty coverage.
   1. Warranty Period: Two years from date of Substantial Completion.

1.8 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Strobe Units: Quantity equal to 10 percent of amount installed, no more than 10, but no fewer than 1 unit.
   2. Smoke Detectors and Heat Detectors: Quantity equal to 10 percent of amount of each type installed, no more than 10, but no fewer than 1 unit of each type.
   3. Detector Bases: Quantity equal to 2 percent of amount of each type installed, but no fewer than 1 unit of each type.
   4. Keys and Tools: One extra set for access to locked and tamper-proofed components.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:
   1. Match existing system manufacturer (verify as required)

2.2 SYSTEMS OPERATIONAL DESCRIPTION

A. Fire-alarm signal initiation shall be by one or more of the following devices and systems:
   1. Manual stations.
   2. Heat detectors.
   3. Smoke detectors.

4. Automatic sprinkler system water flow.
5. Fire-extinguishing system operation.

B. Fire-alarm signal shall initiate the following actions:
1. Continuously operate alarm notification appliances.
   a. Visible notification appliances shall operate until FACP is reset.
   b. Audible notification appliances shall be capable of being manually reset.
2. Identify alarm at fire-alarm control panel and remote annunciators.
3. Transmit an alarm signal to the remote alarm receiving station.
4. Unlock electric door locks in designated egress paths.
5. Release fire and smoke doors held open by magnetic door holders.
6. Activate voice/alarm communication system.
7. Switch heating, ventilating, and air-conditioning equipment controls to fire-alarm mode.
   a. Where return air duct or plenum capacity is over 2000 CFM (0.9 cubic m/s) , de-energize heating, ventilating, and air-conditioning equipment serving zone where alarm was initiated.
   b. Close smoke dampers in air ducts of system serving zone where alarm was initiated.
   c. Transmit alarm signal per air-handling zone to building energy management system.
   d. For Kitchen Hood Fire Extinguishing System Activation, open shunt-trip circuit breakers and close natural gas valves.
8. Close smoke dampers in air ducts of designated air-conditioning duct systems.
9. Activate emergency lighting control.
10. Activate emergency shutoffs for Kitchen Equipment below hood.
11. Record events in the system memory.
12. Record events.

C. Supervisory signal initiation shall be by one or more of the following devices and actions:
1. Valve supervisory switch.
2. Low-air-pressure switch of a dry-pipe sprinkler system.

D. System trouble signal initiation shall be by one or more of the following devices and actions:
1. Open circuits, shorts, and grounds in designated circuits.
2. Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.
3. Loss of primary power at fire-alarm control panel.
4. Ground or a single break in fire-alarm control panel internal circuits.
5. Abnormal ac voltage at fire-alarm control panel.
6. Break in standby battery circuitry.
7. Failure of battery charging.
8. Abnormal position of any switch at fire-alarm control panel or annunciator.
9. Fire-pump power failure, including a dead-phase or phase-reversal condition.
10. Low-air-pressure switch operation on a dry-pipe or pre-action sprinkler system.

E. System Trouble and Supervisory Signal Actions: Annunciate at fire-alarm control panel and remote annunciators. Record the event on system. No notification devices to sound.

2.3 FIRE-ALARM CONTROL PANEL

A. General Requirements for Fire-Alarm Control Panel:
1. Field-programmable, microprocessor-based, modular, power-limited design with electronic modules, complying with UL 864 and listed and labeled by an NRTL.
   a. System software and programs shall be held in flash electrically erasable programmable read-only memory (EEPROM), retaining the information through failure of primary and secondary power supplies.
   b. Include a real-time clock for time annotation of events on the event recorder.
2. Addressable initiation devices that communicate device identity and status.
   a. Smoke sensors shall additionally communicate sensitivity setting and allow for adjustment of sensitivity at fire-alarm control panel.
   b. Temperature sensors shall additionally test for and communicate the sensitivity range of the device.
   c. Manual pull stations.
   d. Interface modules.
3. Addressable control circuits for operation of mechanical equipment.

B. Alphanumeric Display and System Controls: Arranged for interface between human operator at fire-alarm control panel and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and the programming and control menu.
   1. Annunciator and Display: Liquid-crystal type, 2 lines of 40 characters, minimum.
   2. Keypad: Arranged to permit entry and execution of programming, display, and control commands and to indicate control commands to be entered into the system for control of smoke-detector sensitivity and other parameters.

C. Circuits:
   1. Initiating Device and Signaling Line Circuits: NFPA 72, Class A.
      a. Initiating Device Circuits: Style D.
      b. Install no more devices on the circuit than recommended by the manufacturer, while leaving 25% spare capacity on the circuit.
   2. Notification Appliance: NFPA 72, Class B.
      a. Notification Appliance Circuits: Style Y.
      b. Install no more devices on the circuit than recommended by the manufacturer, while leaving 25% spare capacity on the circuit.
   3. Serial Interfaces: One RS-232 ports for printers.

D. Door Controls: Door hold-open devices: Install no more devices on the circuit than recommended by the manufacturer, while leaving 25% spare capacity on the circuit. Devices that are controlled by smoke detectors at doors in smoke barrier walls shall be connected to fire-alarm system.

E. Remote Smoke-Detector Sensitivity Adjustment: Controls shall select specific addressable smoke detectors for adjustment, display their current status and sensitivity settings, and change those settings. Allow controls to be used to program repetitive, time-scheduled, and automated changes in sensitivity of specific detector groups. Record sensitivity adjustments and sensitivity-adjustment schedule changes in system memory

F. Transmission to Remote Alarm Receiving Station: Automatically transmit alarm, supervisory, and trouble signals to a remote alarm station.

G. Voice/Alarm Signaling Service: Central emergency communication system with redundant microphones, preamplifiers, amplifiers, and tone generators provided as a special module that is part of fire-alarm control panel.
   1. Indicated number of alarm channels for automatic, simultaneous transmission of different announcements to different zones or for manual transmission of announcements by use of the central-control microphone. Amplifiers shall comply with UL 1711 and be listed by an NRTL.
      a. Allow the application of and evacuation signal to indicated number of zones and, at same time, allow voice paging to the other zones selectively or in any combination.
      b. Programmable tone and message sequence selection.
      c. Standard digitally recorded messages for "Evacuation" and "All Clear."
      d. Generate tones to be sequenced with audio messages of type recommended by NFPA 72 and that are compatible with tone patterns of notification appliance circuits of fire-alarm control panel.
   2. Status Annunciator: Indicate the status of various voice/alarm speaker zones and the status of firefighters' two-way telephone communication zones.
   3. Preamplifiers, amplifiers, and tone generators shall automatically transfer to backup units, on primary equipment failure.

H. Printout of Events: On receipt of signal, print alarm, supervisory, and trouble events, device, and function. Identify zone, device, and function. Include type of signal (alarm, supervisory, or trouble) and date and time of occurrence. Differentiate alarm signals from all other printed indications. Also print system reset event, including same information for device, location, date, and time. Commands initiate the printing of a list of existing alarm, supervisory, and trouble conditions in the system and a historical log of events.

I. Primary Power: 120-V ac. Initiating devices, notification appliances, signaling lines, trouble signals, supervisory and digital alarm communicator transmitters shall 24-V dc.
   1. Alarm current draw of entire fire-alarm system shall not exceed 80 percent of the power-supply module rating.

J. Secondary Power: 24-V dc batteries, automatic battery charger, and automatic transfer switch.
   1. Batteries: Sealed lead calcium.

2. Battery and Charger Capacity: Comply with NFPA 72, but not less than 24 hours normal operation and 15 minutes alarm operation.
3. Housing: Size FACP housing to accommodate batteries without use of separate enclosures.

K. Surge Protection:
1. Install surge protection on all 120V ac power for FACP and its accessories.
2. Install surge protectors recommended by FACP manufacturer. Install on all system wiring entering and exiting the building from outside per NEC.

L. Instructions: Computer printout or typewritten instruction card mounted behind a plastic or glass cover in a stainless-steel or aluminum frame. Include interpretation and describe appropriate response for displays and signals. Briefly describe the functional operation of the system under normal, alarm, and trouble conditions.

2.4 MANUAL FIRE-ALARM BOXES

A. General Requirements for Manual Fire-Alarm Boxes: Comply with UL 38. Boxes shall be finished in red with molded, raised-letter operating instructions in contrasting color; shall show visible indication of operation; and shall be mounted on recessed outlet box. If indicated as surface mounted, provide manufacturer's surface back box.
1. Dual-action mechanism, pull-lever type; with integral addressable module arranged to communicate manual-station status (normal, alarm, or trouble) to fire-alarm control panel.
2. Station Reset: Key- or wrench-operated switch.
3. Indoor Protective Shield: Factory-fabricated clear plastic enclosure hinged at the top to permit lifting for access to initiate an alarm. Lifting the cover actuates an integral battery-powered audible horn intended to discourage false-alarm operation.
4. No break glass allowed.

2.5 SYSTEM SMOKE DETECTORS

A. General Requirements for System Smoke Detectors:
1. Comply with UL 268; operating at 24-V dc, nominal.
2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control panel.
3. Base Mounting: Detector and associated electronic components shall be mounted in a twist-lock module that connects to a fixed base. Provide terminals in the fixed base for connection to building wiring.
4. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
5. Integral Visual-Indicating Light: LED type indicating detector has operated and power-on status.
6. Remote Control: Unless otherwise indicated, detectors shall be analog-addressable type, individually monitored at fire-alarm control panel for calibration, sensitivity, and alarm condition and individually adjustable for sensitivity by fire-alarm control panel.
   a. Fixed-temperature sensing shall be applicable to existing conditions ranging from 135 deg to 190 deg. Rate of Rise detectors shall be used in applicable conditions where fixed-temperature devices are not.

B. Photoelectric Smoke Detectors:
1. Detector address shall be accessible from fire-alarm control panel and shall be able to identify the detector's location within the system and its sensitivity setting.
2. Rotator addressing wheels are not acceptable.
3. An operator at fire-alarm control panel, having the designated access level, shall be able to manually access the following for each detector:
   a. Primary status.
   b. Device type.
   c. Present average value.
   d. Present sensitivity selected.
   e. Sensor range (normal, dirty, etc.).

C. Duct Smoke Detectors: Photoelectric type complying with UL 268A.

1. Detector address shall be accessible from fire-alarm control panel and shall be able to identify the detector's location within the system and its sensitivity setting.
2. An operator at fire-alarm control panel, having the designated access level, shall be able to manually access the following for each detector:
   a. Primary status.
   b. Device type.
   c. Present average value.
   d. Present sensitivity selected.
   e. Sensor range (normal, dirty, etc.).
3. Weatherproof Duct Housing Enclosure: NEMA 250, Type 4X; NRTL listed for use with the supplied detector.
4. Each sensor shall have multiple levels of detection sensitivity.
5. Sampling Tubes: Design and dimensions as recommended by manufacturer for specific duct size, air velocity, and installation conditions where applied.
6. Relay Fan Shutdown: Rated to interrupt fan motor-control circuit.
7. Ambient temperature rating -4˚F to +152˚F.
8. Remote status/test switches shall be installed where the units are above ceilings and cannot be viewed.

2.6 HEAT DETECTORS

A. General Requirements for Heat Detectors: Comply with UL 521.

B. Heat Detector, Combination Type: Actuated by either a fixed temperature of 135 degree F or a rate of rise that exceeds 15 degree F per minute unless otherwise indicated.
   1. Mounting: Twist-lock base interchangeable with smoke-detector bases.
   2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control panel.

C. Heat Detector, Fixed-Temperature Type: Actuated by temperature that exceeds a fixed temperature of 190 degree F.
   1. Mounting: Twist-lock base interchangeable with smoke-detector bases.
   2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control panel.

2.7 NOTIFICATION APPLIANCES

A. General Requirements for Notification Appliances: Connected to notification appliance signal circuits, zoned as indicated, equipped for mounting as indicated and with screw terminals for system connections.
   1. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly, equipped for mounting as indicated and with screw terminals for system connections.

B. Horns: Electric-vibrating-polarized type, 24-V dc; with provision for housing the operating mechanism behind a grille. Comply with UL 464. Horns shall produce a sound-pressure level of 90 dBA, measured 10 feet from the horn, using the coded signal prescribed in UL 464 test protocol.

C. Visible Notification Appliances: Xenon strobe lights comply with UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch-high letters on the lens.
   1. Rated Light Output:
      a. 15/30/75/110 cd, selectable in the field.
   2. Mounting: Ceiling mounted unless otherwise indicated.
   3. For units with guards to prevent physical damage, light output ratings shall be determined with guards in place.
   4. Flashing shall be in a temporal pattern, synchronized with other units.
   5. Strobe Leads: Factory connected to screw terminals.
   6. Mounting Faceplate: Factory finished, white.
   7. All devices shall be WHITE.

D. Weatherproof Bells: Electric-vibrating, 24-V dc, under-dome type; with provision for housing operating mechanism behind bell. Bells shall produce a sound-pressure level of 94 dBA, measured 10 feet (3 m) from bell. 10-inch (254-mm) size, unless otherwise indicated.

E. Voice/Tone Notification Appliances:
1. Appliances shall comply with UL 1480 and shall be listed and labeled by an NRTL.
2. High-Range Units: Rated 2 to 15 W.
3. Low-Range Units: Rated 1 to 2 W.
4. Mounting: Flush.
5. Matching Transformers: Tap range matched to acoustical environment of speaker location.

2.8 MAGNETIC DOOR HOLDERS

A. Description: Units are equipped for wall or floor mounting as indicated and are complete with matching doorplate. Flush mount only.
1. Electromagnet: Requires no more than 3 W to develop 25-lbf holding force.
2. Wall-Mounted Units: Flush mounted unless otherwise indicated. Units shall have a 3.625” minimum depth from the wall.
3. Rating: 24V dc powered by the fire alarm system.

B. Material and Finish: Match door hardware.

2.9 REMOTE ANNUNCIATOR

A. Description: Annunciator functions shall match those of fire-alarm control panel for alarm, supervisory, and trouble indications. Manual switching functions shall match those of fire-alarm control panel, including acknowledging, silencing, resetting, and testing.
1. Mounting: Flush cabinet, by manufacturer.

B. Display Type and Functional Performance: Alphanumeric display and LED indicating lights shall match those of fire-alarm control panel. Provide controls to acknowledge, silence, reset, and test functions for alarm, supervisory, and trouble signals.

2.10 ADDRESSABLE INTERFACE DEVICE

A. Description: Microelectronic monitor module, NRTL listed for use in providing a system address for alarm-initiating devices for wired applications with normally open contacts.

B. Integral Relay: Capable of providing a direct signal , to circuit-breaker shunt trip for power shutdown, to stage dimming system for panic lighting, to heating, ventilating, and air conditioning equipment controllers for power shutdown, to close smoke dampers, to release magnetic door holders, electric locks, and coiling doors and grilles, to transmit signal to building management systems.

2.11 NAC PANELS

A. General Description: Power-limited design, UL 864 listed.

B. Notification-Appliance Circuits: NFPA 72, Class and Style to match FACP.

C. Alarm Silencing: On-until-silenced for horns, on-until-reset for visible notification appliances. Reset and silence switches located at FACP and remote annunciators.

D. Synchronize visual notification appliances.

E. System Layout: Load notification-appliance circuits no more than 70 percent of rated capacity.

F. Total Rated NAC Current: 6-10 amps.

G. Primary Power: 120-V ac service Notification appliances shall be powered by the 24-V dc from NAC panel.

H. Alarm current draw of entire NAC panel shall not exceed 80 percent of power-supply module rating.

I. Secondary Power: 24-V dc supply system with batteries and automatic battery charger and an automatic transfer switch.

J. Batteries: Sealed lead calcium.

K. Battery and Charger Capacity: Comply with NFPA 72, but not less than 24 hours normal operation and 15 minutes alarm operation.

L. Power supply/charger shall be supervised for power loss, brownout, batteries, and ground faults.

M. Surge Protection:
1. Install surge protection on 120V ac power for NAC panel.
2. Install surge protectors recommended by NAC panel manufacturer. Install on all system wiring external to building housing NAC panel.

2.12 DIGITAL ALARM COMMUNICATOR TRANSMITTER

A. Digital alarm communicator transmitter shall be acceptable to the remote central station and shall comply with UL 632 and be listed and labeled by an NRTL.

B. Functional Performance: Unit shall receive an alarm, supervisory, or trouble signal from fire-alarm control panel and automatically capture two telephone line(s) and dial a preset number for a remote central station. When contact is made with central station(s), signals shall be transmitted. If service on either line is interrupted for longer than 45 seconds, transmitter shall initiate a local trouble signal and transmit the signal indicating loss of telephone line to the remote alarm receiving station over the remaining line. Transmitter shall automatically report telephone service restoration to the central station. If service is lost on both telephone lines, transmitter shall initiate the local trouble signal.

C. Local functions and display at the digital alarm communicator transmitter shall include the following:
1. Verification that both telephone lines are available.
2. Programming device.
3. LED display.
4. Manual test report function and manual transmission clear indication.
5. Communications failure with the central station or fire-alarm control panel.

D. Digital data transmission shall include the following:
1. Address of the alarm-initiating device.
2. Address or Zone of the supervisory signal.
3. Address or Zone of the trouble-initiating device.
4. Loss of ac supply or loss of power.
5. Low battery.
6. Abnormal test signal.
7. Communication bus failure.

E. Secondary Power: Integral rechargeable battery and automatic charger. Battery capacity shall comply with NFPA 72 requirements, but not less than 24 hours.

F. Self-Test: Conducted automatically every 24 hours with report transmitted to central station.

G. Shall be integral to FACP.

2.13 RADIO ALARM TRANSMITTER

A. Transmitter shall comply with NFPA 1221 and shall be listed and labeled by an NRTL.

B. Comply with 47 CFR 90.

C. Description: Manufacturer's standard commercial product; factory assembled, wired, tested, and ready for installation and operation.
   1. Packaging: A single, modular, NEMA 250, Type 1 metal enclosure with a tamper-resistant flush tumbler lock.
   2. Signal Transmission Mode and Frequency: VHF or UHF 2-W power output, coordinated with operating characteristics of the established remote alarm receiving station designated by Owner.
   3. Normal Power Input: 120-V ac.
   4. Secondary Power: Integral-sealed, rechargeable, 12-V battery and charger. Comply with NFPA 72 requirements for battery capacity; submit calculations.
   5. Antenna: Omnidirectional, coaxial half-wave, dipole type with driving point impedance matched to transmitter and antenna cable output impedance. Wind-load strength of antenna and mounting hardware and supports shall withstand 100 mph with a gust factor of 1.3 without failure.
   6. Antenna Cable: Coaxial cable with impedance matched to the transmitter output impedance.
   7. Antenna-Cable Connectors: Weatherproof.
   8. Alarm Interface Devices: Circuit boards, modules, and other auxiliary devices, integral to the transmitter, matching fire-alarm and other system outputs to message-generating inputs of the transmitter that produce required message transmissions.

D. Functional Performance: Unit shall receive an alarm, supervisory, or trouble signal from fire-alarm control panel or from its own internal sensors or controls and shall automatically transmit signal along with a unique code that identifies the transmitting station to the remote alarm receiving station. Transmitted messages shall correspond to standard designations for fire-reporting system to which the signal is being transmitted and shall include separately designated messages in response to the following events or conditions:
   1. Transmitter Low-Battery Condition: Sent when battery voltage is below 85 percent of rated value.
   2. System Test Message: Initiated manually by a test switch within the transmitter cabinet, or automatically at an optionally preselected time, once every 24 hours, with transmission time controlled by a programmed timing device integral to transmitter controls.
   3. Transmitter Trouble Message: Actuated by failure, in excess of one-minute duration, of the transmitter normal power source, derangement of the wiring of the transmitter, or any alarm input interface circuit or device connected to it.
   4. Local Fire-Alarm-System Trouble Message: Initiated by events or conditions that cause a trouble signal to be indicated on the building system.
   5. Local Fire-Alarm-System Alarm Message: Actuated when the building system goes into an alarm state. Identifies device that initiated the alarm.
   6. Local Fire-Alarm-System Supervisory-Alarm Message: Actuated when the building alarm system indicates a supervisory alarm.

2.14 DEVICE GUARDS

A. Description: Welded wire mesh of size and shape for the manual station, smoke detector, gong, or other device requiring protection.
   1. Factory fabricated and furnished by manufacturer of device.
   2. Finish: Paint of color to match the protected device.

2.15 WIRE AND CABLE

A. Wire and cable for fire alarm systems shall be UL listed and labeled as complying with NFPA 70, Article 760.

B. Signaling Line Circuits: Twisted, shielded pair, No. 16 AWG.

C. Power-Limited and Non-Power-Limited Circuits other than Signaling Line Circuits: Solid-copper conductors with 600-V rated, 75 degree C, color-coded insulation.
   1. Low-Voltage Circuits: No. 14 AWG, minimum.

2. Line-Voltage Circuits: No. 12 AWG, minimum.

A. Plenum Cable: Listed and labeled for plenum use.

2.16 CARBON MONOXIDE DETECTORS

A. Description: Carbon monoxide detector listed for connection to fire-alarm system.

B. Performance Criteria:

1. Regulatory Requirements:

a. NFPA 72
b. NFPA 720.
c. UL 2075.

2. General Characteristics:

a. Mounting: Adapter plate for outlet box mounting.
b. Testable by introducing test carbon monoxide into sensing cell.
c. Detector must provide alarm contacts and trouble contacts.
d. Detector must send trouble alarm when nearing end-of-life, power supply problems, or internal faults.
e. Locate, mount, and wire in accordance with manufacturer's written instructions.
f. Provide means for addressable connection to fire-alarm system.
g. Test button simulates alarm condition.

PART 3 - EXECUTION

3.1 EQUIPMENT INSTALLATION

A. Comply with NFPA 72 for installation of fire-alarm equipment.

B. Smoke- or Heat-Detector Spacing:
1. Comply with NFPA 72, "Smoke-Sensing Fire Detectors" Section in the "Initiating Devices" Chapter, for smoke-detector spacing.
2. Comply with NFPA 72, "Heat-Sensing Fire Detectors" Section in the "Initiating Devices" Chapter, for heat-detector spacing.
3. Smooth ceiling spacing shall not exceed 30 feet.
4. Spacing of detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas shall be determined according to Appendix A or Appendix B in NFPA 72.
5. HVAC: Locate detectors not closer than 5 feet from air-supply diffuser or return-air opening.
6. Lighting Fixtures: Locate detectors not closer than 12 inches from any part of a lighting fixture.

C. For Boiler Rooms and Kitchens, provide 190 degree F (88 degree C) fixed heat detectors.

D. Duct Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Install sampling tubes so they extend the full width of duct.

E. Heat Detectors in Elevator Shafts: Coordinate temperature rating and location with sprinkler rating and location.

F. Remote Status and Alarm Indicators: Install near each smoke detector and each sprinkler water-flow switch and valve-tamper switch that is not readily visible from normal viewing position.

1. Install in ceiling below duct smoke detectors.
2. Locate in public space near the device that they monitor. Do not install in normally unoccupied spaces.

G. Audible Alarm-Indicating Devices: Install not less than 6 inches below the ceiling. Install bells and horns on flush-mounted back boxes with the device-operating mechanism concealed behind a grille.

H. Visible Alarm-Indicating Devices: Install adjacent to each alarm bell or alarm horn and at least 6 inches below the ceiling.

I. Device Location-Indicating Lights: Locate in public space near the device they monitor.

J. Fire-Alarm Control Panel: Mount with tops of cabinets not more than 72 inches above the finished floor.

K. Annunciator: Install with top of panel not more than 72 inches above the finished floor.

L. Antenna for Radio Alarm Transmitter: Mount to building structure where indicated. Use mounting arrangement and substrate connection that will resist 100-mph wind load with a gust factor of 1.3 without damage.

M. NAC Panels: Provide quantity of NAC panels requires for notification appliances indicated.
1. Provide a smoke detector in ceiling above each NAC panel.
2. Provide 120V, 20amp AC circuit to each NAC panel.

N. Carbon Monoxide Detectors: Install carbon monoxide detectors in spaces with fuel burning equipment and appliances**, including each classroom and teaching space served by fuel burning, forced-air furnaces**].

3.2 WIRING INSTALLATION

A. Install wiring according to the following:
1. NECA 1.
2. TIA/EIA 568-A.

B. Wiring Method: Install wiring in raceways except in accessible enclosed ceiling spaces where cable wiring method may be used. Use plenum cable in environmental air spaces, including ceiling spaces. Conceal cables and raceways except in unfinished spaces. Cable shall not be visible around cloud ceilings.
1. Cables and raceways used for fire alarm circuits, and equipment control wiring associated with fire alarm system,
   a. May not contain any other wire or cable,
   b. Shall be installed neatly parallel to building structural lines, beams, joists, etc.
   c. Shall be installed above grade and not in concrete – unless specifically indicated otherwise.
2. Signaling Line Circuits: Power-limited fire alarm cables may be installed in same cable or raceway as signaling line circuits.
3. Install exposed cables parallel and perpendicular to surfaces or exposed structural members, and follow surface contours. Secure and support cables by straps, staples, or similar fittings designed and installed to avoid damage to cables. Secure cables at intervals not exceeding 30 inches (760 mm) and not more than 6 inches (150 mm) from cabinets, boxes, or fittings.

C. Wiring within Enclosures: Separate power-limited and non-power-limited conductors as recommended by manufacturer. Install conductors parallel with or at right angles to sides and back of enclosure. Bundle, lace, and train conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with fire alarm system to terminal blocks. Mark each terminal according to system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.

D. Cable Taps: Use numbered terminal strips in junction, pull, and outlet boxes, cabinets, or equipment enclosures where circuit connections are made.

E. Color-Coding: Color-code fire alarm conductors differently from normal building power wiring. Use one color-code for alarm circuit wiring and a different color-code for supervisory circuits. Color-code audible alarm-indicating circuits differently from alarm-initiating circuits. Use different colors for visible alarm-indicating devices. Paint fire alarm system junction boxes and covers red.

F. Wiring to Remote Alarm Transmitting Device: 1-inch conduit between the FACP and transmitter. Install number of conductors and electrical supervision for connecting wiring as needed to suit monitoring function.

3.3 CONNECTIONS

A. For fire-protection systems related to doors in fire-rated walls and partitions and to doors in smoke partitions, comply with requirements in Division 08 Section "Door Hardware." Connect hardware and devices to fire-alarm system.
   1. Verify that hardware and devices are NRTL and UL listed for use with fire-alarm system in this Section before making connections.

B. Make addressable connections with a supervised interface device to the following devices and systems. Install the interface device less than 3 feet from the device controlled. Make an addressable confirmation connection when such feedback is available at the device or system being controlled.
   1. Alarm-initiating connection to smoke-control system (smoke management) at firefighter smoke-control system panel.
   2. Smoke dampers in air ducts of designated air-conditioning duct systems.
   3. Alarm-initiating connection to elevator recall system and components.
   4. Alarm-initiating connection to activate emergency shutoffs for gas and fuel supplies.
   5. Supervisory connections at valve supervisory switches (including automatic sprinkler system water flow, valve tampers, and positive indicator valve tampers).
   6. Supervisory connections at low-air-pressure switch of each dry-pipe sprinkler system.
   7. Supervisory connections at kitchen hood fire extinguishing system.

3.4 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

B. Install framed instructions and system map in a location visible from fire-alarm control panel. Frame shall be 24”x36” and made of wood with non-glare plexiglass.

3.5 PROGRAMMING

A. Program the fire alarm system to function as indicated and per code.

B. Program the fire alarm system to recognize the location of the unit in alarm. The alarmed unit or zone shall be displayed in the alphanumeric display per the Owners direction, using the Owner’s final room numbering, room naming convention or area of the building which will allow easy identification of the unit in alarm.

C. Program the fire alarm system to recognize the location of each addressable unit using per the Owners direction, using the Owner’s final room numbering, room naming convention or area of the building which will allow easy identification of addressable unit.

3.6 GROUNDING

A. Ground fire-alarm control panel, NAC panels, and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to fire-alarm control panel and NAC panels.

3.7 FIELD QUALITY CONTROL

A. Field tests shall be witnessed by authorities having jurisdiction.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

C. Perform tests and inspections.
   1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

D. Tests and Inspections:
   1. Visual Inspection: Conduct visual inspection prior to testing.
      a. Inspection shall be based on completed Record Drawings and system documentation that is required by NFPA 72 in its "Completion Documents, Preparation" Table in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter.
      b. Comply with "Visual Inspection Frequencies" Table in the "Inspection" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72; retain the "Initial/Reacceptance" column and list only the installed components.
   2. System Testing: Comply with "Test Methods" Table in the "Testing" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.
   3. Test audible appliances for the public operating mode according to manufacturer's written instructions. Perform the test using a portable sound-level meter complying with Type 2 requirements in ANSI S1.4.
   4. Test visible appliances for the public operating mode according to manufacturer's written instructions.
   5. Factory-authorized service representative shall prepare the "Fire Alarm System Record of Completion" in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA 72 and the "Inspection and Testing Form" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.

E. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.

F. Fire-alarm system will be considered defective if it does not pass tests and inspections.

G. Prepare test and inspection reports.

3.8 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project outside normal occupancy hours for this purpose.

3.9 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain fire-alarm system.

END OF SECTION 28 31 11

Stantec

PROJECT TEAM

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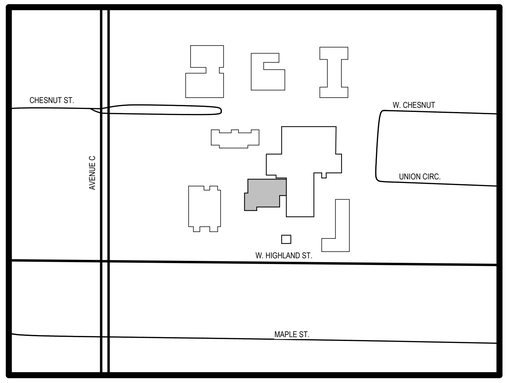
LOCATION MAP



DRAWING INDEX

NO.	DRAWING NAME	ISSUE FOR CONSTRUCTION - DEMOLITION PACKAGE	ISSUE FOR CONSTRUCTION
GENERAL			
G001	PROJECT COVER SHEET	●	●
G003	SCOPE OF WORK PLANS	●	●
G101	CODE REVIEW	●	●
ARCHITECTURAL DEMOLITION			
AD101	LEVEL 1 DEMOLITION PLAN	●	○
AD102	LEVEL 2 DEMOLITION PLAN	●	○
AD111	LEVEL 1 DEMOLITION PLAN PHASE 2		●
AD112	LEVEL 2 DEMOLITION PLAN PHASE 2		●
AD113	LEVEL 3 DEMOLITION PLAN PHASE 2		●
AD601	LEVEL 1 CEILING DEMOLITION PLAN	●	○
AD602	LEVEL 2 CEILING DEMOLITION PLAN	●	○
AD611	LEVEL 1 CEILING DEMOLITION PLAN PHASE 2		●
AD612	LEVEL 2 CEILING DEMOLITION PLAN PHASE 2		●
ARCHITECTURAL			
A001	ABBV., MATERIAL LEGEND AND SYMBOLS	●	●
A002	TYPICAL MOUNTING HEIGHTS AND TOILET LAYOUT		●
A003	INTERIOR PARTITION TYPES		●
A006	WALL SPANS INTERIOR AND WALL TO DECK DETAILS		●
A101	LEVEL 1 FLOOR PLAN		●
A102	LEVEL 2 FLOOR PLAN		●
A103	LEVEL 3 FLOOR PLAN		●
A401	ENLARGED PLANS & DETAILS		●
A501	DOOR SCHEDULE, INFO, AND FRAME TYPES		●
A502	FRAME ELEVATIONS		●
A511	HJS DETAILS		●
A601	LEVEL 1 CEILING PLAN		●
A602	LEVEL 2 CEILING PLAN		●
A651	CEILING DETAILS		●
A701	FINISH PLAN LEVEL 1		●
A702	FINISH PLAN LEVEL 2		●
A731	ENLARGED PLANS AND ELEVATIONS		●
A751	CASEWORK DETAILS		●
A801	FINISH SCHEDULES		●
A804	TRANSITION DETAILS		●
A821	INTERIOR ELEVATIONS		●
A901	LEVEL 1 FURNITURE PLAN		●
A902	LEVEL 2 FURNITURE PLAN		●
FIRE PROTECTION			
FP100	FIRE PROTECTION PLANS - OVERALL		●
ELECTRICAL			
E001	ELECTRICAL LEGENDS, ABBREVIATIONS AND SYMBOLS		●
E002	ELECTRICAL COMCHECK		●
ED201	LEVEL 1 - ELECTRICAL PLAN DEMOLITION - PHASE 2		●
ED202	LEVEL 2 - ELECTRICAL PLAN DEMOLITION - PHASE 2		●
ED001	ELECTRICAL LEGENDS, ABBREVIATIONS AND SYMBOLS	●	
ED101	LEVEL 1 - ELECTRICAL PLAN DEMOLITION - PHASE 1	●	
ED102	LEVEL 2 - ELECTRICAL PLAN DEMOLITION - PHASE 1	●	
E111	LEVEL 1 - LIGHTING PLAN		●
E121	LEVEL 2 - LIGHTING PLAN		●
E211	LEVEL 1 - POWER PLAN		●
E221	LEVEL 2 - POWER PLAN		●
E401	ELECTRICAL ONE LINE DIAGRAM		●
E411	PANEL SCHEDULES		●
E501	ELECTRICAL DETAILS		●
E601	LIGHTING FIXTURE SCHEDULE AND DETAILS		●
MECHANICAL			
M001	MECHANICAL LEGEND, SYMBOLS, AND ABBREVIATIONS		●
MD101	MECHANICAL DEMOLITION PLAN - FIRST FLOOR		●
MD102	MECHANICAL DEMOLITION PLAN - SECOND FLOOR		●
M101	MECHANICAL PLAN - FIRST FLOOR		●
M102	MECHANICAL PLAN - SECOND FLOOR		●
M103	MECHANICAL PLAN - THIRD FLOOR		●
M501	MECHANICAL SCHEDULES AND DETAILS		●
M502	MECHANICAL DETAILS		●

DRAWING INDEX SUBMISSION MATRIX LEGEND

● ISSUED
○ ISSUED FOR REFERENCE (WORK COMPLETED UNDER SEPARATE CONTRACT)

SHEET NUMBERING KEY:

A 1 2 1
- DISCIPLINE DESIGNATOR
- SHEET SEQUENCE DESIGNATOR*
- FLOOR LEVEL/SUB-GROUP DESIGNATOR
- DRAWING NUMBER OR PLAN SECTOR DESIGNATOR

G - GENERAL INFORMATION
A - ARCHITECTURE
D - DEMO
M - MECHANICAL
E - ELECTRICAL

*SHEET SEQUENCE DESIGNATOR - ARCHITECTURE KEY

0 - GENERAL ARCHITECTURAL INFORMATION
S - ARCHITECTURAL SITE
D - ARCHITECTURAL DEMOLITION
1 - FLOOR PLAN / ROOF PLAN
2 - ELEVATIONS / BUILDING SECTIONS
3 - EXTERIOR SECTIONS AND DETAILS, INCLUDING ROOF DETAILS; PLAN DETAILS
4 - STAIR, ELEVATOR, TOILET ROOM, AND OTHER ENLARGED PLANS
5 - SCHEDULES
6 - REFLECTED CEILING PLANS
7 - INTERIOR FIT OUT (FINISHES, MILLWORK, AND CASEWORK)
8 - INTERIOR ELEVATIONS AND DETAILS
9 - INTERIOR FURNISHINGS AND EQUIPMENT

ALTERNATES:

ARCHITECTURAL:
A1 – DEDUCTIVE ALTERNATE TO PROVIDE CPT-1 IN LIEU OF LVT AT SECOND FLOOR MAIN CORRIDOR.

ELECTRICAL:
E1 - ADD ALTERNATE TO REPLACE EXISTING LIGHTING AND CONTROLS WITH NEW AS NOTED ON ELECTRICAL DRAWINGS.
E2 – ADD ALTERNATE TO DEMOLISH EXISTING ABANDONED EQUIPMENT, CONDUIT, OR DEVICES ABOVE CEILING WHERE CEILINGS ARE DEMOLISHED. OWNER'S ALLOWANCE OF $100K FOR HIDDEN CONDITIONS.

MECHANICAL:
M1 - ADD ALTERNATE FOR REPLACEMENT OF VAV BOXES THAT ARE INDICATED TO BE RELOCATED AND REUSED. REUSE EXISTING CONTROLLERS.
M2 - ADD ALTERNATE FOR REPLACEMENT OF ALL VAV BOXES WITHIN SCOPE OF WORK AREA. REUSE EXISTING CONTROLLERS.

EAGLE STUDENT SERVICES CENTER

REGISTERED ARCHITECT
VICTORIA ROSE BROWN
22669
STATE OF TEXAS
02/10/2023

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ISSUE FOR CONSTRUCTION
2023/02/03

Stantec Project Number: 2140001088

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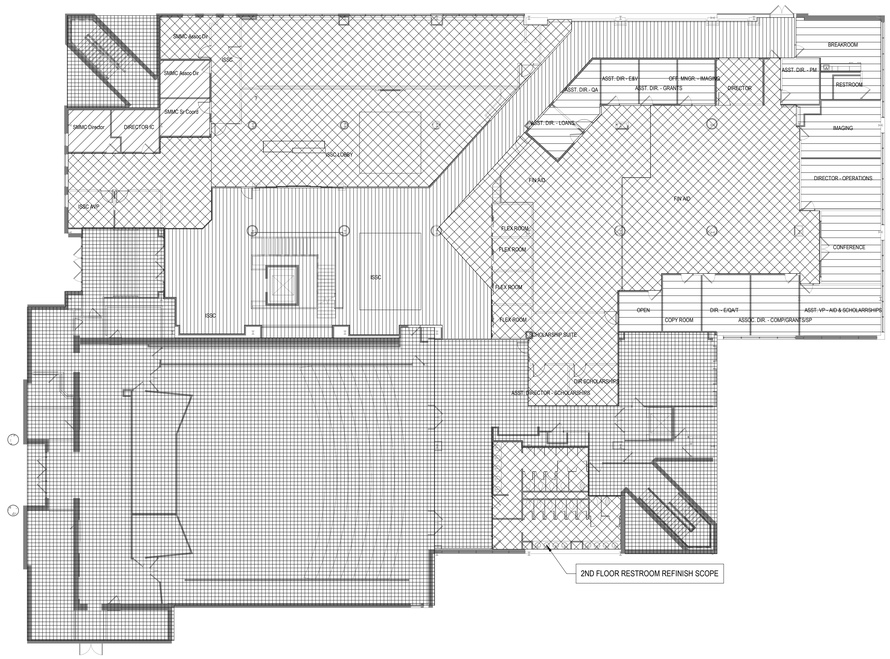
C1 THIRD FLOOR SCOPE
G003 1/16" = 1'-0"

A1 FIRST FLOOR SCOPE
G003 1/16" = 1'-0"



A4 SECOND FLOOR SCOPE
G003 1/16" = 1'-0"

SCOPE OF WORK LEGEND

NOTE: REFER TO DEMOLITION AND NEW WORK PLANS FOR ADDITIONAL INFORMATION

- TIER 1 RENO
  DEMO: FLOORING, BASE
  NEW: FLOOR, BASE, PAINT
- TIER 2 RENO
  DEMO: FLOORING, BASE, FURNITURE SYSTEMS, CASEWORK, TILE WALL FINISHES
  NEW: FLOOR, BASE, PAINT, WALL FINISHES, FURNITURE, CASEWORK, AND TOILET ACCESSORIES
- TIER 3 RENO
  DEMO: FLOORING, BASE, INTERIOR PARTITIONS WHERE INDICATED, FURNITURE SYSTEMS, CASEWORK, CEILINGS
  NEW: FLOOR, BASE, PAINT, CEILINGS, FURNITURE AND CASEWORK
  SALVAGE AND RESUSE: DOORS AND LIGHTS (WHERE POSSIBLE)
- PATCH AND REPAIR WORK
  PATCH AND REPAIR EXISTING CONDITIONS AS NEEDED UP TO 5' MAX FROM ADJACENT SCOPE OF WORK TO PROVIDE CONSISTENT LEVEL OF FINISH
- FINISH REFRESH WORK
  SCOPE: FLOORING, PAINT, AND RESILIENT WAINSCOT (TILE OR PLAM)
  ADD ALTERNATE: FULL DEMO AND REPLACE OF CEILING
- REFER TO NOTES ON PLANS FOR SCOPE
- NOT IN SCOPE

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Notes

Revision	By	Appd	YYYY.MM.DD
ISSUE FOR CONSTRUCTION	AA	AS	2023/02/03
ISSUE FOR CONSTRUCTION - DEMOLITION	AA	AS	2023/01/09

Issued

Permit/Seal

REGISTERED ARCHITECT VICTORIA ROSE BROWN 22968 STATE OF TEXAS
02/10/2023

Client/Project Logo

UNT

Client/Project
University of North Texas - Denton

EAGLE STUDENT SERVICES CENTER

Eagle Student Services Center 1147 Union Cir, Denton, TX 76201

Title
SCOPE OF WORK PLANS

Project No. 2140001088
Scale 1/16" = 1'-0"
Revision
Drawing No. G003

ORIGINAL SHEET - ARCH E1

OCCUPANCY / EGRESS LEGEND:

INTERIOR AND EXTERIOR DOOR EGRESS (IBC SECTION 1005.1)

1 — 3'-0" DOOR (32" CLR) AT .15"/OCCUPANT = 213 OCCUPANTS

2 — PAIR 3'-0" DOOR (68" CLR) AT .15"/OCCUPANT = 453 OCCUPANTS

INTERIOR AND EXTERIOR STAIR EGRESS

3 — 3'-11" STAIRS (44" CLR) AT .2"/OCCUPANT = 235 OCCUPANTS

EXIT ACCESS TRAVEL DISTANCE SUMMARY

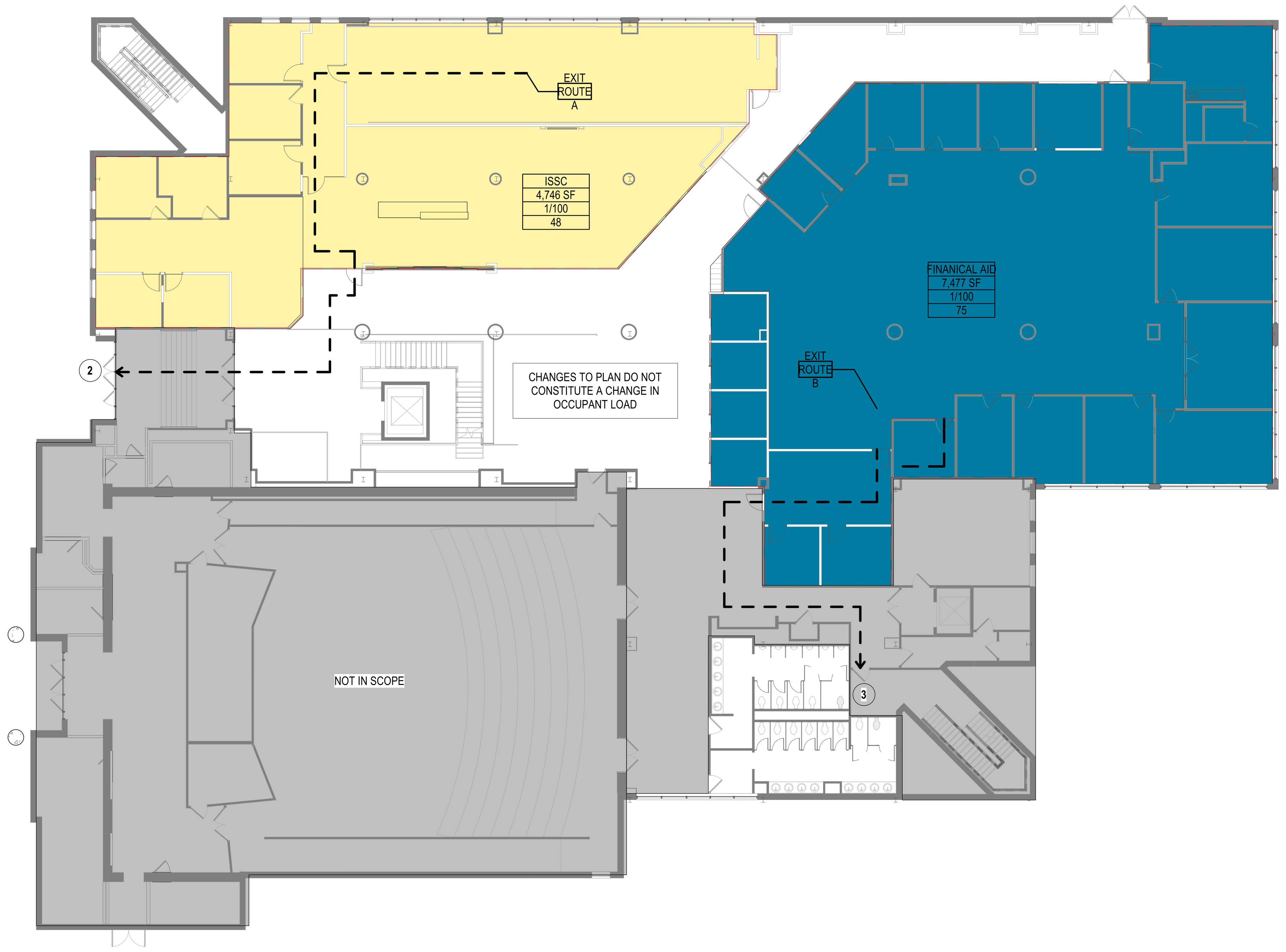
Comments	EXIT ROUTE	TRAVEL DISTANCE	COMMENTS
LEVEL 1			
LEVEL 1	EXIT ROUTE A	146' - 8"	Per Table 1016.2
LEVEL 1	EXIT ROUTE B	120' - 9"	Per Table 1016.2
LEVEL 2			
LEVEL 2	EXIT ROUTE A	142' - 0"	Per Table 1016.2
LEVEL 2	EXIT ROUTE B	128' - 8"	Per Table 1016.2

LIFE SAFETY LEGEND

SMART OCCUPANCY AREA TAG

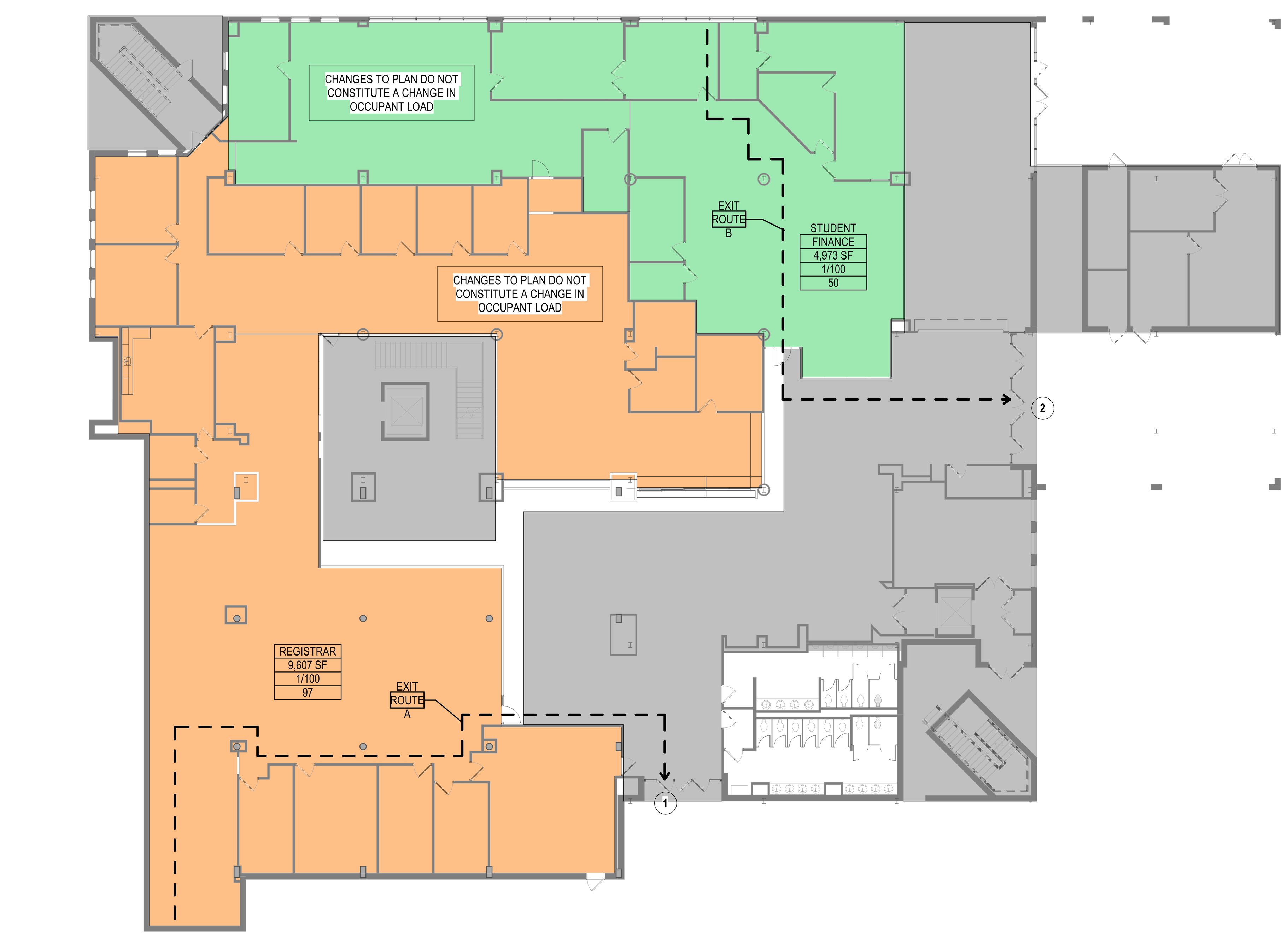
AREA NAME	AREA NAME
150 SF	TOTAL AREA OF SPACE
1/15	OCCUPANCY LOAD FACTOR
10	NUMBER OF OCCUPANTS IN SPACE

TRAVEL DISTANCE - PATH OF TRAVEL



C1 G101 **LIFE SAFETY - LEVEL 2**

1/16" = 1'-0"



A1 G101 **LIFE SAFETY - LEVEL 1**

1/16" = 1'-0"

CODE REVIEW: IBC - 2018 / NFPA 101 - 2018

	IBC - 2018	NFPA 101 - 2018
I. OCCUPANCY CLASSIFICATION — SEPARATED MIXED USE		
BUSINESS	GROUP B (OFFICES, CLASSROOMS)	BUSINESS SEC 6.1.11
ASSEMBLY A-3	ASSEMBLY A-3 (LECTURE HALL - OVER 50 OCC)	ASSEMBLY A-3 (LEVEL 2 ONLY) SEC 6.1.2
II. CONSTRUCTION CLASSIFICATION		
A. CONSTRUCTION TYPE:	TYPE IIA (ASSUMED PER EXISTING BLDG. TYPE II; 1991 UBC 602.2, TABLE 601	
III. STRUCTURAL REQUIREMENTS		
A. STRUCTURAL FRAME:	1 HR (TABLE 601 & 602)	1 HR (TABLE 7.2.1.1)
B. BEARING WALLS:		
EXTERIOR	1 HR	
INTERIOR	1 HR	
C. NONBEARING WALLS:		
EXTERIOR LESS THAN 5'	1 HR	
5' OR LESS THAN 10'	1 HR	
10' OR LESS THAN 30'	1 HR	
GREATER THAN 30'	0 HR	
INTERIOR	0 HR	
D. FLOOR CONSTRUCTION (INCL. SUPPORT BEAMS/JOISTS)	1 HR	
E. ROOF CONSTRUCTION (INCL. SUPPORT BEAMS/JOISTS)	1 HR	
OCCUPANCY SEPARATIONS:	1 HOUR - SEPARATED USE (SEC 508.4)	
CORRIDORS SEPARATION (TABLE 1020.1):	0 HOUR (EXISTING CORRIDORS ASSUMED 1-HOUR PER 1991 UBC. NEW CONSTRUCTION DOES NOT REQUIRE FIRE RATING.)	
F. OPENING PROTECTIONS:		
1. GLAZING IN DOORS		
a. MAXIMUM SIZE IN FIRE DOORS IN FIRE BARRIERS	100 sq. in. (TABLE 716.5)	100 sq. in. (TABLE 8.3.3.2.2)
b. RATING MUST MEET RATING REQUIREMENT OF DOOR	(716.5.6)	(NFPA 80 1-7.4)

	FLAME SPREAD	SMOKE DEVELOPED	IBC - 2018	NFPA 101 - 2018
G. INTERIOR FINISH				
1. MAXIMUM SMOKE DEVELOPED		MAX 450	803.1.1 AND TABLE 803.9	Table A10.2.2 Annex A
2. MAXIMUM FLAME SPREAD				
a. WALLS AND CEILINGS				
1) ACCESS CORRIDORS AND OTHER EXIT WAYS	GROUP B = 76-200 GROUP A-3 = 26-75	MAX 450 MAX 450	803.1.1 AND TABLE 803.9	38.3.3.2.1
2) ROOMS AND ENCLOSED SPACES	76-200	MAX 450	803.1.1 AND TABLE 803.9	38.3.3.2.2

	IBC - 2018	NFPA 101 - 2018
IV. OCCUPANCY REQUIREMENTS		
A. OCCUPANT LOAD (sf. ft PER PERSON)		
1. BUSINESS AREAS	100 GROSS	100 GROSS
1) BUSINESS AREAS CONCENTRATED (1004.8)	50 ft	
2. STORAGE, MECHANICAL, ELECTRICAL ROOMS	300 GROSS	300 GROSS
3. ASSEMBLY A-3 W/ FIXED SEATS (1004.6)	NUMBER OF SEATS	15 NET
B. MAXIMUM ALLOWABLE TRAVEL DISTANCE		
1. BUSINESS	300 ft (TABLE 1017.2)	300 ft (Table A7.6 Annex A)
2. ASSEMBLY	250 ft (TABLE 1017.2)	250 ft (Table A7.6 Annex A)
C. MAXIMUM COMMON PATH OF TRAVEL		
1. BUSINESS / STORAGE	100 ft (TABLE 1006.2.1)	100 ft (Table A7.6 Annex A)
2. ASSEMBLY	75 ft (TABLE 1006.2.1)	75 ft (Table A7.6 Annex A)
D. MAXIMUM DEAD END CORRIDOR		
1. BUSINESS	50 ft (1020.4.2)	50 ft (Table A7.6 Annex A)
2. ASSEMBLY	20 ft (1020.4)	20 ft (Table A7.6 Annex A)
E. MINIMUM NUMBER OF EXITS		7.4.1.1 / 7.4.1.2
NUMBER OF EXITS REQUIRED (TABLE 1006.3.1 / TABLE 1006.3.2(2)		
1-49 OCCUPANTS → 1		
51-500 OCCUPANTS → 2		
501-1000 OCCUPANTS → 3		
1001 OR MORE OCCUPANTS → 4		
F. LOCATION OF EXITS		
TWO EXITS OR EXIT ACCESS DOORWAYS SHALL BE PROVIDED WHERE THE DESIGN OCCUPANT LOAD OR THE COMMON PATH OF EGRESS TRAVEL DISTANCE EXCEEDS THE VALUES LISTED IN TABLE 1006.2.1.	1006.2.1	7.5.1.3.3
G. DOORS		
1. MINIMUM CLEAR WIDTH	32 in. (1010.1.1)	32 in. (7.2.1.2.3.2)
2. MAXIMUM DOOR LEAF WIDTH	48 in. (1010.1.1)	
3. MINIMUM HEIGHT	80 in. (1010.1.1)	80 in. (7.1.5.2)
4. SWING IN DIRECTION OF EXIT TRAVEL IS REQUIRED WHEN OCCUPANT LOAD EXCEEDS 50.		
H. CORRIDORS		
MINIMUM CORRIDOR WIDTH (SEC. 1005.3.2) → 44" MIN OR .15" PER OCCUPANT		
MINIMUM STAIR WIDTH (SEC. 1005.3.2) → 44" MIN OR .20" PER OCCUPANT		
MINIMUM EGRESS WIDTH FOR OUTDOOR SMOKE PROTECTED ASSEMBLY (TABLE 1029.6.2) → CLEAR WIDTH IN INCHES OF AISLES AND OTHER MEANS OF EGRESS SHALL BE 0.08 INCHES/PERSON FOR AISLES AND STAIRS 0.06 INCHES/PERSON FOR RAMPS, CORRIDORS, TUNNELS AND VOMITORIES		80 in. (7.1.5.2) 7.2.1.4.3.2
DOORS IN THE COURSE OF SWING SHALL NOT REDUCE THE REQUIRED EGRESS WIDTH BY MORE THAN ONE-HALF	1005.7.1	7.2.1.4.3.1

V. CONVENIENCE OPENINGS (NFPA 101 2018, 8.6.9.2)

1. WHERE PERMITTED BY CHAPTERS 11-43, UNENCLOSED VERTICAL OPENINGS CREATED BY CONVENIENCE STAIRWAYS SHALL COMPLY WITH ALL OF THE FOLLOWING
   a.) THE CONVENIENCE STAIR OPENINGS SHALL NOT SERVE AS A REQUIRED MEANS OF EGRESS.
   b.) THE BUILDING SHALL BE PROTECTED THROUGHOUT WITH AN APPROVED, SUPERVISED AUTOMATIC SPRINKLER SYSTEM IN ACCORDANCE WITH SECTION 9.7.
   c.) THE CONVENIENCE STAIR OPENINGS SHALL BE PROTECTED IN ACCORDANCE WITH THE METHOD DETAILED FOR THE PROTECTION OF VERTICAL OPENINGS IN NFPA 13.

VI. ATRIUMS (IBC 2018 SECTION 404)

1. ATRIUM FLOOR AREA IS PERMITTED TO BE USED FOR ANY APPROVED USE WHERE THE INDIVIDUAL SPACE IS PROVIDED WITH AN AUTOMATIC SPRINKLER SYSTEM IN ACCORDANCE WITH SECTION 903.3.1.1
2. A SMOKE CONTROL SYSTEM SHALL BE INSTALLED IN ACCORDANCE WITH SECTION 909
   i.) EXCEPTION: IN OTHER THAN GROUP I-2 AND I-1, CONDITION 2, SMOKE CONTROL IS NOT REQUIRED FOR ATRIUMS THAT CONNECT ONLY TWO STORIES.
3. ATRIUM SPACES SHALL BE SEPARATED FROM ADJACENT SPACES BY A 1-HOUR FIRE BARRIER CONSTRUCTED IN ACCORDANCE WITH SECTION 707 OR A HORIZONTAL ASSEMBLY CONSTRUCTED IN ACCORDANCE WITH SECTION 711, OR BOTH.
   a.) FIRE BARRIER IS NOT REQUIRED WHERE A GLASS WALL FORMING A SMOKE PARTITION IS PROVIDED. (404.6.1)
   b.) FIRE BARRIER IS NOT REQUIRED BETWEEN ATRIUM AND THE ADJOINING SPACES OF UP TO THREE FLOORS OF THE ATRIUM PROVIDED THAT SUCH SPACES ARE ACCOUNTED FOR IN THE DESIGN OF THE SMOKE CONTROL SYSTEM (404.6.3)
   c.) A FIRE BARRIER IS NOT REQUIRED BETWEEN THE ATRIUM AND THE ADJOINING SPACES WHERE THE ATRIUM IS NOT REQUIRED TO BE PROVIDED WITH SMOKE CONTROL (404.6.4)

PROJECT GENERAL INFORMATION:

PROJECT → UNIVERSITY OF NORTH TEXAS - EAGLE STUDENT SERVICES CENTER

LOCATION → DENTON, TEXAS

BUILDING HEIGHT → THREE STORIES

AREA SUMMARY →

FLOOR AREA	**RENOVATION AREA**
LEVEL 1: 24,898 SF	14,580 SF
LEVEL 2: 29,542 SF	12,223 SF
LEVEL 3: 17,617 SF	0 SF
TOTAL = **72,057 SF**	**26,803 SF**

OCCUPANCY SEPARATION

LEVEL	FL AREA	OCCUPANCY PER IBC 2018	OCCUPANCY PER NFPA 2018
L2	35,817	GROUP A-3 (CLASSROOMS OVER 50 EXISTING) GROUP B (OFFICES)	EXISTING ASSEMBLY NEW BUSINESS (OFFICES)
L1	41,196	GROUP B (OFFICES)	NEW BUSINESS (OFFICES)

APPLICABLE CODES

AUTHORITY HAVING JURISDICTION → UNIVERSITY OF NORTH TEXAS - EAGLE STUDENT SERVICES CENTER

APPLICABLE CODES

IBC - INTERNATIONAL BUILDING CODE	2018	IFGC - INTERNATIONAL FUEL GAS CODE	2018
IPC - INTERNATIONAL PLUMBING CODE	2018	IECC - INTERNATIONAL ENERGY CONSERVATION CODE	2018
IMC - INTERNATIONAL MECHANICAL CODE	2018	NFPA 70 - NATIONAL FIRE PROTECTION ASSOCIATION	2018
IFC - INTERNATIONAL FIRE CODE	2018	NFPA 101 - NATIONAL FIRE PROTECTION ASSOCIATION	2018

BUILDING OCCUPANT LOAD (FOR RENOVATION AREAS ONLY)

LEVEL	RENOV. AREA	OCC. LOAD FACTOR PER IBC	TOTAL OCCC. LOAD PER IBC
L2	12,223	GROUP B (OFFICES) 150 GROSS | CONCENTRATED BUSINESS USE AREAS	95 OCC. LOAD
L1	14,580	GROUP B (OFFICES) 150 GROSS | CONCENTRATED BUSINESS USE AREAS	122 OCC. LOAD
	RENOV. AREA TOTALS		217 OCC. LOAD

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ISSUE FOR CONSTRUCTION	AA	AS	2023/02/03
ISSUE FOR CONSTRUCTION - DEMOLITION	AA	AS	2023/01/09

Permit/Seal

REGISTERED ARCHITECT
VICTORIA ROSE BROWN
22568
STATE OF TEXAS
02/10/2023

Client/Project Logo

UNT

Client/Project
University of North Texas - Denton

EAGLE STUDENT SERVICES CENTER

Eagle Student Services Center 1147 Union Cir, Denton, TX 76201

Title
CODE REVIEW

Project No. 2140001088

Scale As indicated

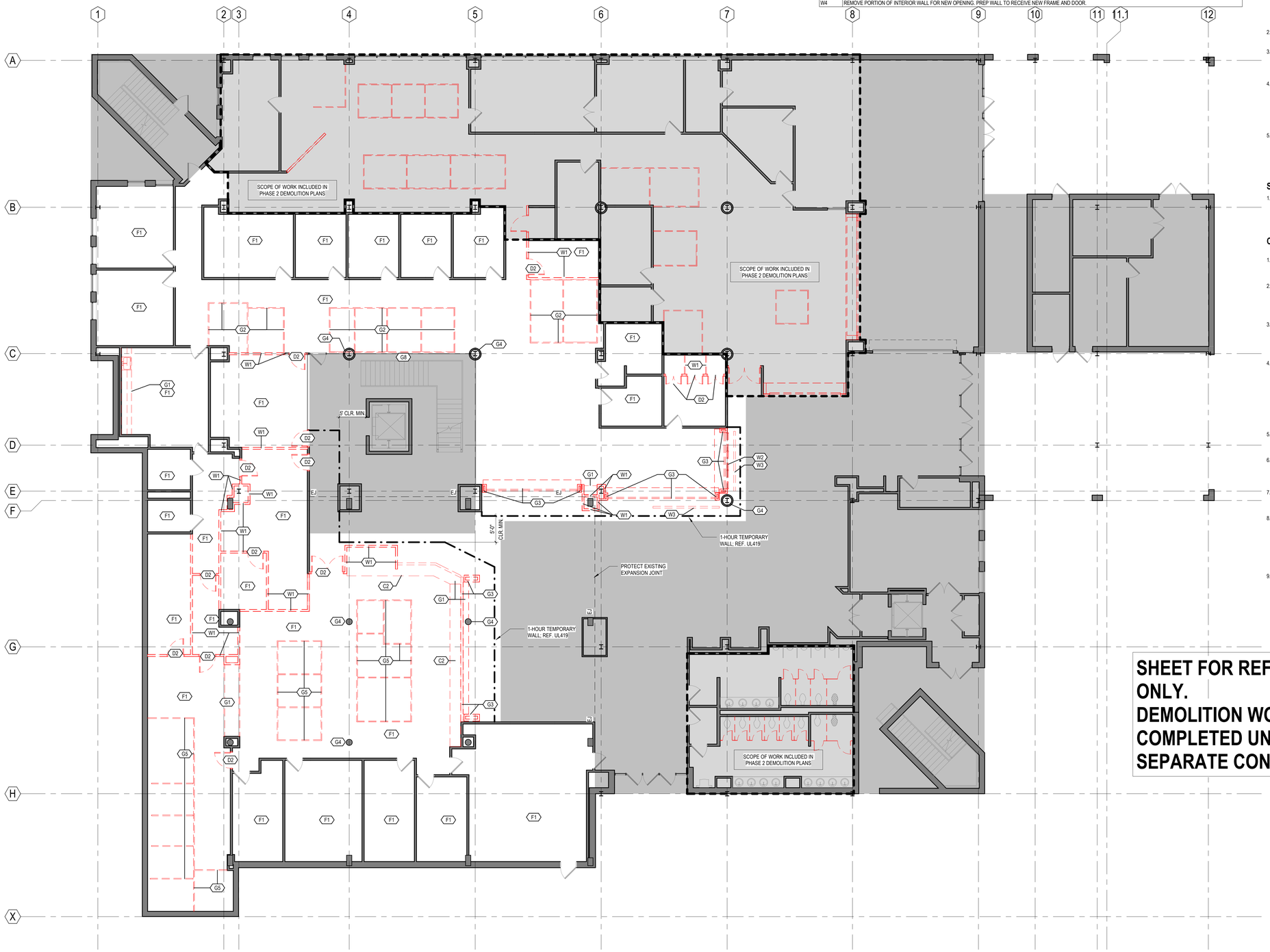
Revision

Drawing No. **G101**

<Pick location in Project Information>
2/10/2023 9:31:34 AM

ORIGINAL SHEET - ARCH E1

DEMO KEYNOTE LEGEND	
Key Value	Keynote Text
C1	REMOVE EXISTING CEILING TILE AND GRID OR PORTION OF GYP CEILING AS INDICATED.
C2	LINEAR TRACK LIGHTING TO BE DEMOLISHED AS NOTED IN DRAWINGS. COORDINATE TERMINATION OF UNUSED ELECTRICAL CONNECTIONS WITH ELECTRICAL DRAWINGS
C3	REMOVE EXISTING 2'X4' CEILING TILES AND PREP CEILING GRID TO RECEIVE NEW TEES FOR CONVERSION TO 2'X2' GRID.
C4	REMOVE BARREL VAULT, GYP CEILING, ASSOCIATED STRUCTURE, AND LIGHTING
C6	REMOVE CEILING MOUNTED PROJECTOR, HARDWARE, AND PROJECTOR SCREEN
D2	REMOVE DOOR AND FRAME; PREP FOR NEW WORK
F1	REMOVE EXISTING FLOORING AND BASE. PREP FOR NEW FLOORING AS SCHEDULED
F2	REMOVE AND RETAIN ALL BATHROOM FIXTURES AND ACCESSORIES, COORDINATE WITH OWNER. PREPARE ALL TILE SURFACES TO RECEIVE SANI-GLAZE PRODUCT TREATMENT.
G1	REMOVE EXISTING CASEWORK AND MILLWORK. COORDINATE REMOVAL OF EXISTING SINKS WITH MEP DRAWINGS WHERE OCCURS.
G2	EXISTING FURNITURE SYSTEMS TO BE RETAINED FOR REUSE OR SALVAGE AS DETERMINED BY OWNER
G3	EXISTING OVERHEAD COILING GRILLES AND ASSOCIATED COLUMN TRACT STRUCTURES TO BE DEMOLISHED
G4	EXISTING TILE COLUMN WRAP TO BE PRESERVED AND PROTECTED
G5	EXISTING FURNITURE SYSTEMS TO BE DEMOLISHED
G6	DEMOLISH EXISTING WALL, INCLUDING DISPLAY CASES AND FURNITURE SYSTEMS
G7	Ceiling mounted toilet partitions and urinal partitions to be demolished. Patch and repair affected surfaces. Prepare to receive new partitions.
G8	EXISTING GLAZING TO BE PRESERVED AND PROTECTED
G9	EXISTING TILE COLUMN WRAP TO BE DEMOLISHED. PROTECT STEEL COLUMN DURING CONSTRUCTION.
W1	DEMOLISH EXISTING INTERIOR WALL AND ALL DEVICES LOCATED ON WALL. PATCH ADJACENT AREAS TO REMAIN TO MATCH EXISTING CONDITIONS AND PREP TO RECEIVE NEW FINISHES. REFER TO ELECTRICAL AND MECHANICAL DRAWINGS FOR ADDITIONAL INFORMATION.
W2	DEMOLISH EXISTING INTERIOR STORE FRONT SYSTEM. PATCH ADJACENT AREAS TO REMAIN TO MATCH EXISTING CONDITIONS AND PREP TO RECEIVE NEW FINISHES
W3	GLASS BLOCK WALLS TO BE DEMOLISHED IN THEIR ENTIRETY. PATCH AND REPAIR FLOORING TO MATCH ADJACENT FINISH.
W4	REMOVE PORTION OF INTERIOR WALL FOR NEW OPENING. PREP WALL TO RECEIVE NEW FRAME AND DOOR.



DEMOLITION LEGEND:

- EXISTING WALLS TO REMAIN
- EXISTING WALLS TO BE DEMO'D
- EXISTING PARTITIONS, GRILLES, AND MISC TO BE DEMO'D
- EXISTING DOOR AND HARDWARE TO BE DEMO'D
- NOT IN SCOPE

GENERAL DEMOLITION REQUIREMENTS

GENERAL:

1. VISIT THE SITE TO UNDERSTAND THE SCOPE OF WORK AND TO FIELD VERIFY EXISTING CONDITIONS PRIOR TO BIDDING THIS PROJECT. REPORT DISCREPANCIES OR AMBIGUOUS ITEMS TO THE ARCHITECT PRIOR TO BIDDING FOR CLARIFICATION.
2. FIELD VERIFY EXISTING CONDITIONS PRIOR TO DEMOLITION WORK.
3. REFER TO MEP DRAWINGS FOR ADDITIONAL DEMOLITION AND ALTERATION REQUIREMENTS. PATCH WALLS WHERE FIXTURES AND EQUIPMENT ARE DEMOLISHED TO MATCH EXISTING ADJACENT SURFACE.
4. THE OWNER HAS FIRST RIGHTS OF SALVAGE OF ALL FIXTURES, EQUIPMENT AND BUILDING MATERIALS REMOVED AS PART OF THE DEMOLITION AND NOT REUSED IN THE NEW CONSTRUCTION. REMOVE ALL OTHER DEBRIS AND WASTE FROM THE SITE AND DISPOSE OF PROPERLY, IN ACCORDANCE WITH ANY APPLICABLE FEDERAL, STATE, AND LOCAL REGULATIONS.
5. PRIOR TO START OF DEMOLITION, SECURE FROM THE OWNER A LIST OF ADDITIONAL EXISTING BUILDING COMPONENTS TO BE SALVAGED AND DELIVERED TO THE OWNER. EXERCISE SUFFICIENT CARE IN SALVAGE OPERATIONS SUCH THAT SALVAGED COMPONENTS ARE DELIVERED TO THE OWNER IN THEIR EXISTING UNDAMAGED CONDITION.

STRUCTURAL INTEGRITY:

1. PROVIDE SHORING, BRACING, AND SUPPORTS AS REQUIRED TO MAINTAIN THE STRUCTURAL INTEGRITY OF THE PROJECT BEFORE CUTTING OR ALTERING ANY OPENING IN AN EXISTING LOAD BEARING OR NON-LOAD BEARING WALL, FOOTING, OR ROOF DECK.

CUTTING AND PATCHING:

1. PROVIDE MATERIALS FOR CUTTING AND PATCHING WHICH WILL RESULT IN EQUAL-OR-BETTER WORK THAN THAT BEING CUT OR PATCHED.
2. REMOVE EXISTING CONSTRUCTION SO AS NOT TO DAMAGE EXISTING CONSTRUCTION THAT IS TO REMAIN. PATCH FLOORS, WALLS AND CEILINGS IN A RECTANGULAR PATTERN TO MATCH EXISTING CONDITIONS AND MAKE THEM READY TO RECEIVE ANY NEW FINISHES INDICATED.
3. WHERE EXISTING FLOORING, CEILINGS OR WALL FINISHES ARE TO BE REMOVED AND REPLACED WITH NEW FINISHES, SURFACES TO REMAIN SHALL BE STRIPPED CLEAN OF ALL EXISTING FINISHES AND MADE READY TO RECEIVE NEW FINISHES.
4. INSPECT FLOORS TO RECEIVE NEW FINISHES PRIOR TO BID. COMPLETELY REMOVE FLOOR FINISHES TO BE REPLACED UON. CLEAN AND PROPERLY PREPARE THE EXISTING SUBSTRATE PRIOR TO INSTALLATION OF NEW FINISH MATERIAL. STRIP, PATCH, AND FILL TO PROVIDE A SMOOTH, DURABLE SURFACE FREE OF BURRS AND ADHESIVE AND SUITABLE FOR APPLICATION OF NEW FINISH MATERIAL UNDER CUT OF DOORS TO ACCOMMODATE NEW FLOOR FINISH WHERE NEW FINISH IS THICKER THAN ORIGINAL FINISH.
5. WHERE NEW CONCRETE TOPPING IS TO BE PLACED OVER EXISTING CONCRETE SLAB, ABRADE EXISTING CONCRETE FINISH FOR BETTER BOND.
6. REMOVE FRAME AND PATCH WALL WITH SAME ADJACENT MATERIAL AND FINISH AS EXISTING WHERE EXISTING DOOR OPENINGS ARE TO BE SEALED. ALIGN NEW AND EXISTING WALLS (UON).
7. EXISTING DOORS, FRAMES, AND HARDWARE THAT ARE REMOVED MAY BE REUSED IF IN GOOD CONDITION IN THE OPINION OF THE ARCHITECT AND OWNER.
8. AT CONTRACTOR'S OPTION: SALVAGE EXISTING GSU THAT IS TO BE REMOVED FOR USE IN PATCHING EXISTING. REUSE GSU ONLY IF IN GOOD CONDITION IN THE OPINION OF THE ARCHITECT AND THE OWNER. SALVAGED GSU MAY BE USED TO CONSTRUCT NEW WALLS THAT TIE IN TO EXISTING GSU WALLS. REFER TO ROOM FINISH SCHEDULES FOR ROOMS THAT CALL FOR NEW GSU. ALLOW FOR 200 UNITS OF GSU FOR MISC PATCHING AS DIRECTED BY ARCHITECT.
9. REMOVE EXISTING LAY-IN CEILING AND GRID FROM AREAS WHERE THERE IS NEW CONSTRUCTION FOR REINSTALLATION IN NEW CONFIGURATION.

SHEET FOR REFERENCE ONLY.
DEMOLITION WORK COMPLETED UNDER SEPARATE CONTRACT

A1
AD101
FIRST FLOOR DEMO PLAN PHASE 1
1/8" = 1'-0"

Stantec

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Permit/Seal

NOT FOR REGULATORY APPROVAL, PERMITTING, OR CONSTRUCTION

Victoria Brown, #22568

Client/Project Logo

Client/Project
University of North Texas - Denton

EAGLE STUDENT SERVICES CENTER

Eagle Student Services Center 1147 Union Cir, Denton, TX 76201

Title
LEVEL 1 DEMOLITION PLAN

Project No.
2140001088

Scale
As indicated

Revision

Drawing No.
AD101

ORIGINAL SHEET - ARCH E1

DEMO KEYNOTE LEGEND	
Key Value	Keynote Text
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G1	REMOVE EXISTING CASEWORK AND MILLWORK. COORDINATE REMOVAL OF EXISTING SINKS WITH MEP DRAWINGS WHERE OCCURS.
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G3	EXISTING OVERHEAD COILING GRILLES AND ASSOCIATED COLUMN TRACT STRUCTURES TO BE DEMOLISHED
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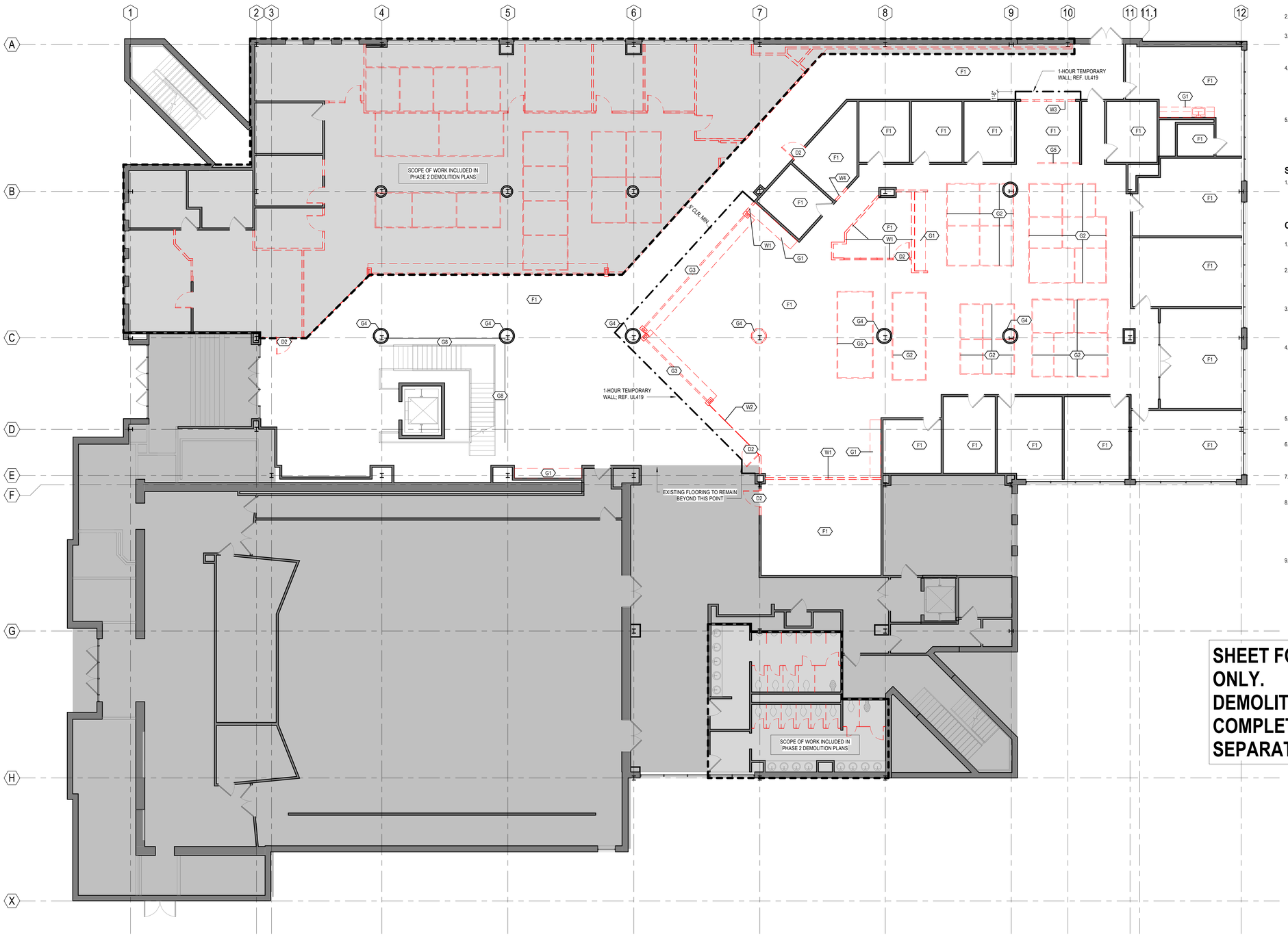
G9	EXISTING TILE COLUMN WRAP TO BE DEMOLISHED. PROTECT STEEL COLUMN DURING CONSTRUCTION.
W1	DEMOLISH EXISTING INTERIOR WALL AND ALL DEVICES LOCATED ON WALL. PATCH ADJACENT AREAS TO REMAIN TO MATCH EXISTING CONDITIONS AND PREP TO RECEIVE NEW FINISHES. REFER TO ELECTRICAL AND MECHANICAL DRAWINGS FOR ADDITIONAL INFORMATION.
W2	DEMOLISH EXISTING INTERIOR STORE FRONT SYSTEM. PATCH ADJACENT AREAS TO REMAIN TO MATCH EXISTING CONDITIONS AND PREP TO RECEIVE NEW FINISHES
W3	GLASS BLOCK WALLS TO BE DEMOLISHED IN THEIR ENTIRETY. PATCH AND REPAIR FLOORING TO MATCH ADJACENT FINISH.
W4	REMOVE PORTION OF INTERIOR WALL FOR NEW OPENING. PREP WALL TO RECEIVE NEW FRAME AND DOOR.



SHEET FOR REFERENCE ONLY.
DEMOLITION WORK COMPLETED UNDER SEPARATE CONTRACT

DEMOLITION LEGEND:

- EXISTING WALLS TO REMAIN
- EXISTING WALLS TO BE DEMO'D
- EXISTING PARTITIONS, GRILLES, AND MISC TO BE DEMO'D
- EXISTING DOOR AND HARDWARE TO BE DEMO'D
- NOT IN SCOPE

GENERAL DEMOLITION REQUIREMENTS

GENERAL:

1. VISIT THE SITE TO UNDERSTAND THE SCOPE OF WORK AND TO FIELD VERIFY EXISTING CONDITIONS PRIOR TO BIDDING THIS PROJECT. REPORT DISCREPANCIES OR AMBIGUOUS ITEMS TO THE ARCHITECT PRIOR TO BIDDING FOR CLARIFICATION.
2. FIELD VERIFY EXISTING CONDITIONS PRIOR TO DEMOLITION WORK.
3. REFER TO MEP DRAWINGS FOR ADDITIONAL DEMOLITION AND ALTERATION REQUIREMENTS. PATCH WALLS WHERE FIXTURES AND EQUIPMENT ARE DEMOLISHED TO MATCH EXISTING ADJACENT SURFACE.
4. THE OWNER HAS FIRST RIGHTS OF SALVAGE OF ALL FIXTURES, EQUIPMENT AND BUILDING MATERIALS REMOVED AS PART OF THE DEMOLITION AND NOT REUSED IN THE NEW CONSTRUCTION. REMOVE ALL OTHER DEBRIS AND WASTE FROM THE SITE AND DISPOSE OF PROPERLY, IN ACCORDANCE WITH ANY APPLICABLE FEDERAL, STATE, AND LOCAL REGULATIONS.
5. PRIOR TO START OF DEMOLITION, SECURE FROM THE OWNER A LIST OF ADDITIONAL EXISTING BUILDING COMPONENTS TO BE SALVAGED AND DELIVERED TO THE OWNER. EXERCISE SUFFICIENT CARE IN SALVAGE OPERATIONS SUCH THAT SALVAGED COMPONENTS ARE DELIVERED TO THE OWNER IN THEIR EXISTING UNDAMAGED CONDITION.

STRUCTURAL INTEGRITY:

1. PROVIDE SHORING, BRACING, AND SUPPORTS AS REQUIRED TO MAINTAIN THE STRUCTURAL INTEGRITY OF THE PROJECT BEFORE CUTTING OR ALTERING ANY OPENING IN AN EXISTING LOAD BEARING OR NON-LOAD BEARING WALL, FOOTING, OR ROOF DECK.

CUTTING AND PATCHING:

1. PROVIDE MATERIALS FOR CUTTING AND PATCHING WHICH WILL RESULT IN EQUAL-OR-BETTER WORK THAN THAT BEING CUT OR PATCHED.
2. REMOVE EXISTING CONSTRUCTION SO AS NOT TO DAMAGE EXISTING CONSTRUCTION THAT IS TO REMAIN. PATCH FLOORS, WALLS AND CEILINGS IN A RECTANGULAR PATTERN TO MATCH EXISTING CONDITIONS AND MAKE THEM READY TO RECEIVE ANY NEW FINISHES INDICATED.
3. WHERE EXISTING FLOORING, CEILINGS OR WALL FINISHES ARE TO BE REMOVED AND REPLACED WITH NEW FINISHES, SURFACES TO REMAIN SHALL BE STRIPPED CLEAN OF ALL EXISTING FINISHES AND MADE READY TO RECEIVE NEW FINISHES.
4. INSPECT FLOORS TO RECEIVE NEW FINISHES PRIOR TO BID. COMPLETELY REMOVE FLOOR FINISHES TO BE REPLACED UON. CLEAN AND PROPERLY PREPARE THE EXISTING SUBSTRATE PRIOR TO INSTALLATION OF NEW FINISH MATERIAL. STRIP, PATCH, AND FILL TO PROVIDE A SMOOTH, DURABLE SURFACE FREE OF BURRS AND ADHESIVE AND SUITABLE FOR APPLICATION OF NEW FINISH MATERIAL. UNDER CUT OF DOORS TO ACCOMMODATE NEW FLOOR FINISH WHERE NEW FINISH IS THICKER THAN ORIGINAL FINISH.
5. WHERE NEW CONCRETE TOPPING IS TO BE PLACED OVER EXISTING CONCRETE SLAB, ABRADE EXISTING CONCRETE FINISH FOR BETTER BOND.
6. REMOVE FRAME AND PATCH WALL WITH SAME ADJACENT MATERIAL AND FINISH AS EXISTING WHERE EXISTING DOOR OPENINGS ARE TO BE SEALED. ALIGN NEW AND EXISTING WALLS (UON).
7. EXISTING DOORS, FRAMES, AND HARDWARE THAT ARE REMOVED MAY BE REUSED IF IN GOOD CONDITION IN THE OPINION OF THE ARCHITECT AND OWNER.
8. AT CONTRACTOR'S OPTION: SALVAGE EXISTING GSU THAT IS TO BE REMOVED FOR USE IN PATCHING EXISTING. REUSE GSU ONLY IF IN GOOD CONDITION IN THE OPINION OF THE ARCHITECT AND THE OWNER. SALVAGED GSU MAY BE USED TO CONSTRUCT NEW WALLS THAT TIE IN TO EXISTING GSU WALLS. REFER TO ROOM FINISH SCHEDULES FOR ROOMS THAT CALL FOR NEW GSU. ALLOW FOR 200 UNITS OF GSU FOR MISC PATCHING AS DIRECTED BY ARCHITECT.
9. REMOVE EXISTING LAY-IN CEILING AND GRID FROM AREAS WHERE THERE IS NEW CONSTRUCTION FOR REINSTALLATION IN NEW CONFIGURATION.

A1 AD102 **SECOND FLOOR DEMO PLAN PHASE 1**
1/8" = 1'-0"

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Revision	By	Appd	YYYY.MM.DD

Issued	By	Appd	YYYY.MM.DD
ISSUE FOR CONSTRUCTION	AA	AS	2023/02/03
ISSUE FOR CONSTRUCTION - DEMOLITION	AA	AS	2023/01/09

Permit/Seal

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Victoria Brown, #22568

Client/Project Logo

Client/Project
University of North Texas - Denton

EAGLE STUDENT SERVICES CENTER

Eagle Student Services Center 1147 Union Cir, Denton, TX 76201

Title
LEVEL 2 DEMOLITION PLAN

Project No. 2140001088
Scale As indicated
Revision
Drawing No. **AD102**

*Pick location in Project Information
2/10/2023 2:10:23 PM
ORIGINAL SHEET - ARCH E1

DEMO KEYNOTE LEGEND	
Key Value	Keynote Text
C1	REMOVE EXISTING CEILING TILE AND GRID OR PORTION OF GYP CEILING AS INDICATED.
C2	LINEAR TRACK LIGHTING TO BE DEMOLISHED AS NOTED IN DRAWINGS. COORDINATE TERMINATION OF UNUSED ELECTRICAL CONNECTIONS WITH ELECTRICAL DRAWINGS
C3	REMOVE EXISTING 2'X4' CEILING TILES AND PREP CEILING GRID TO RECEIVE NEW TEES FOR CONVERSION TO 2'X2' GRID.
C4	REMOVE BARREL VAULT, GYP CEILING, ASSOCIATED STRUCTURE, AND LIGHTING
C6	REMOVE CEILING MOUNTED PROJECTOR, HARDWARE, AND PROJECTOR SCREEN
D2	REMOVE DOOR AND FRAME; PREP FOR NEW WORK
F1	REMOVE EXISTING FLOORING AND BASE. PREP FOR NEW FLOORING AS SCHEDULED
F2	REMOVE AND RETAIN ALL BATHROOM FIXTURES AND ACCESSORIES, COORDINATE WITH OWNER. PREPARE ALL TILE SURFACES TO RECEIVE SANI-GLAZE PRODUCT TREATMENT.
G1	REMOVE EXISTING CASEWORK AND MILLWORK. COORDINATE REMOVAL OF EXISTING SINKS WITH MEP DRAWINGS WHERE OCCURS.
G2	EXISTING FURNITURE SYSTEMS TO BE RETAINED FOR REUSE OR SALVAGE AS DETERMINED BY OWNER
G3	EXISTING OVERHEAD COILING GRILLES AND ASSOCIATED COLUMN TRACT STRUCTURES TO BE DEMOLISHED
G4	EXISTING TILE COLUMN WRAP TO BE PRESERVED AND PROTECTED
G5	EXISTING FURNITURE SYSTEMS TO BE DEMOLISHED
G6	DEMOLISH EXISTING WALL, INCLUDING DISPLAY CASES AND FURNITURE SYSTEMS
G7	Ceiling mounted toilet partitions and urinal partitions to be demolished. Patch and repair affected surfaces. Prepare to receive new partitions.
G8	EXISTING GLAZING TO BE PRESERVED AND PROTECTED
G9	EXISTING TILE COLUMN WRAP TO BE DEMOLISHED. PROTECT STEEL COLUMN DURING CONSTRUCTION.
W1	DEMOLISH EXISTING INTERIOR WALL AND ALL DEVICES LOCATED ON WALL. PATCH ADJACENT AREAS TO REMAIN TO MATCH EXISTING CONDITIONS AND PREP TO RECEIVE NEW FINISHES. REFER TO ELECTRICAL AND MECHANICAL DRAWINGS FOR ADDITIONAL INFORMATION.
W2	DEMOLISH EXISTING INTERIOR STORE FRONT SYSTEM. PATCH ADJACENT AREAS TO REMAIN TO MATCH EXISTING CONDITIONS AND PREP TO RECEIVE NEW FINISHES
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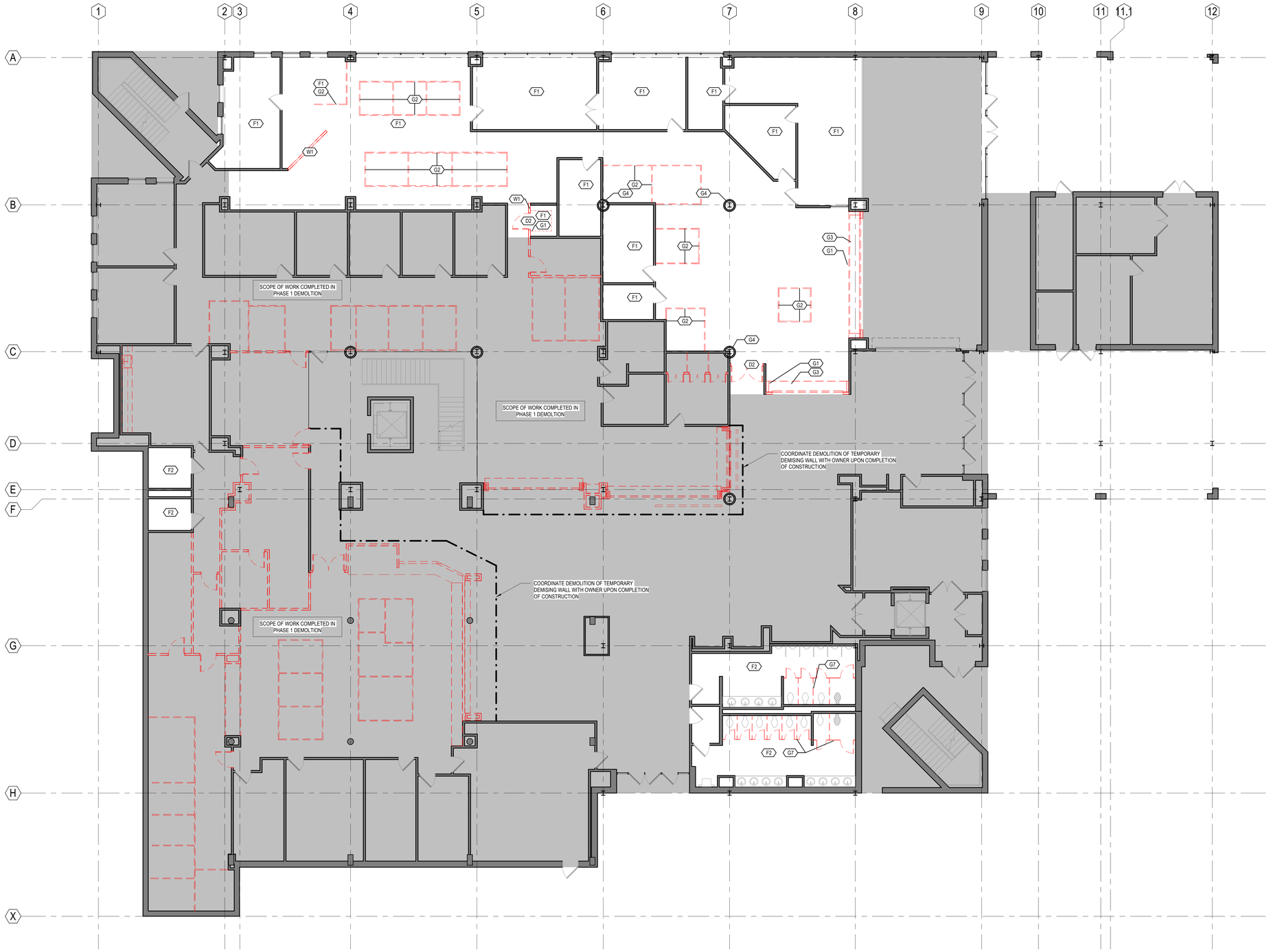
W4	REMOVE PORTION OF INTERIOR WALL FOR NEW OPENING. PREP WALL TO RECEIVE NEW FRAME AND DOOR.



A1
AD111
FIRST FLOOR DEMO PLAN PHASE 2
1/8" = 1'-0"

DEMOLITION LEGEND:

- EXISTING WALLS TO REMAIN
- EXISTING WALLS TO BE DEMO'D
- EXISTING PARTITIONS, GRILLES, AND MISC TO BE DEMO'D
- EXISTING DOOR AND HARDWARE TO BE DEMO'D
- NOT IN SCOPE

GENERAL DEMOLITION REQUIREMENTS

GENERAL:

1. VISIT THE SITE TO UNDERSTAND THE SCOPE OF WORK AND TO FIELD VERIFY EXISTING CONDITIONS PRIOR TO BIDDING THIS PROJECT. REPORT DISCREPANCIES OR AMBIGUOUS ITEMS TO THE ARCHITECT PRIOR TO BIDDING FOR CLARIFICATION.
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5. WHERE NEW CONCRETE TOPPING IS TO BE PLACED OVER EXISTING CONCRETE SLAB, ABRADE EXISTING CONCRETE FINISH FOR BETTER BOND.
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9. REMOVE EXISTING LAY-IN CEILING AND GRID FROM AREAS WHERE THERE IS NEW CONSTRUCTION FOR REINSTALLATION IN NEW CONFIGURATION.

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ISSUE FOR CONSTRUCTION	AA	AS	2023/02/03
ISSUE FOR CONSTRUCTION - DEMOLITION	AA	AS	2023/01/09

Permit/Seal

REGISTERED ARCHITECT VICTORIA ROSE BROWN 22669 STATE OF TEXAS
02/10/2023

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Client/Project
University of North Texas - Denton

EAGLE STUDENT SERVICES CENTER

Eagle Student Services Center 1147 Union Cir, Denton, TX 76201

Title
LEVEL 1 DEMOLITION PLAN PHASE 2

Project No. 2140001088
Scale As indicated
Revision
Drawing No. AD111

<PCs location in Project Information>
2/10/2023 12:01:32 PM
ORIGINAL SHEET - ARCH E1

DEMO KEYNOTE LEGEND	
Key Value	Keynote Text
C1	REMOVE EXISTING CEILING TILE AND GRID OR PORTION OF GYP CEILING AS INDICATED.
C2	LINEAR TRACK LIGHTING TO BE DEMOLISHED AS NOTED IN DRAWINGS. COORDINATE TERMINATION OF UNUSED ELECTRICAL CONNECTIONS WITH ELECTRICAL DRAWINGS
C3	REMOVE EXISTING 2X4' CEILING TILES AND PREP CEILING GRID TO RECEIVE NEW TEES FOR CONVERSION TO 2'X2' GRID.
C4	REMOVE BARREL VAULT, GYP CEILING, ASSOCIATED STRUCTURE, AND LIGHTING
C6	REMOVE CEILING MOUNTED PROJECTOR, HARDWARE, AND PROJECTOR SCREEN
D2	REMOVE DOOR AND FRAME; PREP FOR NEW WORK
F1	REMOVE EXISTING FLOORING AND BASE, PREP FOR NEW FLOORING AS SCHEDULED
F2	REMOVE AND RETAIN ALL BATHROOM FIXTURES AND ACCESSORIES, COORDINATE WITH OWNER. PREPARE ALL TILE SURFACES TO RECEIVE SANI-GLAZE PRODUCT TREATMENT.
G1	REMOVE EXISTING CASEWORK AND MILLWORK. COORDINATE REMOVAL OF EXISTING SINKS WITH MEP DRAWINGS WHERE OCCURS.
G2	EXISTING FURNITURE SYSTEMS TO BE RETAINED FOR REUSE OR SALVAGE AS DETERMINED BY OWNER
G3	EXISTING OVERHEAD COILING GRILLES AND ASSOCIATED COLUMN TRACT STRUCTURES TO BE DEMOLISHED
G4	EXISTING TILE COLUMN WRAP TO BE PRESERVED AND PROTECTED
G5	EXISTING FURNITURE SYSTEMS TO BE DEMOLISHED
G6	DEMOLISH EXISTING WALL, INCLUDING DISPLAY CASES AND FURNITURE SYSTEMS
G7	Ceiling mounted toilet partitions and urinal partitions to be demolished. Patch and repair affected surfaces. Prepare to receive new partitions.
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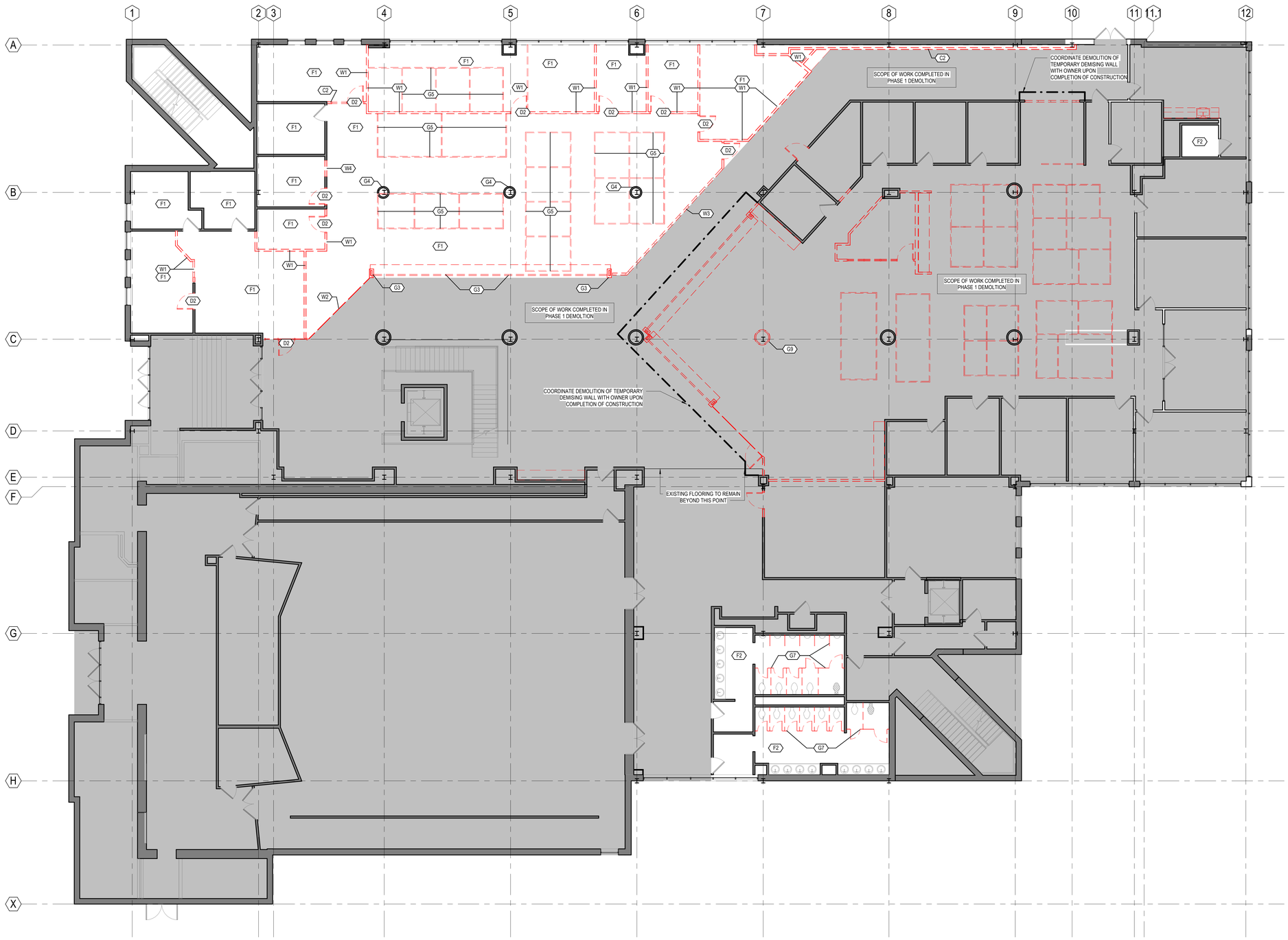
W1	DEMOLISH EXISTING INTERIOR WALL AND ALL DEVICES LOCATED ON WALL, PATCH ADJACENT AREAS TO REMAIN TO MATCH EXISTING CONDITIONS AND PREP TO RECEIVE NEW FINISHES. REFER TO ELECTRICAL AND MECHANICAL DRAWINGS FOR ADDITIONAL INFORMATION.
W2	DEMOLISH EXISTING INTERIOR STORE FRONT SYSTEM, PATCH ADJACENT AREAS TO REMAIN TO MATCH EXISTING CONDITIONS AND PREP TO RECEIVE NEW FINISHES
W3	GLASS BLOCK WALLS TO BE DEMOLISHED IN THEIR ENTIRETY. PATCH AND REPAIR FLOORING TO MATCH ADJACENT FINISH.
W4	REMOVE PORTION OF INTERIOR WALL FOR NEW OPENING. PREP WALL TO RECEIVE NEW FRAME AND DOOR.



DEMOLITION LEGEND:

- EXISTING WALLS TO REMAIN
- EXISTING WALLS TO BE DEMO'D
- EXISTING PARTITIONS, GRILLES, AND MISC TO BE DEMO'D
- EXISTING DOOR AND HARDWARE TO BE DEMO'D
- NOT IN SCOPE

GENERAL DEMOLITION REQUIREMENTS

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CUTTING AND PATCHING:

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3. WHERE EXISTING FLOORING, CEILINGS OR WALL FINISHES ARE TO BE REMOVED AND REPLACED WITH NEW FINISHES, SURFACES TO REMAIN SHALL BE STRIPPED CLEAN OF ALL EXISTING FINISHES AND MADE READY TO RECEIVE NEW FINISHES.
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5. WHERE NEW CONCRETE TOPPING IS TO BE PLACED OVER EXISTING CONCRETE SLAB, ABRADE EXISTING CONCRETE FINISH FOR BETTER BOND.
6. REMOVE FRAME AND PATCH WALL WITH SAME ADJACENT MATERIAL AND FINISH AS EXISTING WHERE EXISTING DOOR OPENINGS ARE TO BE SEALED. ALIGN NEW AND EXISTING WALLS (UON).
7. EXISTING DOORS, FRAMES, AND HARDWARE THAT ARE REMOVED MAY BE REUSED IF IN GOOD CONDITION IN THE OPINION OF THE ARCHITECT AND OWNER.
8. AT CONTRACTOR'S OPTION: SALVAGE EXISTING GSU THAT IS TO BE REMOVED FOR USE IN PATCHING EXISTING. REUSE GSU ONLY IF IN GOOD CONDITION IN THE OPINION OF THE ARCHITECT AND THE OWNER. SALVAGED GSU MAY BE USED TO CONSTRUCT NEW WALLS THAT TIE IN TO EXISTING GSU WALLS. REFER TO ROOM FINISH SCHEDULES FOR ROOMS THAT CALL FOR NEW GSU. ALLOW FOR 200 UNITS OF GSU FOR MISC PATCHING AS DIRECTED BY ARCHITECT.
9. REMOVE EXISTING LAY-IN CEILING AND GRID FROM AREAS WHERE THERE IS NEW CONSTRUCTION FOR REINSTALLATION IN NEW CONFIGURATION.

A1 AD112 **SECOND FLOOR DEMO PLAN PHASE 2**

1/8" = 1'-0"

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ISSUE FOR CONSTRUCTION	AA	AS	2023/02/03
ISSUE FOR CONSTRUCTION - DEMOLITION	AA	AS	2023/01/09

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REGISTERED ARCHITECT VIRGINIA ROSE BROWN 22086 STATE OF TEXAS

02/10/2023

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Client/Project

University of North Texas - Denton

EAGLE STUDENT SERVICES CENTER

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Title

LEVEL 2 DEMOLITION PLAN PHASE 2

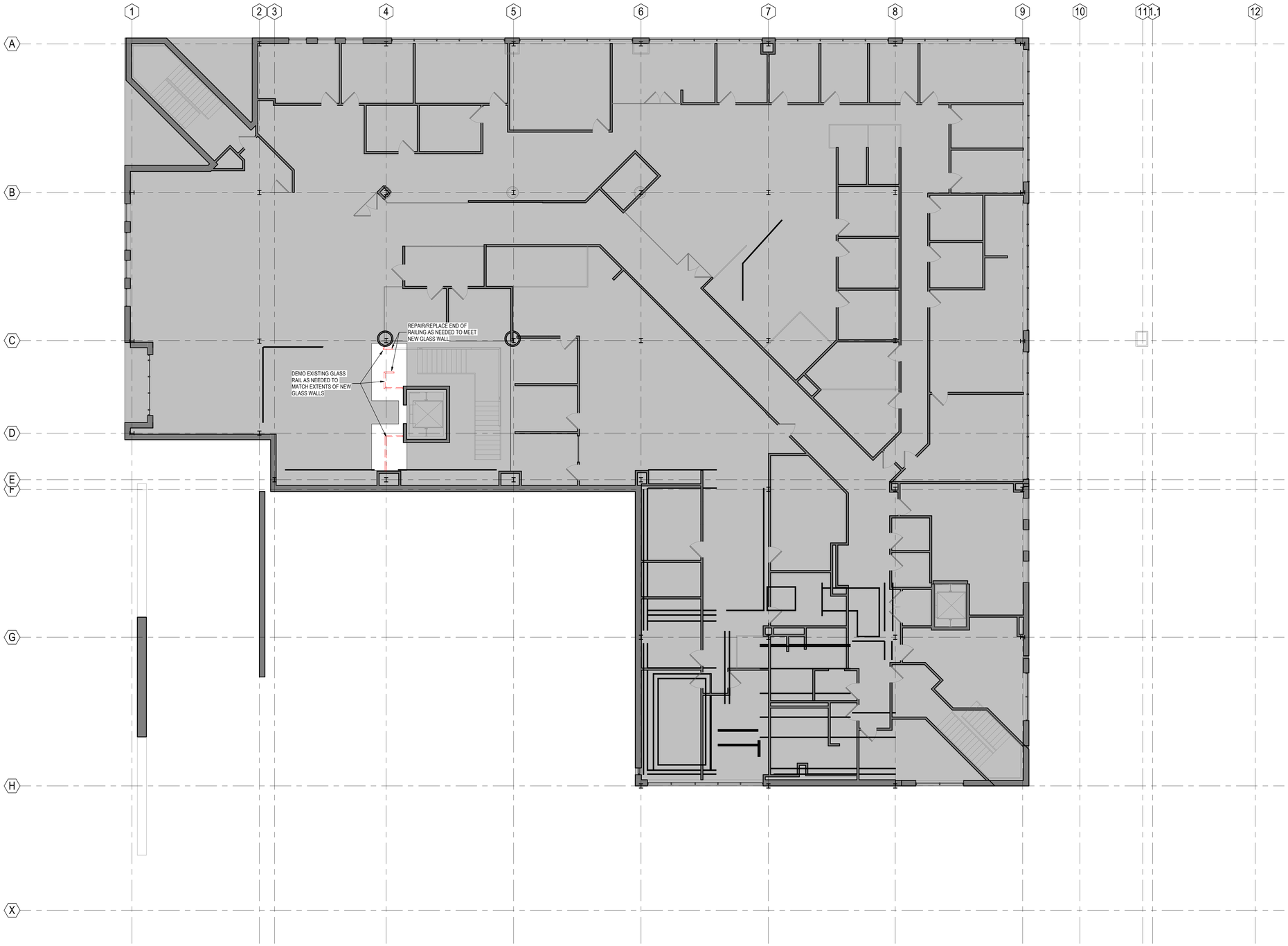
Project No. 2140001088

Scale As indicated

Revision

Drawing No. **AD112**

ORIGINAL SHEET - ARCH E1



DEMOLITION LEGEND:

- EXISTING WALLS TO REMAIN
- EXISTING WALLS TO BE DEMO'D
- EXISTING PARTITIONS, GRILLES, AND MISC TO BE DEMO'D
- EXISTING DOOR AND HARDWARE TO BE DEMO'D
- NOT IN SCOPE

A1 AD113 **THIRD FLOOR DEMO PLAN**
1/8" = 1'-0"

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ISSUE FOR CONSTRUCTION - DEMOLITION	AA	AS	2023/01/09
Issued	By	Appd	YYYY.MM.DD

Permit/Seal

REGISTERED ARCHITECT VICTORIA ROSE BROWN 22568 STATE OF TEXAS

02/10/2023

Client/Project Logo

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Client/Project
University of North Texas - Denton

EAGLE STUDENT SERVICES CENTER

Eagle Student Services Center 1147 Union Cir, Denton, TX 76201

Title
LEVEL 3 DEMOLITION PLAN PHASE 2

Project No. 2140001088

Scale As indicated

Revision

Drawing No. AD113

<Pick location in Project Information>
2/10/2023 9:30:57 AM

ORIGINAL SHEET - ARCH E1

DEMO KEYNOTE LEGEND	
Key Value	Keynote Text
C1	REMOVE EXISTING CEILING TILE AND GRID OR PORTION OF GYP CEILING AS INDICATED.
C2	LINEAR TRACK LIGHTING TO BE DEMOLISHED AS NOTED IN DRAWINGS. COORDINATE TERMINATION OF UNUSED ELECTRICAL CONNECTIONS WITH ELECTRICAL DRAWINGS
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G1	REMOVE EXISTING CASEWORK AND MILLWORK. COORDINATE REMOVAL OF EXISTING SINKS WITH MEP DRAWINGS WHERE OCCURS.
G2	EXISTING FURNITURE SYSTEMS TO BE RETAINED FOR REUSE OR SALVAGE AS DETERMINED BY OWNER
G3	EXISTING OVERHEAD COILING GRILLES AND ASSOCIATED COLUMN TRACT STRUCTURES TO BE DEMOLISHED
G4	EXISTING TILE COLUMN WRAP TO BE PRESERVED AND PROTECTED
G5	EXISTING FURNITURE SYSTEMS TO BE DEMOLISHED
G6	DEMOLISH EXISTING WALL, INCLUDING DISPLAY CASES AND FURNITURE SYSTEMS
G7	Ceiling mounted toilet partitions and urinal partitions to be demolished. Patch and repair affected surfaces. Prepare to receive new partitions.
G8	EXISTING GLAZING TO BE PRESERVED AND PROTECTED
G9	EXISTING TILE COLUMN WRAP TO BE DEMOLISHED. PROTECT STEEL COLUMN DURING CONSTRUCTION.
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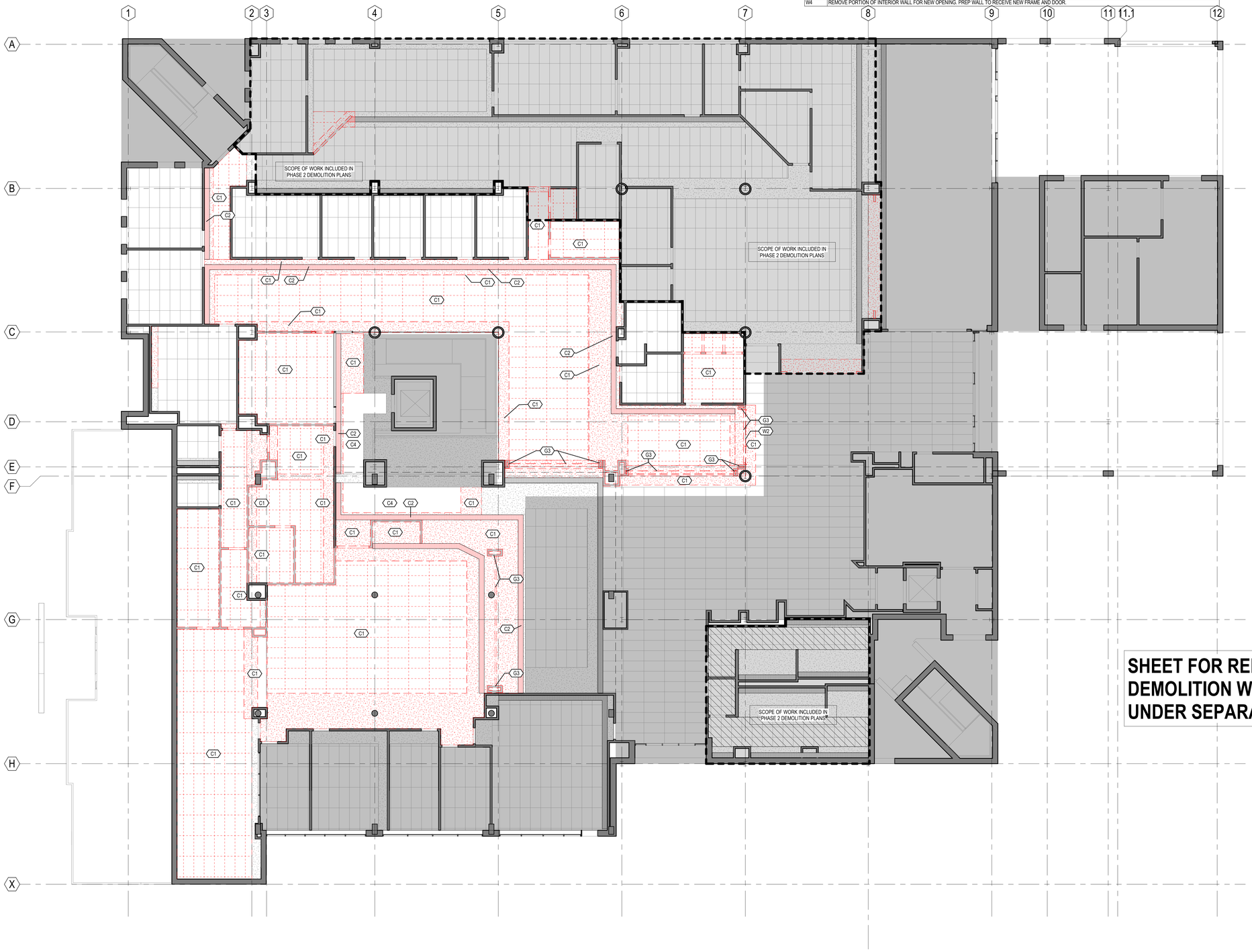
W2	DEMOLISH EXISTING INTERIOR STORE FRONT SYSTEM. PATCH ADJACENT AREAS TO REMAIN TO MATCH EXISTING CONDITIONS AND PREP TO RECEIVE NEW FINISHES
W3	GLASS BLOCK WALLS TO BE DEMOLISHED IN THEIR ENTIRETY. PATCH AND REPAIR FLOORING TO MATCH ADJACENT FINISH.
W4	REMOVE PORTION OF INTEROR WALL FOR NEW OPENING. PREP WALL TO RECEIVE NEW FRAME AND DOOR.

CEILING DEMO LEGEND:

NOT IN SCOPE

CEILING GRID TO REMAIN. ADDITIONAL GRID TEE TO BE ADDED TO CREATE 2'-0'X2'-0' GRID FOR 2'-0"X2'-0" ACOUSTIC PANEL CEILING SYSTEM. REFER TO RCP FOR TYPE AND HEIGHT, TYP

EXISTING CEILING TO BE DEMO'D



SHEET FOR REFERENCE ONLY. DEMOLITION WORK COMPLETED UNDER SEPARATE CONTRACT

A1 AD601 **FIRST FLOOR DEMO REFLECTED CEILING PLAN PHASE 1**

1/8" = 1'-0"

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Notes

Revision	By	Appd	YYYY.MM.DD

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ISSUE FOR CONSTRUCTION	AA	AS	2023/02/03
ISSUE FOR CONSTRUCTION - DEMOLITION	AA	AS	2023/01/09

Permit/Seal

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Victoria Brown, #22568

Client/Project Logo

Client/Project
University of North Texas - Denton

EAGLE STUDENT SERVICES CENTER

Eagle Student Services Center 1147 Union Cir, Denton, TX 76201

Title
LEVEL 1 CEILING DEMOLITION PLAN

Project No. 2140001088

Scale As indicated

Revision

Drawing No. **AD601**

*Pick location in Project Information
1/10/2023 2:10:24 PM

ORIGINAL SHEET - ARCH E1

DEMO KEYNOTE LEGEND	
Key Value	Keynote Text
C1	REMOVE EXISTING CEILING TILE AND GRID OR PORTION OF GYP CEILING AS INDICATED.
C2	LINEAR TRACK LIGHTING TO BE DEMOLISHED AS NOTED IN DRAWINGS. COORDINATE TERMINATION OF UNUSED ELECTRICAL CONNECTIONS WITH ELECTRICAL DRAWINGS
C3	REMOVE EXISTING 2'X4' CEILING TILES AND PREP CEILING GRID TO RECEIVE NEW TEES FOR CONVERSION TO 2'X2' GRID.
C4	REMOVE BARREL VAULT, GYP CEILING, ASSOCIATED STRUCTURE, AND LIGHTING
C6	REMOVE CEILING MOUNTED PROJECTOR, HARDWARE, AND PROJECTOR SCREEN
D2	REMOVE DOOR AND FRAME; PREP FOR NEW WORK
F1	REMOVE EXISTING FLOORING AND BASE, PREP FOR NEW FLOORING AS SCHEDULED
F2	REMOVE AND RETAIN ALL BATHROOM FIXTURES AND ACCESSORIES, COORDINATE WITH OWNER. PREPARE ALL TILE SURFACES TO RECEIVE SANI-GLAZE PRODUCT TREATMENT.
G1	REMOVE EXISTING CASEWORK AND MILLWORK. COORDINATE REMOVAL OF EXISTING SINKS WITH MEP DRAWINGS WHERE OCCURS.
G2	EXISTING FURNITURE SYSTEMS TO BE RETAINED FOR REUSE OR SALVAGE AS DETERMINED BY OWNER
G3	EXISTING OVERHEAD COILING GRILLES AND ASSOCIATED COLUMN TRACT STRUCTURES TO BE DEMOLISHED
G4	EXISTING TILE COLUMN WRAP TO BE PRESERVED AND PROTECTED
G5	EXISTING FURNITURE SYSTEMS TO BE DEMOLISHED
G6	DEMOLISH EXISTING WALL, INCLUDING DISPLAY CASES AND FURNITURE SYSTEMS
G7	Ceiling mounted toilet partitions and urinal partitions to be demolished. Patch and repair affected surfaces. Prepare to receive new partitions.
G8	EXISTING GLAZING TO BE PRESERVED AND PROTECTED
G9	EXISTING TILE COLUMN WRAP TO BE DEMOLISHED. PROTECT STEEL COLUMN DURING CONSTRUCTION.
W1	DEMOLISH EXISTING INTERIOR WALL AND ALL DEVICES LOCATED ON WALL. PATCH ADJACENT AREAS TO REMAIN TO MATCH EXISTING CONDITIONS AND PREP TO RECEIVE NEW FINISHES. REFER TO ELECTRICAL AND MECHANICAL DRAWINGS FOR ADDITIONAL INFORMATION.
W2	DEMOLISH EXISTING INTERIOR STORE FRONT SYSTEM. PATCH ADJACENT AREAS TO REMAIN TO MATCH EXISTING CONDITIONS AND PREP TO RECEIVE NEW FINISHES
W3	GLASS BLOCK WALLS TO BE DEMOLISHED IN THEIR ENTIRETY. PATCH AND REPAIR FLOORING TO MATCH ADJACENT FINISH.
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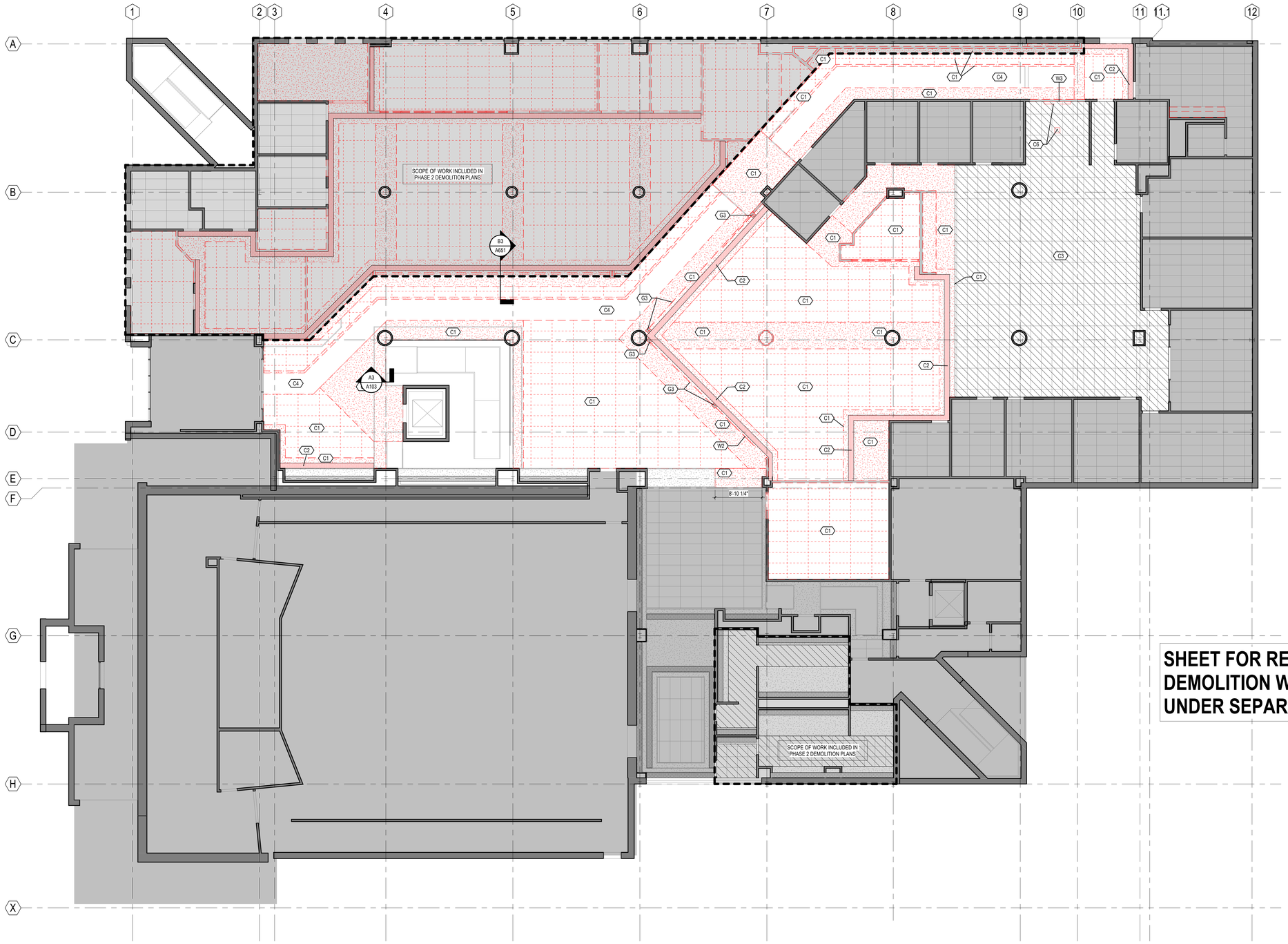
CEILING DEMO LEGEND:

NOT IN SCOPE

CEILING GRID TO REMAIN. ADDITIONAL GRID TEE TO BE ADDED TO CREATE 2'-0"X2'-0" GRID FOR 2'-0"X2'-0" ACOUSTIC PANEL CEILING SYSTEM. REFER TO RCP FOR TYPE AND HEIGHT, TYP

EXISTING CEILING TO BE DEMO'D



SHEET FOR REFERENCE ONLY. DEMOLITION WORK COMPLETED UNDER SEPARATE CONTRACT

A1 AD602 **SECOND FLOOR DEMO REFLECTED CEILING PLAN PHASE 1**

1/8" = 1'-0"

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ISSUE FOR CONSTRUCTION - DEMOLITION	AA	AS	2023/01/09

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Victoria Brown, #22568

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Client/Project
University of North Texas - Denton

EAGLE STUDENT SERVICES CENTER

Eagle Student Services Center 1147 Union Cir, Denton, TX 76201

Title
LEVEL 2 CEILING DEMOLITION PLAN

Project No. 2140001088

Scale As indicated

Revision

Drawing No. **AD602**

<PCs location in Project Information>
2/10/2023 2:10:24 PM
ORIGINAL SHEET - ARCH E1

DEMO KEYNOTE LEGEND	
Key Value	Keynote Text
C1	REMOVE EXISTING CEILING TILE AND GRID OR PORTION OF GYP CEILING AS INDICATED.
C2	LINEAR TRACK LIGHTING TO BE DEMOLISHED AS NOTED IN DRAWINGS. COORDINATE TERMINATION OF UNUSED ELECTRICAL CONNECTIONS WITH ELECTRICAL DRAWINGS
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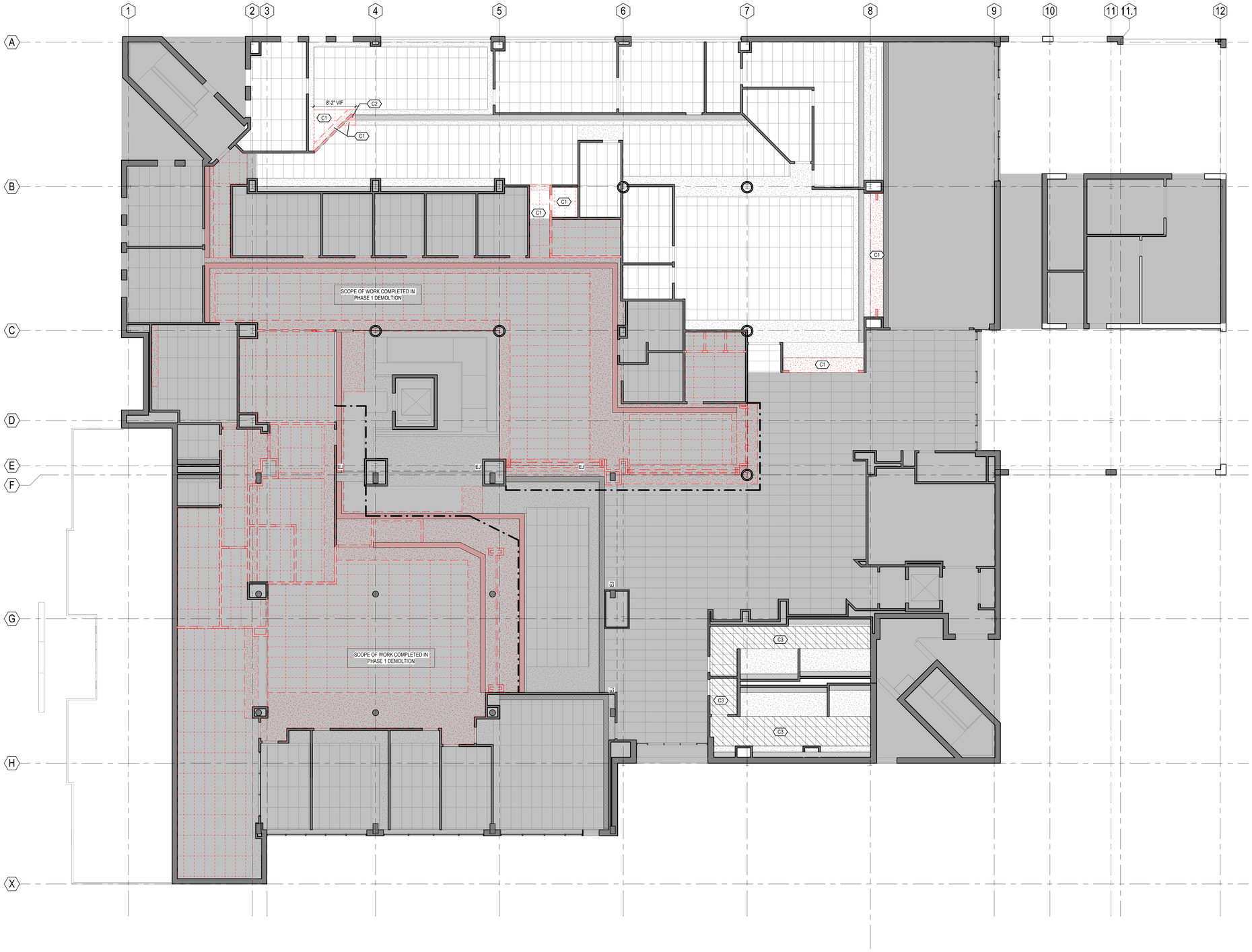

A1 AD611 **FIRST FLOOR DEMO REFLECTED CEILING PLAN PHASE 2**

1/8" = 1'-0"

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ISSUE FOR CONSTRUCTION	AA	AS	2023/02/03
ISSUE FOR CONSTRUCTION - DEMOLITION	AA	AS	2023/01/09

Permit/Seal

REGISTERED ARCHITECT VICTORIA ROSE BROWN 22868 STATE OF TEXAS

02/10/2023

Client/Project Logo

UNT

Client/Project
University of North Texas - Denton

EAGLE STUDENT SERVICES CENTER

Eagle Student Services Center 1147 Union Cir, Denton, TX 76201

Title
LEVEL 1 CEILING DEMOLITION PLAN PHASE 2

Project No. 2140001088

Scale As indicated

Revision

Drawing No. **AD611**

<Plot location in Project Information>
2/10/2023 9:31:09 AM

ORIGINAL SHEET - ARCH E1

DEMO KEYNOTE LEGEND	
Key Value	Keynote Text
C1	REMOVE EXISTING CEILING TILE AND GRID OR PORTION OF GYP CEILING AS INDICATED.
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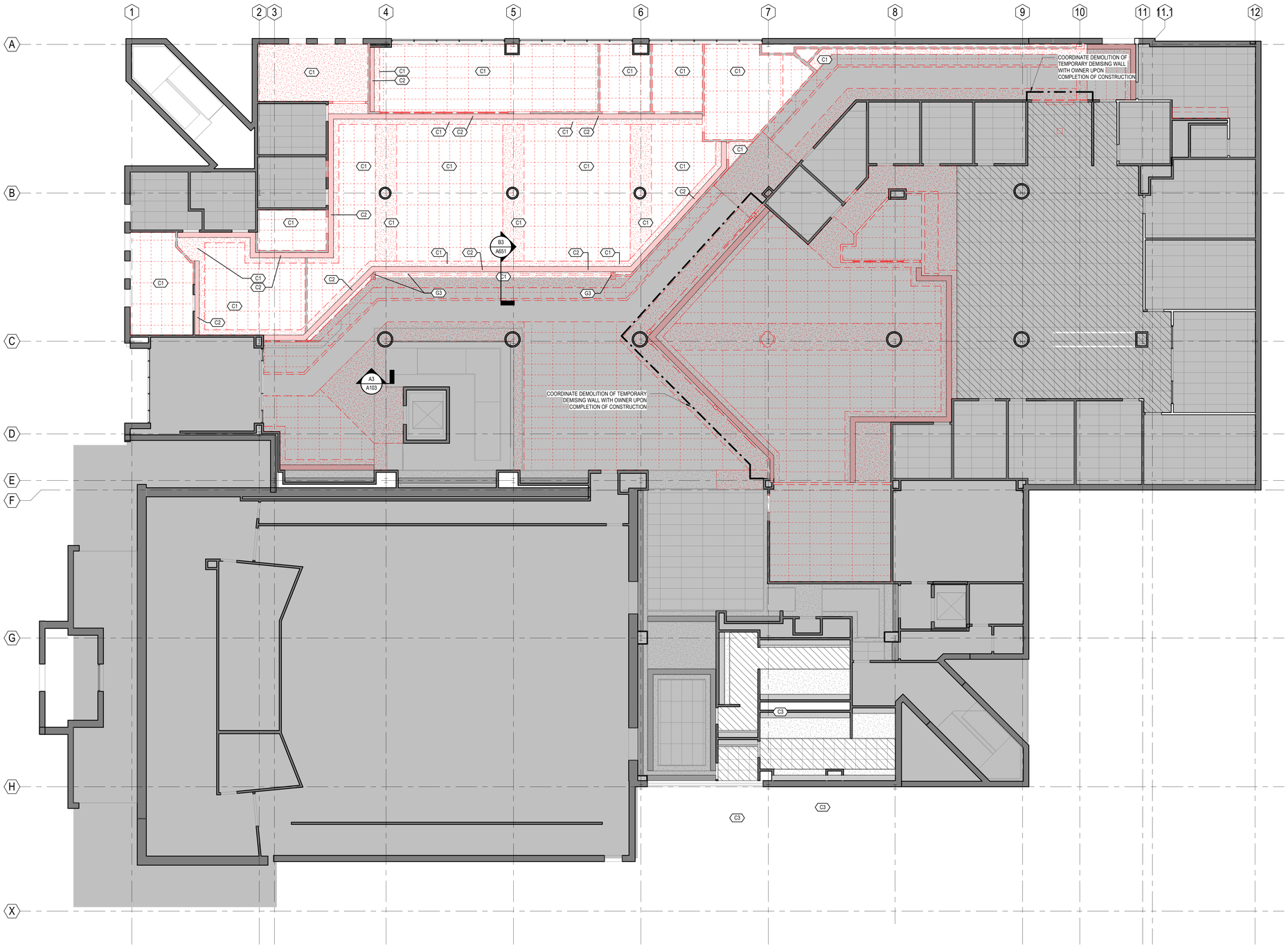

A1 AD612 **SECOND FLOOR DEMO REFLECTED CEILING PLAN PHASE 2**

1/8" = 1'-0"

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ISSUE FOR CONSTRUCTION - DEMOLITION	AA	AS	2023/01/09

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REGISTERED ARCHITECT VICTORIA ROSE BROWN 22968 STATE OF TEXAS

02/10/2023

Client/Project Logo

Client/Project

University of North Texas - Denton

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Eagle Student Services Center 1147 Union Cir, Denton, TX 76201

Title

LEVEL 2 CEILING DEMOLITION PLAN PHASE 2

Project No. 2140001088

Scale As indicated

Revision

Drawing No. **AD612**

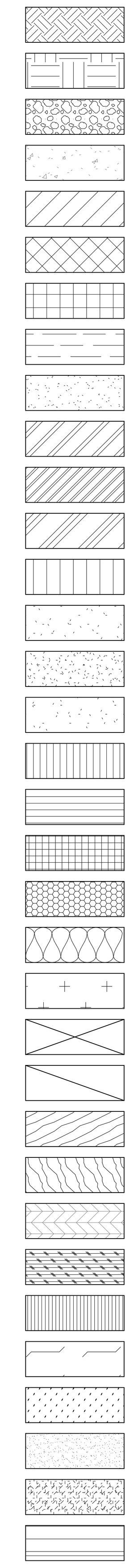
APIck location in Project Information
2/10/2023 1:31:13 AM

ORIGINAL SHEET - ARCH E1

ABBREVIATIONS:

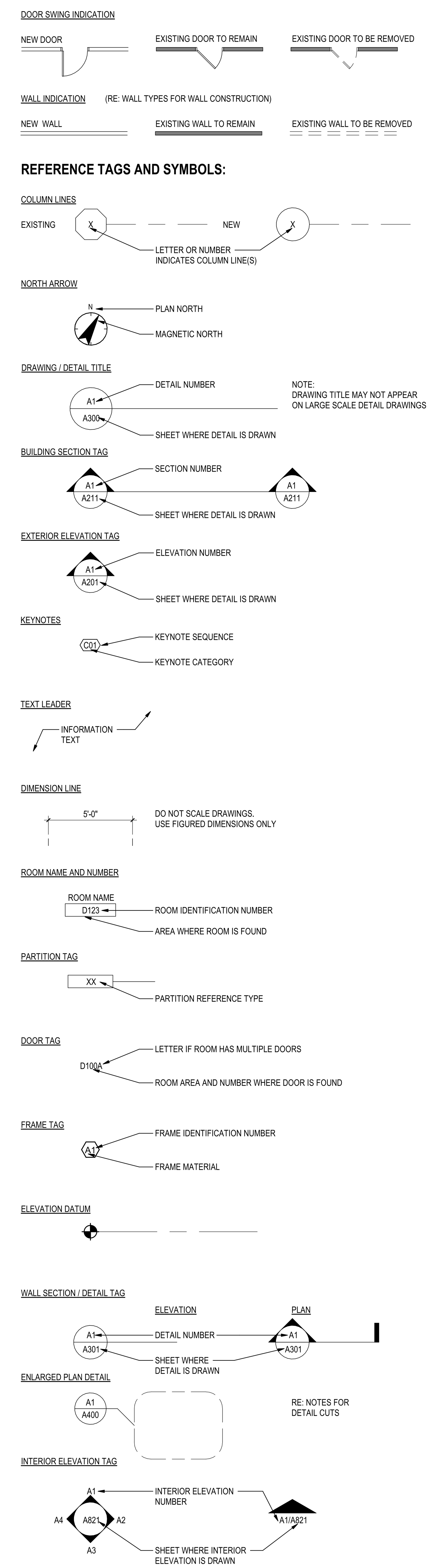
#	NUMBER, POUNDS
%	PERCENT
&	AND
'	FOOT, FEET
"	INCH
@	AT
Ø	DIAMETER
℄	CENTER LINE
A	
A/C	AIR CONDITIONING
ACC	ACCESSIBLE
ACT	ACOUSTICAL TILE
ADA, ADAAG	AMERICANS WITH DISABILITIES ACT GUIDELINES
ADD	ADDENDUM
ADJ	ADJUSTABLE, ADJACENT
ADMIN	ADMINISTRATION, ADMINISTRATIVE
AFF	ABOVE FINISH FLOOR
AHU	AIR HANDLING UNIT
ALT	ALTERNATE
ALUM	ALUMINUM
AMP	AMPERES
ANOD	ANODIZED
AP	ACCESS PANEL
APC	ACOUSTICAL PANEL CEILING
APPROX	APPROXIMATELY, APPROXIMATE
ARCH	ARCHITECT, ARCHITECTURAL
AUX	AUXILARY
AVG	AVERAGE
AWI	ARCHITECTURAL WOODWORK INSTITUTE
AWP	ACOUSTICAL WALL PANEL
B	
BD	BOARD
BIT	BITUMINOUS
BK	BRICK
BLDG	BUILDING
BLKG	BLOCKING
BLKHD	BULKHEAD
BO	BOTTOM OF
BOD	BOTTOM OF DECK
BOS	BOTTOM OF STEEL
BRZ	BRONZE
BTU	BRITISH THERMAL UNIT
BUR	BUILT-UP ROOF
C	
CAB	CABINET
CB	CHALKBOARD, CARPET BASE
CCD	COUNTER COILING DOOR
CF	CURTAIN FABRIC
CFMF	COLD-FORMED METAL FRAMING
CG	CORNER GUARD
CIP	CAST IN PLACE
CJ	CONTROL JOINT
CL	CENTER LINE
CLG	CEILING
CLO	CLOSET
CLR	CLEAR, COLOR, COOLER
CLRM	CLASSROOM
CMU	CONCRETE MASONRY UNIT
COL	COLUMN
CONC	CONCRETE
CONST	CONSTRUCTION
CONT	CONTINUE, CONTINUOUS
COORD	COORDINATE
CORR	CORRIDOR
CPT	CARPET
CS	CAST STONE, COUNTER SHUTTER
CT	CERAMIC TILE
CUST	CUSTODIAL
CW	CURTAIN WALL
D	
D	DEPTH, DEEP
DBL	DOUBLE
DEMO	DEMOLISH
DIA	DIAMETER
DIM	DIMENSION
DIST	DISTANCE
DIV	DIVISION, DIVIDE
DN	DOWN
DS	DOWNSPOUT
DTL	DETAIL
DWG	DRAWING(S)
E	
E	EAST
EA	EACH
EIFS	EXTERIOR INSULATION & FINISH SYSTEM
EJ	EXPANSION JOINT
EL	ELEVATION
ELECT	ELECTRICAL
ELEV	ELEVATOR
EMER	EMERGENCY
EP	EPOXY
EQ	EQUAL
EQUIP	EQUIPMENT
ETC	EC CETERA
ETR	EXISTING TO REMAIN
EWC	ELECTRIC WATER COOLER
EXIST	EXISTING
EXP	EXPOSED CEILING
EXT	EXTERIOR
F	
FD	FLOOR DRAIN
FE	FIRE EXTINGUISHER
FEC	FIRE EXTINGUISHER CABINET
FF	FINISH FLOOR
FF EL	FINISH FLOOR ELEVATION
FF&E	FURNITURE, FIXTURE & EQUIPMENT
FHC	FIRE HOSE CABINET
FIG	FIGURE
FLDG PTN	FOLDING PARTITION
FLR	FLOOR
FO	FACE OF, FINISH OPENING
FOC	FACE OF CONCRETE
FOF	FACE OF FINISH
FOM	FACE OF MASONRY
FOS	FACE OF STUD
FRP	FIBER REINFORCED PLASTIC
FRP	FIBERGLASS REINFORCED PLASTIC
FRT	FIRE-RETARDANT TREATED
FRTW	FIRE-RETARDANT TREATED WOOD
FT	FEET
FVC	FIRE VALVE CABINET
FWP	FABRIC WRAPPED PANELS
G	
GA	GAGE, GAUGE
GALV	GALVANIZED
GB	GRAB BAR
GEN	GENERAL
GL	GLASS
GLZ	GLAZING, GLAZED
GSU	GLAZED STRUCTURAL UNIT
GYP	GYPSUM
GYP BD	GYPSUM BOARD
H	
HB	HOSE BIBB
HC	HOLLOW CORE
HIWC	HIGH IMPACT WALL COVERING
HM	HOLLOW METAL
HORIZ	HORIZONTAL
HPC	HIGH PERFORMANCE COATING
HR	HOUR, HOURS
HRDW	HARDWARE
HT	HEIGHT
HVAC	HEATING, VENTING & COOLING
HWD	HARD WOOD
I	
IBC	INTERNATIONAL BUILDING CODE
ID	INSIDE DIMENSION, INSIDE DIAMETER
IN	INCH, INCHES
INFO	INFORMATION
INSUL	INSULATION, INSULATING
INSUL GL	INSULATING GLASS
INT	INTERIOR
IPC	INTERNATIONAL PLUMBING CODE
IRWC	IMPACT-RESISTANT WALL COVERING
J	
JAN	JANITOR
JT	JOINT
L	
L	ANGLE, ANGLE SHAPE
LAM	LAMINATE
LAV	LAVATORY
LBS	POUNDS
LF	LINEAR FOOT
LH	LEFT HAND
LSD	LIQUID SOAP DISPENSER
LT	LIGHT
LVR	LOUVER
LVT	LUXURY VINYL TILE
M	
MAINT	MAINTENANCE
MAS	MASONRY
MATL	MATERIAL
MAX	MAXIMUM
MB	MARKERBOARD
MBH	MOP/BROOM HOLDER
MCJ	MASONRY CONTROL JOINT (CMU)
MDF	MEDIUM DENSITY FIBERBOARD
MECH	MECHANICAL
MEJ	MASONRY EXPANSION JOINT (BRICK MASONRY)
MEP	MECHANICAL/ELECTRICAL/PLUMBING
MEZZ	MEZZANINE
MFR	MANUFACTURER
MFR REC	REC MANUFACTURER'S RECOMMENDATIONS
MIN	MINIMUM
MIR	MIRROR
MISC	MISCELLANEOUS
MO	MASONRY OPENING, MOTOR OPERATED
MOD	MODIFY
MOD BIT	MODIFIED BITUMEN
MS	MASONITE
MSB	MOP SERVICE BASIN
MTD	MOUNTED, MOUNTING
MTL	METAL
MU	MASONRY UNIT
MWK	MILLWORK
N	
N	NORTH
NA	NON APPLICABLE
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
NIC	NOT IN CONTRACT
NO	NUMBER(S)
NOM	NOMINAL
NRCA	NATIONAL ROOFING CONTRACTORS ASSOCIATION
NTS	NOT TO SCALE
O	
OC	ON CENTER
OCC	OCCUPANCY
OCG	OVERHEAD COILING GRILL
OCS	OVERHEAD COILING FIRE SHUTTER
OD	OUTSIDE DIAMETER/DIMENSION
OFCI	OWNER FURNISHED CONTRACTOR INSTALLED
OFD	OVERFLOW DRAIN
OFF	OFFICE
OH	OVERHEAD
OPH	OPPOSITE HAND
OPNG	OPENING
OPP	OPPOSITE
ORD	OVERFLOW ROOF DRAIN
OSB	ORIENTED STRAND BOARD
P	
P	PAINT
PAR	PARALLEL, PARAPET
PC	POLISHED CONCRETE
PCP	PORTLAND CEMENT PLASTER
PERP	PERPENDICULAR
PL	PLASTIC LAMINATE
PLAM	PLASTIC LAMINATE
PLUMB	PLUMBING
PLYWD	PLYWOOD
PNL	PANEL
PNT	PAINT, PAINTED
PR	PAIR
PRE-K	PREKINDERGARTEN
PREFAB	PREFABRICATED
PREFIN	PREFINISHED
PT	PAINT, PAINTED
PTD	PAPER TOWEL DISPENSER
PVC	POLYVINYL CHLORIDE
Q	
QT	QUARRY TILE
R	
RAF	RESILIENT ATHLETIC FLOORING
RB	RESILIENT BASE, RUBBER BASE
RBF	RUBBER FLOORING / RUBBER STAIRS
RCP	REFLECTED CEILING PLAN
RD	ROOF DRAIN
RE:	REFER
REBAR	REINFORCING BAR
REF	REFER, REFERENCE, REFRIGERATOR
REINF	REINFORCED, REINFORCEMENT
REQD	REQUIRED
REV	REVISION(S)
RF	RESILIENT FLOORING
RH	RIGHT HAND, ROOF HATCH
RM	ROOM
RO	ROUGH OPENING
RP	RESIN PANELS
RS	ROLLER SHADES
RSF	RESINOUS FLOORING
RTU	ROOF TOP UNIT
S	
S	SOUTH
SC	SOLID CORE, STAGE CURTAIN, SEALED CONCRETE
SCHED	SCHEDULE
SCJ	SAWN CONTROL JOINT
SCR	SHOWER CURTAIN ROD
SCWD	SOLID CORE WOOD DOOR
SD	SMOKE DETECTOR
SDT	STATIC DISSIPATIVE TILE
SECT	SECTION
SF	SQUARE FEET, STOREFRONT
SFC	STRECTCHED FABRIC CEILING
SGD	SLIDING GLASS DOOR
SGL	SINGLE
SHT	SHEET
SIM	SIMILAR
SMACNA	SHEET METAL AND AIR CONDITIONING CONTRACTORS NATIONAL ASSOC
SND	SANITARY NAPKIN DISPENSER
SNDU	SANITARY NAPKIN DISPOSAL UNIT
SOD	SECTIONAL OVERHEAD DOOR
SOSG	SELF OPENING SECURITY GRILL
SQ	SQUARE
SS	STAINLESS STEEL
SSM	SOLID SURFACE MATERIAL
ST	STONE
STC	SOUND TRANSMISSION CLASS
STL	STEEL
STOR	STORAGE
STRUCT	STRUCTURE, STRUCTURAL
SUSP	SUSPENDED
SYM	SYMETRICAL
T	
T	CERAMIC / PORCELAIN TILE / GLASS TILE
TAS	TEXAS ACCESSIBILITY STANDARDS
TB	TACKBOARD, CERAMIC / PORCELAIN TILE BASE
TEL	TELEPHONE
TEMP	TEMPERATURE
THRU	THROUGH
TLT	TOILET
TO	TOP OF
TOC	TOP OF CURB, TOP OF CONCRETE
TOM	TOP OF MASONRY
TOS	TOP OF STEEL
TOW	TOP OF WALL
TP	TOILET PARTITION
TPD	TOILET PAPER DISPENSER
TW	TACKWALL
TYP	TYPICAL
TZ	TERRAZO
U	
UL	UNDERWRITER'S LABORATORY
UNEXC	UNEXCAVATED
UNO	UNLESS NOTED OTHERWISE
UON	UNLESS OTHERWISE NOTED
UPC	UNIFORM PLUMBING CODE
UR	URINAL
UR SCRN	URINAL SCREEN
UTIL	UTILITY
V	
V	VOLTS
VB	VINYL BASE
VCT	VINYL COMPOSITION TILE
VEND	VENDING
VERT	VERTICAL
VEST	VESTIBULE
VIF	VERIFY IN FIELD
VOL	VOLUME
VWC	VINYL WALL COVERING
W	
W	WIDTH, WEST
W/	WITH
W/O	WITHOUT
WB	WINDOW BLINDS
WC	WATER CLOSET, WALL COVERING
WD	WOOD / WOOD VENEER
WDF	WOOD FLOORING
WDW	WINDOW
WF	WINDOW FILM
WH	WATER HEATER
WL	WIND LOAD
WP	WORKING POINT, WALL PAD
WS	WOOD STAIN
WT	WEIGHT
WWF	WELDED-WIRE FABRIC

MATERIAL LEGEND:



EARTH (UNDISTURBED)
EARTH (COMPACTED)
POROUS FILL (STONE, GRAVEL, ETC.)
CONCRETE
BRICK (COMMON OR FACE)
CONCRETE MASONRY UNITS (CMU)
GLAZED STRUCTURAL UNIT (GSU)
CUT STONE
CUT CAST STONE
STEEL (LARGE SCALE)
STEEL (SMALL SCALE)
ALUMINUM
ACOUSTICAL PANEL CEILING
TERRAZZO
PLASTER, SAND, CEMENT, GROUT
GYPSUM DRYWALL
CERAMIC TILE
GLASS
RIGID INSULATION
SPRAY FOAM INSULATION
BATT INSULATION
TAPERED INSULATION
ROUGH WOOD (CONTINUOUS)
ROUGH WOOD (NON-CONTINUOUS)
FINISH WOOD 1
FINISH WOOD 2
PLYWOOD
CORK
EXPANSION MATERIAL
FLEX
GROUT
MORTAR
PARTICLE BOARD
PLASTIC

RENOVATION GRAPHICS:



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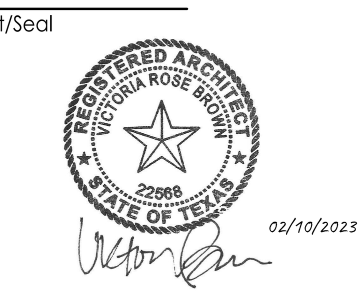
Revision	By	Appd	YYYY.MM.DD

Issued	By	Appd	YYYY.MM.DD
ISSUE FOR CONSTRUCTION	AA	AS	2023/02/03
ISSUE FOR CONSTRUCTION - DEMOLITION	AA	AS	2023/01/09

Permit/Seal



Client/Project Logo

Client/Project
University of North Texas - Denton

EAGLE STUDENT SERVICES CENTER

Eagle Student Services Center 1147 Union Cir, Denton, TX 76201

Title
ABBV., MATERIAL LEGEND AND SYMBOLS

Project No.	Scale
2140001088	As indicated
Revision	Drawing No.
	A001

<Pick location in Project Information>
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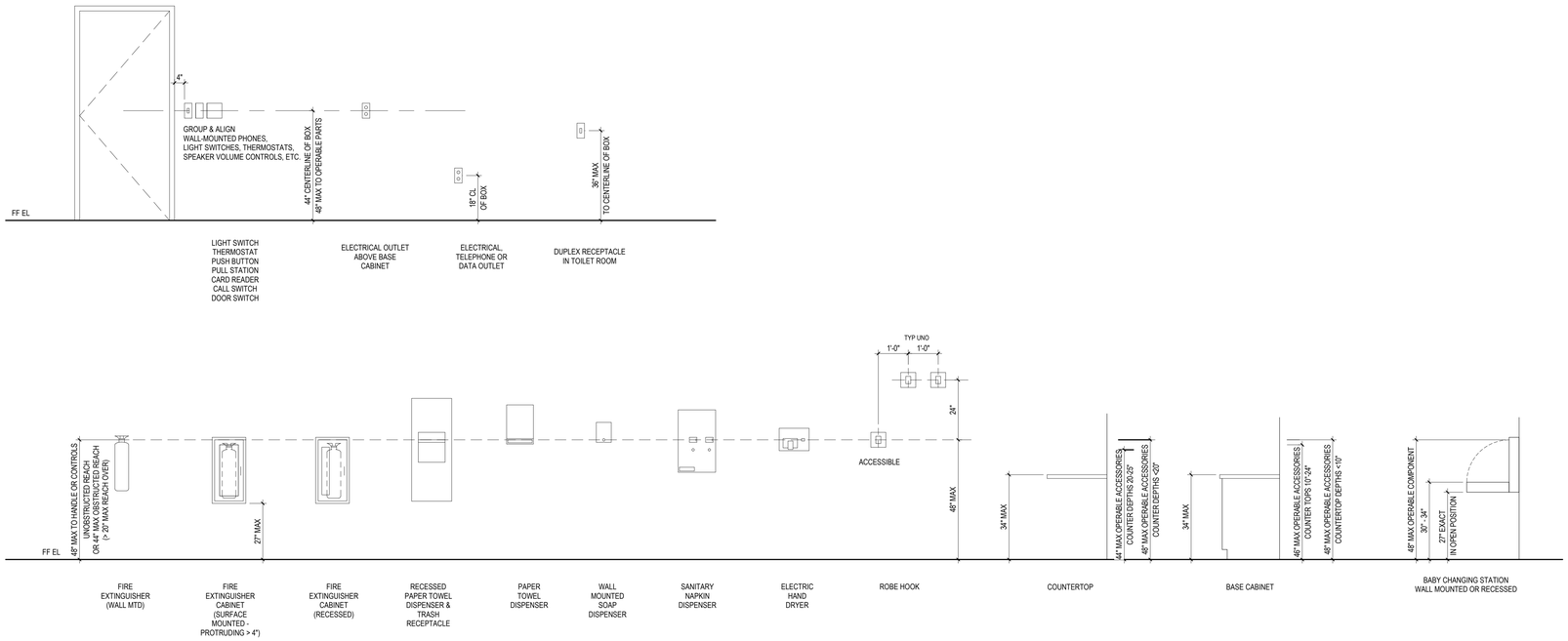
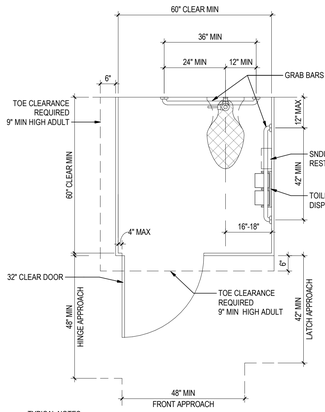
ORIGINAL SHEET - ARCH E1

TYPICAL MOUNTING HEIGHTS



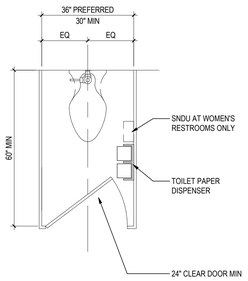
NOTES: COORDINATE ALL ELECTRICAL ITEMS W/ CASEWORK, DISPLAY BOARDS, MIRRORS & ACOUSTICAL MATERIAL AS INDICATED ON THE PLANS, CASEWORK ELEVATIONS & INTERIOR ELEVATIONS (TYP).

TYPICAL TOILET ROOM LAYOUTS

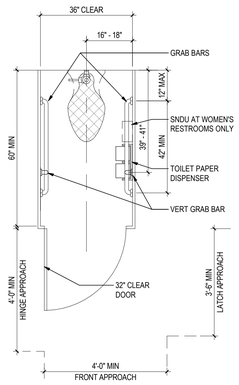


TYPICAL NOTES:
1. REFER SIDE AND FRONT ELEVATIONS.
2. PARTITION BOTTOM SHALL BE 9" MIN AFF.

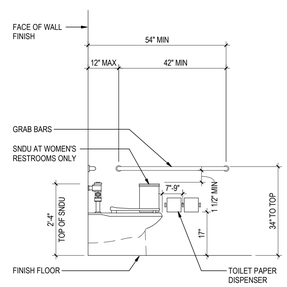
TYPICAL END OF ROW ACCESSIBLE STALL



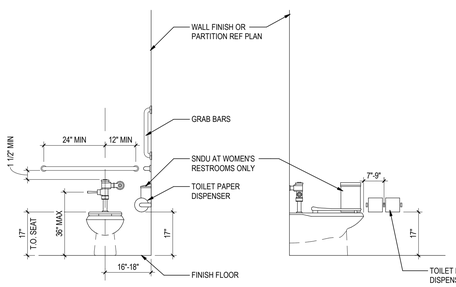
TYPICAL STANDARD STALL



TYPICAL AMBULATORY STALL

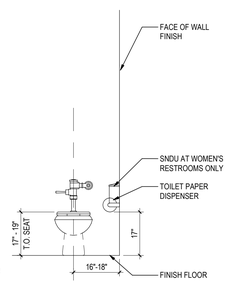


TYPICAL SIDE WALL ELEVATION AT ACCESSIBLE TOILET



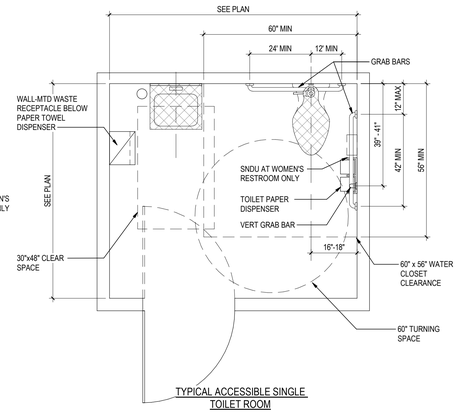
TYPICAL ELEVATION AT ACCESSIBLE TOILET

TYPICAL SIDE WALL ELEVATION AT STANDARD TOILET



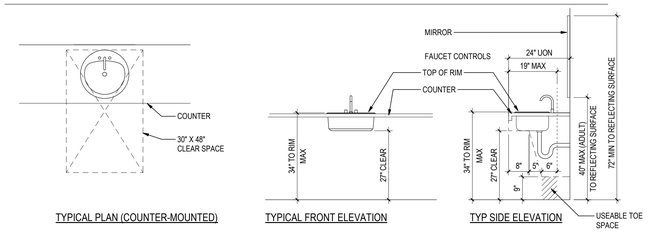
TYPICAL ELEVATION AT STANDARD TOILET

TYPICAL NOTES:
1. GRAB BARS ARE PERMITTED TO BE MOUNTED 33"-36" TO TOP OF BAR WHEN REQUIRED TO ACCOMODATE ACCESSORY CONFLICTS.
2. TOILET PAPER DISPNSERR PERMITTED TO BE MOUNTED 15"-48" TO POINT OF OUTLET WHEN REQUIRED TO MAINTAIN 1 1/2" GRAB BAR CLEARANCES.



TYPICAL ACCESSIBLE SINGLE TOILET ROOM

TYPICAL ACCESSIBLE LAVATORY

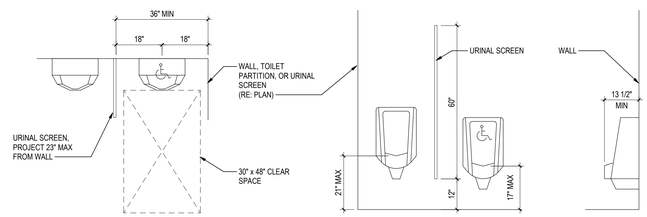


TYPICAL PLAN (COUNTER-MOUNTED)

TYPICAL FRONT ELEVATION

TYP SIDE ELEVATION

TYPICAL URINAL LAYOUT



TYPICAL PLAN

TYPICAL FRONT ELEVATION

TYP SIDE ELEVATION

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Issued	By	Appd	YYYY.MM.DD
ISSUE FOR CONSTRUCTION	AA	AS	2023/02/03
ISSUE FOR CONSTRUCTION - DEMOLITION	AA	AS	2023/01/09

Permit/Seal

REGISTERED ARCHITECT VICTORIA ROSE BROWN 22668 STATE OF TEXAS

02/10/2023

Client/Project Logo

Client/Project
University of North Texas - Denton

EAGLE STUDENT SERVICES CENTER

Eagle Student Services Center 1147 Union Cir, Denton, TX 76201

Title
TYPICAL MOUNTING HEIGHTS AND TOILET LAYOUT

Project No. 2140001088

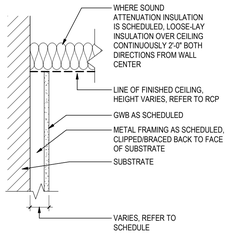
Scale 1/2" = 1'-0"

Revision

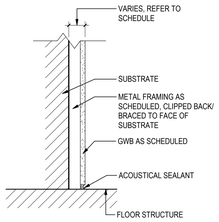
Drawing No. A002

*Pick location in Project Information
2/10/2023 9:29:32 AM

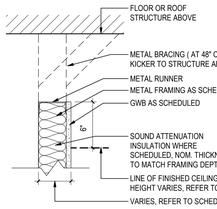
ORIGINAL SHEET - ARCH E1



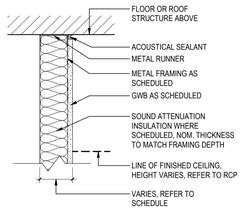
TOP TA3



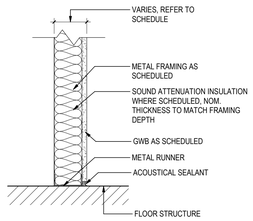
BASE BA1



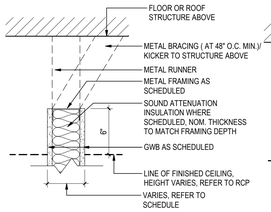
TOP TB2



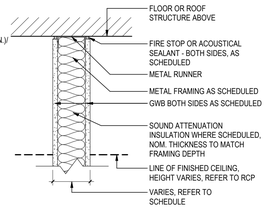
TOP TB1



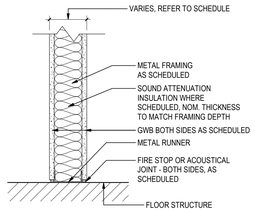
BASE BB1



TOP TC2



TOP TC1



BASE BC1

INTERIOR PARTITION SCHEDULE - GROUPS A - L (LIGHT GAUGE METAL FRAMING)

TYPE	CONSTRUCTION DATA: OVERALL PARTITION DEPTH	GWB THICKNESS	MASONRY / FRAMING SIZE	METAL GA	STUD SPACING	DETAIL AT TOP	DETAIL AT BASE	TOP TERMINATION: STUDS TO STRUCTURE	GWB TO STRUCTURE	INSULATION TO STRUCTURE	MASONRY TO STRUCTURE	RATED PARTITIONS: SMOKE PARTITION	FIRE RATING (HRS)	FIRE TEST	ACOUSTICAL PERFORMANCE: SOUND INSULATION	STC RATING	STC TEST	NOTES
Group A - Material, Furring, Substrate																		
A03	1 1/2"	5/8"	7/8"			TA3	BA1	-	-	-	-	-	0		-	0		
Group B - Material, Stud																		
B08	3 1/8"	5/8"	2 1/2"			TB1	BB1	●	●	●	-	-	0		●	0		
B09	3 1/8"	5/8"	2 1/2"			TB2	BB1	●	-	-	-	-	0		-	0		
B13	4 1/4"	5/8"	3 5/8"			TB1	BB1	●	●	-	-	-	0		-	0		
B15	4 1/4"	5/8"	3 5/8"			TB2	BB1	●	-	-	-	-	0		-	0		
Group C - Material, Stud, Material																		
C10	4 7/8"	5/8"	3 5/8"			TC1	BC1	●	●	-	-	-	0		-	40	RAL-TL11-125	
C11	4 7/8"	5/8"	3 5/8"			TC1	BC1	●	●	●	-	-	0		●	49	SA-870717	
C16	4 7/8"	5/8"	3 5/8"			TC2	BC1	●	-	-	-	-	0		-	0		
C20	7 1/4"	5/8"	6"			TC1	BC1	●	●	-	-	-	0		-	40	RAL-TL11-125	
C21	7 1/4"	5/8"	6"			TC1	BC1	●	●	●	-	-	0		●	49	SA-870717	

GENERAL NOTES - PARTITIONS:

1. NOT ALL PARTITION GROUPS OR TYPES HAVE BEEN UTILIZED - RESULTING TYPE NUMBERS MAY NOT BE SEQUENTIAL. REFER TO PARTITION SCHEDULES FOR TYPES UTILIZED IN THIS PROJECT.
2. FOR ALL PARTITION SYSTEMS THAT ARE INDICATED TO EXTEND FROM FLOOR SLAB TO UNDERSIDE OF STRUCTURE OR FLOOR SLAB ABOVE, INCLUDING ALL FIRE RATED PARTITIONS AND ALL PARTITIONS INDICATED TO HAVE A SOUND TRANSMISSION CLASS (STC), PROVIDE ASSEMBLY AT HEAD OF PARTITION THAT WILL ACCOMODATE A MINIMUM DEFLECTION OF THE STRUCTURE ABOVE THE PARTITION AS INDICATED ON THE STRUCTURAL DRAWING, BUT NOT LESS THAN L/360 (WHERE L = SPAN OF THE STRUCTURE) WITHOUT TRANSFERRING LOADS RESULTANT FROM THAT DEFLECTION TO THE PARTITION ASSEMBLY.
3. PROVIDE ASSEMBLY THAT WILL TRANSFER LATERAL LOADS APPLIED NORMAL TO THE FACE OF THE PARTITION SYSTEM INTO THE STRUCTURE OR FLOOR SLAB ABOVE. WHERE FIRE-RATED PARTITIONS OCCUR, PROVIDE A UL-LISTED AND APPROVED HEAD ASSEMBLY FOR THAT PARTITION THAT HAS BEEN TESTED AND DETERMINED TO PROVIDE A FIRE RATING EQUIVALENT TO THAT OF THE FIRE RATED PARTITION. WHERE PARTITIONS INDICATED TO HAVE A SOUND TRANSMISSION CLASS OCCURS, PROVIDE A HEAD ASSEMBLY FOR THAT PARTITION THAT HAS BEEN TESTED AND DETERMINED TO PROVIDE A SOUND TRANSMISSION CLASS EQUIVALENT TO THAT OF THE SOUND RATED PARTITION. ALL HEAD ASSEMBLIES SHALL BE INSTALLED IN STRICT CONFORMANCE TO MANUFACTURER'S RECOMMENDATIONS.
4. REFER TO CODE REVIEW IN G000 SERIES FOR LOCATION & EXTENT OF RATED ASSEMBLIES.

INTERIOR STUD CONSTRUCTION NOTES:

1. GYP BD TO BE 5/8" FIRE RESISTIVE (UON).
2. PROVIDE 1/2" CEMENTITIOUS TILE BACKER BOARD BEHIND TILE AT WET WALLS AND SHOWER ENCLOSURES. PROVIDE 5/8" WR GYP BD BEHIND TILE AT NON-WET WALLS, AND AT NON-TILED WET WALLS.

ACOUSTIC PARTITION CONSTRUCTION NOTES:

1. PROVIDE CONTINUOUS ACOUSTICAL SEALANT (BOTH SIDES) AT ALL NON-RATED PARTITION HEAD, BASE & JAMB TERMINATION JOINTS. FILL BHEAD DEFECTION VOID AND DECK FLUTES WITH 10 PDC GLASS FIBER INSULATION.
2. PENETRATIONS THROUGH SOUND ISOLATING WALLS TO BE FULLY SEALED AROUND ENTIRE PERIMETER. PENETRATING ELEMENTS TO BE CENTERED WITHIN OPENING SO THAT THEY NEITHER TOUCH NOR BEAR ON SURROUNDING CONSTRUCTION AND FULLY SEALED.
3. ALL ELECTRICAL AND TELECOMMUNICATIONS BOXES WITHIN SOUND ISOLATING WALLS SHALL BE INSTALLED IN ALTERNATING SOUND BAYS TO MINIMIZE FLANKING SOUND PATHS. SEAL DEVICE TO DRYWALL CUT-OUTS WITH MOLDABLE PUTTY PAD - BASIS OF DESIGN TO BE 3M FIRE BARRIER MOLDABLE PUTTY PAD.
4. ALL ELECTRICAL AND TELECOMMUNICATION OUTLET BOXES IN FIRE RATED BARRIER PARTITIONS TO RECEIVE FIRE RATED MOLDABLE PUTTY PAD - BASIS OF DESIGN TO BE 3M FIRE BARRIER MOLDABLE PUTTY PAD.

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ISSUE FOR CONSTRUCTION	AA	AS	2023/02/03
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Permit/Seal

REGISTERED ARCHITECT VICTORIA ROSE BROWN 22666 STATE OF TEXAS

02/10/2023

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Title
INTERIOR PARTITION TYPES

Project No.
2140001088

Scale
As indicated

Revision

Drawing No.
A003

Pick location in Project Information
2/10/2023 9:29:33 AM

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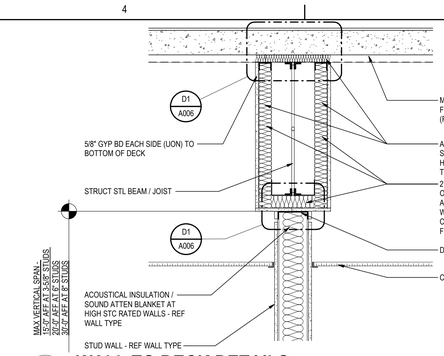
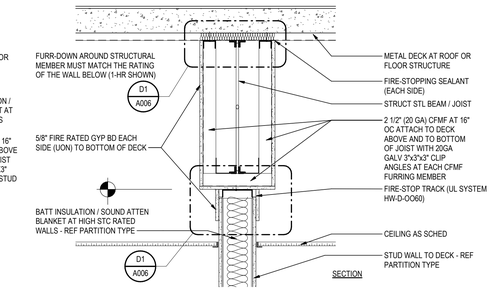


B5 A006 WALL TO DECK DETAILS

1" = 1'-0"



B7 A006 WALL TO DECK DETAILS

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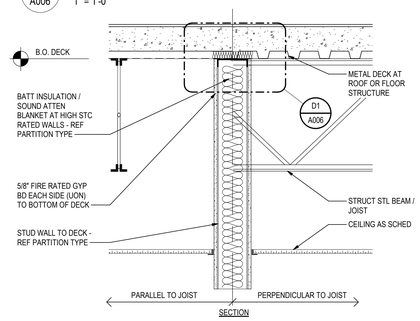
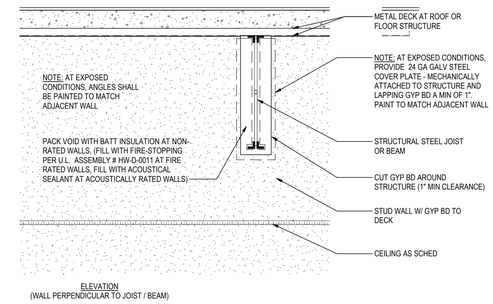
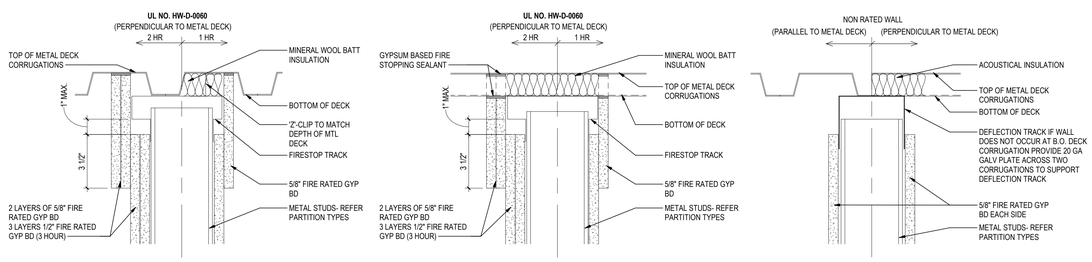




C5 A006 WALL TO DECK DETAILS

1" = 1'-0"

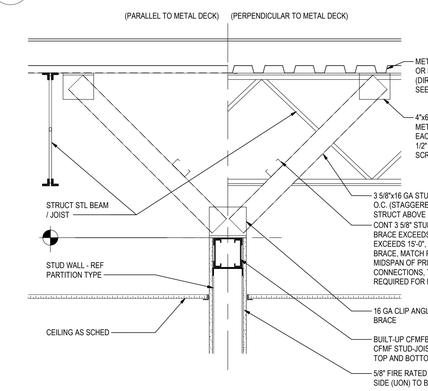


RATED WALL

NON-RATED WALL

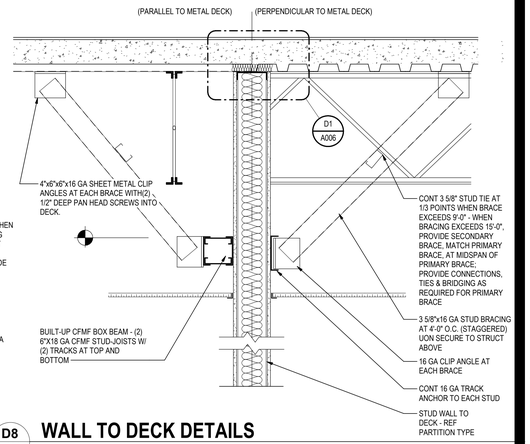
D1 A006 TOP OF WALL DETAILS

3" = 1'-0"



D5 A006 WALL TO DECK DETAILS

1" = 1'-0"



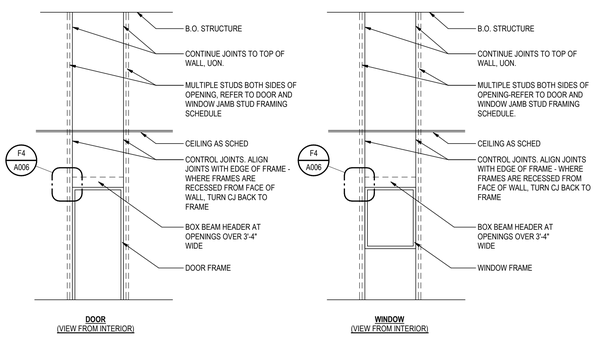
D8 A006 WALL TO DECK DETAILS

1" = 1'-0"

DOOR AND WINDOW JAMB STUD/CFMF FRAMING SCHEDULE			
STUDS AT 16" OC		STUDS AT 12" OC	
CLEAR OPENING WIDTH	MIN NUMBER OF STUDS AT EACH JAMB	CLEAR OPENING WIDTH	MIN NUMBER OF STUDS AT EACH JAMB
5'-4" OR LESS	2	4'-0" OR LESS	2
5'-4"+ TO 8'-0"	3	4'-0"+ TO 6'-0"	3
8'-0"+ TO 10'-8"	4	6'-0"+ TO 8'-0"	4
10'-8"+ TO 13'-4"	5	8'-0"+ TO 10'-0"	5
13'-4"+ TO 16'-0"	6	10'-0"+ TO 12'-0"	6

NOTES:

1. MULTIPLE STUDS ARE TO BE FASTENED TOGETHER AT EACH JAMB.
2. STUD FRAMING IS TO ESTABLISH DESIGN BASIS.
3. CFMF SUPPLIER TO ENGINEER ALL OPENINGS IN EXTERIOR WALLS.
4. IN ADDITION TO THOSE PROVIDED AT DOORS AND WINDOWS IN ACCORDANCE WITH DETAILS F1/A006, PROVIDE CJS AND MEJS AT GYPSUM BOARD WALLS, PARTITIONS, AND BULKHEADS SO THAT DISTANCE BETWEEN CJS AND MEJS DOES NOT EXCEED 20'-0" OC FOR EXTERIOR WALLS OR 30'-0" FOR INTERIOR WALLS. (SEE PLANS AND ELEVATIONS FOR CONTROLLED LOCATIONS)

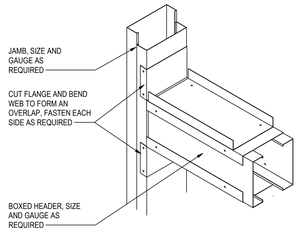


F1 A006 OPENINGS IN STUD/CFMF WALLS

1" = 1'-0"

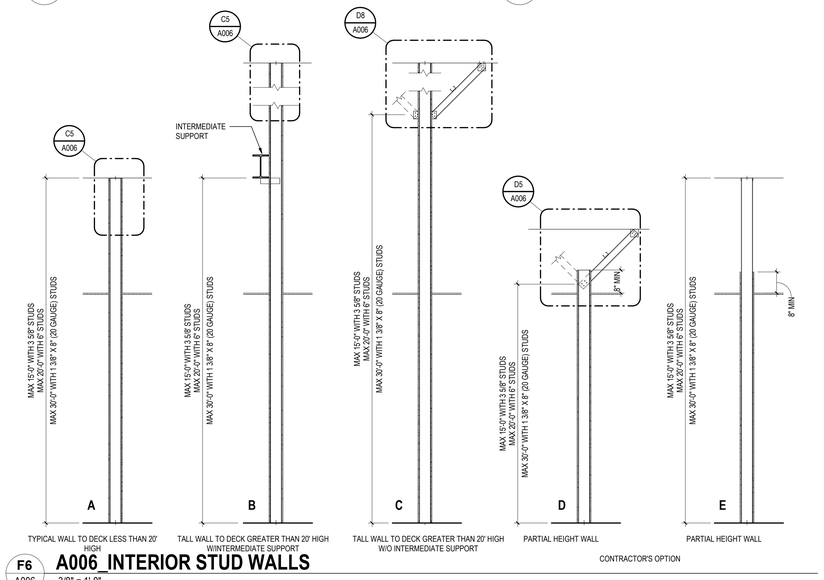
CONSTRUCTION NOTES - INTERIOR STUDS:

1. UL ASSEMBLIES INDICATED ESTABLISH A BASIS OF PERFORMANCE. OTHER ASSEMBLIES MAY BE CONSIDERED AT THE SOLE DISCRETION OF THE ARCHITECT IF EQUIVALENT PERFORMANCE IS PROVIDED.
2. SUBSTITUTION PROPOSALS SHALL INCLUDE CHANGES REQUIRED TO ALL COMPONENTS OF THE ASSEMBLY.
3. ASSEMBLIES INDICATED PROVIDE ASSEMBLY RATING UNDER FLOOR DECK.
4. NOT ALL REQUIREMENTS OF UL ASSEMBLY SHOWN.
5. PROVIDE INTERMEDIATE BRACING FOR FULL-HEIGHT INTERIOR STUD WALLS EXCEEDING MAX UNBRACED HEIGHT. REFER TO F6 THIS SHEET, DETAILS B AND C ON THIS PAGE.
6. PROVIDE DEFLECTION CONNECTION AT TOPS OF ALL STUD WALLS. FIRESTOP FIRE-RATED WALLS AND INSTALL ACOUSTICAL SEALANT AT ACOUSTICAL WALLS.
7. FURNISH MULTIPLE STUDS AT JAMBS OF ALL OPENINGS PER DOOR AND WINDOW JAMB STUD FRAMING SCHEDULE ON THIS SHEET.
8. INSTALL CONTROL JOINTS AT OPENINGS IN INTERIOR STUD WALLS PER F1 THIS SHEET.
9. INSTALL ADDITIONAL CONTROL JOINTS SO THAT JOINT SPACING DOES NOT EXCEED 30'-0".



F4 A006 CFMF BOX BEAM HEADER

1 1/2" = 1'-0"



F6 A006 A006_INTERIOR STUD WALLS

3/8" = 1'-0"

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ISSUE FOR CONSTRUCTION	AA	AS	2023/02/03
ISSUE FOR CONSTRUCTION - DEMOLITION	AA	AS	2023/01/09

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REGISTERED ARCHITECT VICTOR ROSENBROWN 22668 STATE OF TEXAS

02/10/2023

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University of North Texas - Denton

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Title

WALL SPANS INTERIOR AND WALL TO DECK DETAILS

Project No. 214001088

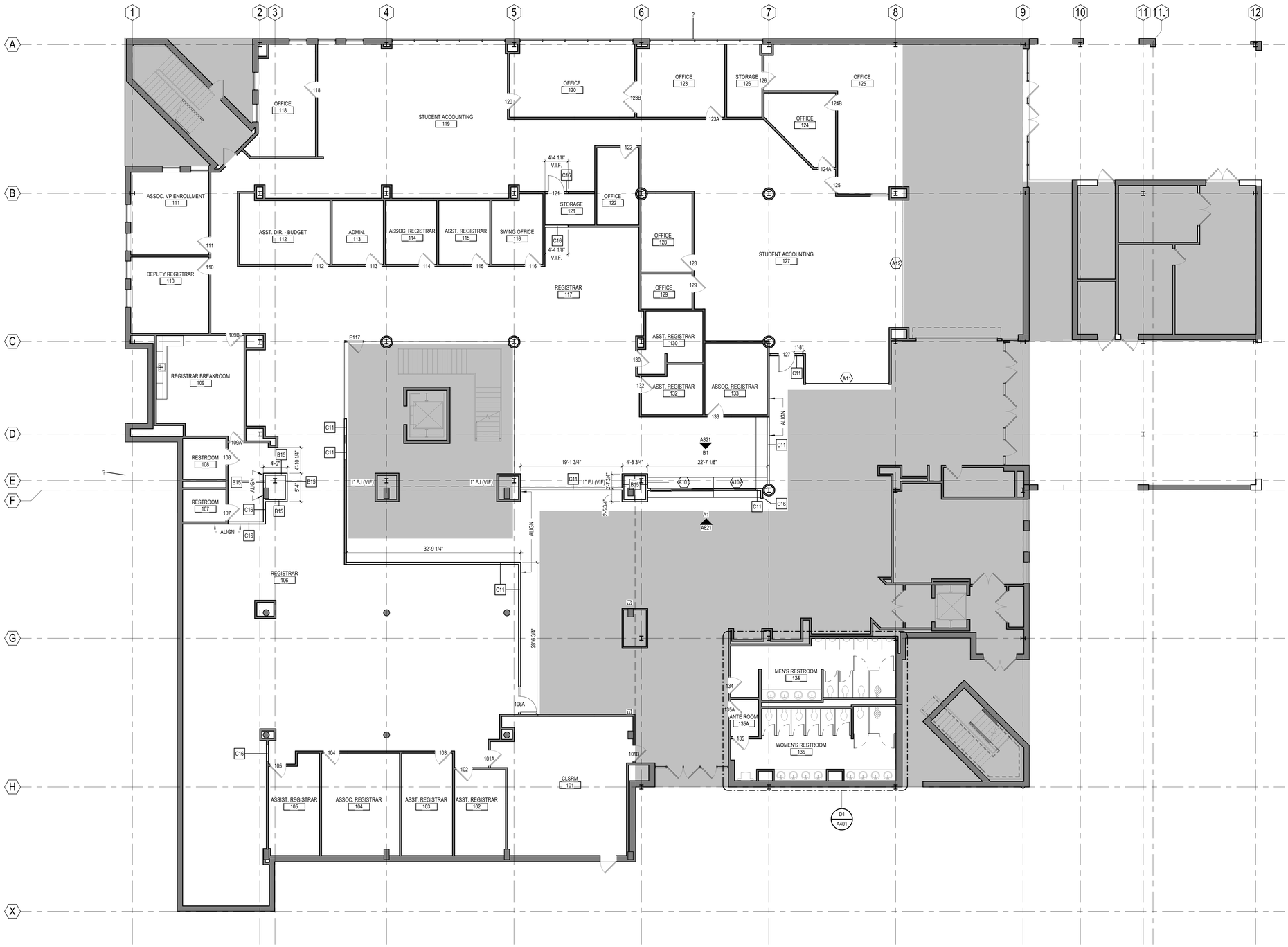
Scale As indicated

Revision

Drawing No. **A006**

File location in Project Information
2/10/2023 9:29:34 AM

ORIGINAL SHEET - ARCH E1



WALL TYPE LEGEND

- EXISTING WALL TO REMAIN
- NEW WALL (GYP/STUD)
- NOT IN SCOPE

GENERAL NOTES - PLANS:

1. ON THIS PLAN, PARTITION TYPE C11 IS TYP AT INTERIOR WALLS, UON.
2. DIMENSIONS ARE TO FACE OF STUD, UON.
3. REFER TO SHEET A003 FOR INTERIOR PARTITION TYPE CONSTRUCTION INFORMATION, TYP.
4. REFER TO FINISH PLANS FOR FLOOR MATERIAL TRANSITIONS NOT OCCURRING AT DOORS AND FOR FLOOR PATTERNS, TYP.
5. ALIGN FACE OF WALLS WITH FACE OF COLUMN WRAPS, WHERE POSSIBLE, WHERE OCCURS, TYP, UON.
6. WHERE PARTITION TYPES WITH GYP. BD. FINISH AND DIFFERENT THICKNESSES ADJOIN IN SAME PLANE, ALIGN FACE OF GYP BD.
7. DIMENSIONS AT EXISTING WALLS ARE TO FACE OF WALL.
8. FIELD VERIFY EXISTING DIMENSIONS PRIOR TO BEGINNING WORK. NOTIFY ARCHITECT IMMEDIATELY OF ANY DISCREPANCIES.
9. UNMARKED DOORS AND WINDOWS ARE EXISTING TO REMAIN.

A1 A101 **LEVEL 1 PLAN**
1/8" = 1'-0"

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Title

LEVEL 1 FLOOR PLAN

Project No. 2140001088

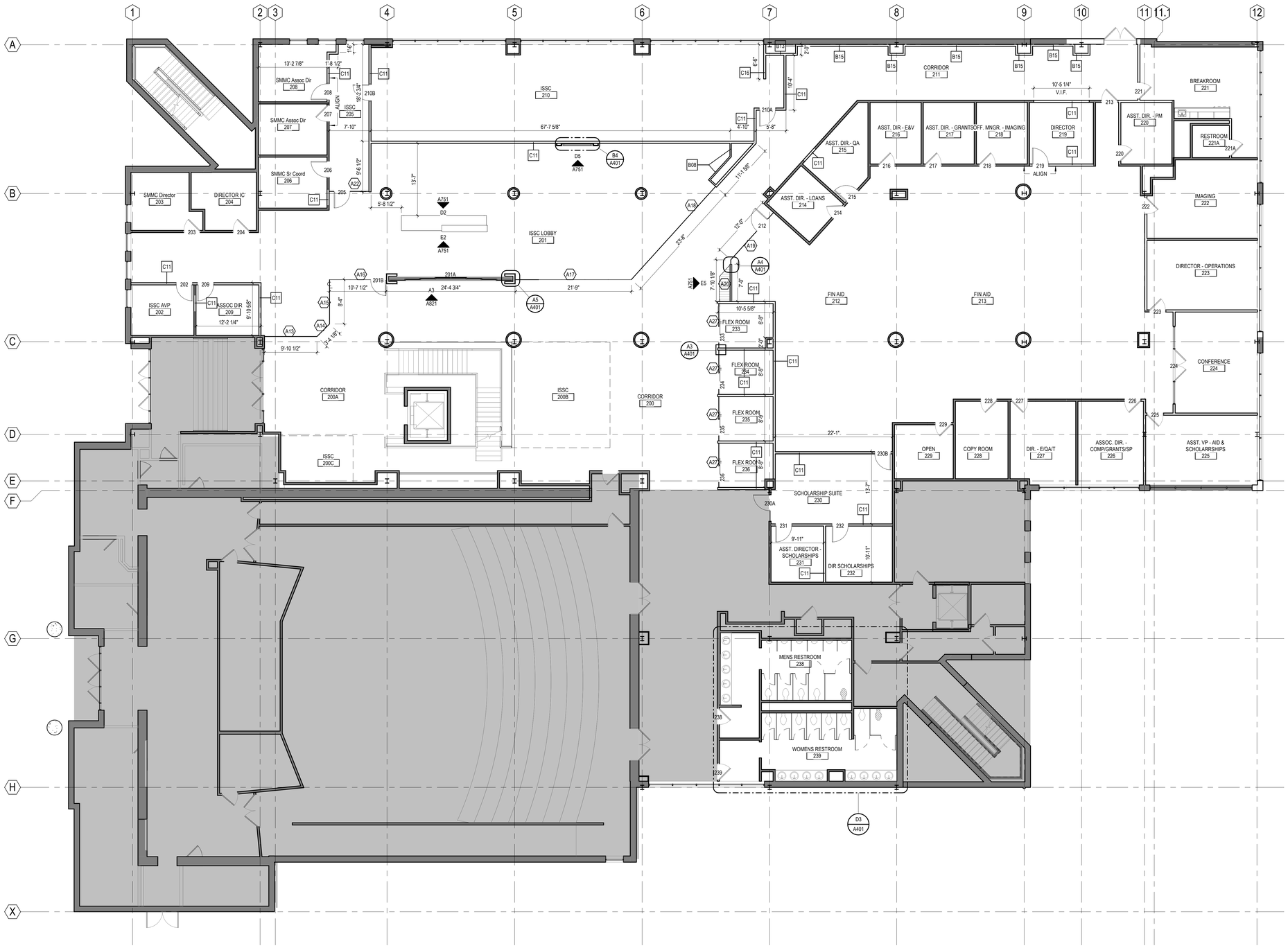
Scale As indicated

Revision

Drawing No. A101

<Pick location in Project Information>
2/10/2023 9:29:40 AM

ORIGINAL SHEET - ARCH E1



A1 A102 **LEVEL 2 PLAN**
1/8" = 1'-0"

WALL TYPE LEGEND

- EXISTING WALL TO REMAIN
- NEW WALL (GYP/STUD)
- NOT IN SCOPE

GENERAL NOTES - PLANS:

1. ON THIS PLAN, PARTITION TYPE C11 IS TYP AT INTERIOR WALLS, UON.
2. DIMENSIONS ARE TO FACE OF STUD, UON.
3. REFER TO SHEET A003 FOR INTERIOR PARTITION TYPE CONSTRUCTION INFORMATION, TYP.
4. REFER TO FINISH PLANS FOR FLOOR MATERIAL TRANSITIONS NOT OCCURRING AT DOORS AND FOR FLOOR PATTERNS, TYP.
5. ALIGN FACE OF WALLS WITH FACE OF COLUMN WRAPS, WHERE POSSIBLE, WHERE OCCURS, TYP, UON.
6. WHERE PARTITION TYPES WITH GYP. BD. FINISH AND DIFFERENT THICKNESSES ADJOIN IN SAME PLANE, ALIGN FACE OF GYP BD.
7. DIMENSIONS AT EXISTING WALLS ARE TO FACE OF WALL.
8. FIELD VERIFY EXISTING DIMENSIONS PRIOR TO BEGINNING WORK. NOTIFY ARCHITECT IMMEDIATELY OF ANY DISCREPANCIES.
9. UNMARKED DOORS AND WINDOWS ARE EXISTING TO REMAIN.

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02/10/2023

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University of North Texas - Denton

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Eagle Student Services Center 1147 Union Cir, Denton, TX 76201

Title
LEVEL 2 FLOOR PLAN

Project No. 2140001088
Scale As indicated
Revision
Drawing No. **A102**

ORIGINAL SHEET - ARCH E1

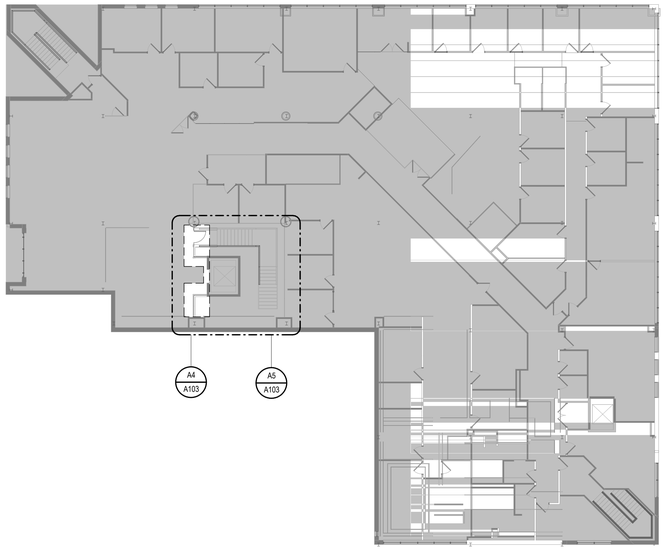
WALL TYPE LEGEND

	EXISTING WALL TO REMAIN
	NEW WALL (GYP/STUD)
	NOT IN SCOPE

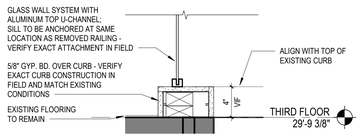
GENERAL NOTES - PLANS:

1. ON THIS PLAN, PARTITION TYPE C11 IS TYP AT INTERIOR WALLS, UON.
2. DIMENSIONS ARE TO FACE OF STUD, UON.
3. REFER TO SHEET A003 FOR INTERIOR PARTITION TYPE CONSTRUCTION INFORMATION, TYP.
4. REFER TO FINISH PLANS FOR FLOOR MATERIAL TRANSITIONS NOT OCCURRING AT DOORS AND FOR FLOOR PATTERNS, TYP.
5. ALIGN FACE OF WALLS WITH FACE OF COLUMN WRAPS, WHERE POSSIBLE, WHERE OCCURS, TYP, UON.
6. WHERE PARTITION TYPES WITH GYP. BD. FINISH AND DIFFERENT THICKNESSES ADJOIN IN SAME PLANE, ALIGN FACE OF GYP BD.
7. DIMENSIONS AT EXISTING WALLS ARE TO FACE OF WALL.
8. FIELD VERIFY EXISTING DIMENSIONS PRIOR TO BEGINNING WORK. NOTIFY ARCHITECT IMMEDIATELY OF ANY DISCREPANCIES.
9. UNMARKED DOORS AND WINDOWS ARE EXISTING TO REMAIN.

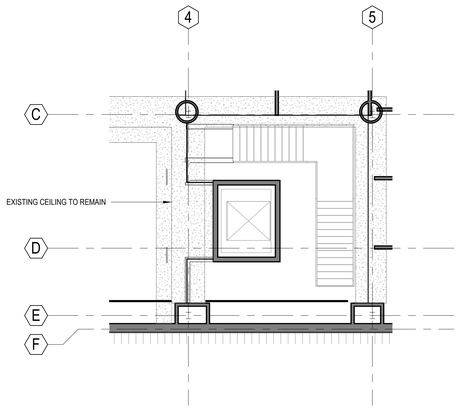
B1 / A103 LEVEL 3 GLAZING
1/2" = 1'-0"



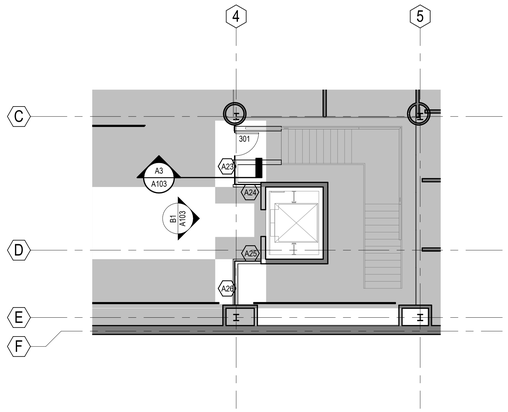
B4 / A103 THIRD FLOOR SCOPE PLAN
1/16" = 1'-0"



A3 / A103 WALL BASE AT CURB
1 1/2" = 1'-0"



A4 / A103 LEVEL 3 RCP
1/8" = 1'-0"



A5 / A103 LEVEL 3 PLAN
1/8" = 1'-0"

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ISSUE FOR CONSTRUCTION	AA	AS	2023/02/03
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REGISTERED ARCHITECT VICTORIA ROSE BROWN 29968 STATE OF TEXAS

02/10/2023

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Title
LEVEL 3 FLOOR PLAN

Project No. 2140001088

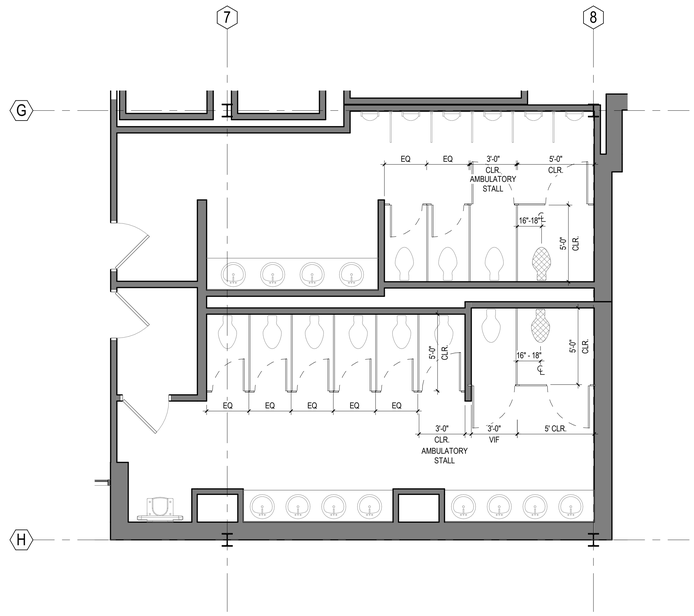
Scale As indicated

Revision

Drawing No. **A103**

APIKA Location in Project Information
2/10/2023 1:29:51 AM

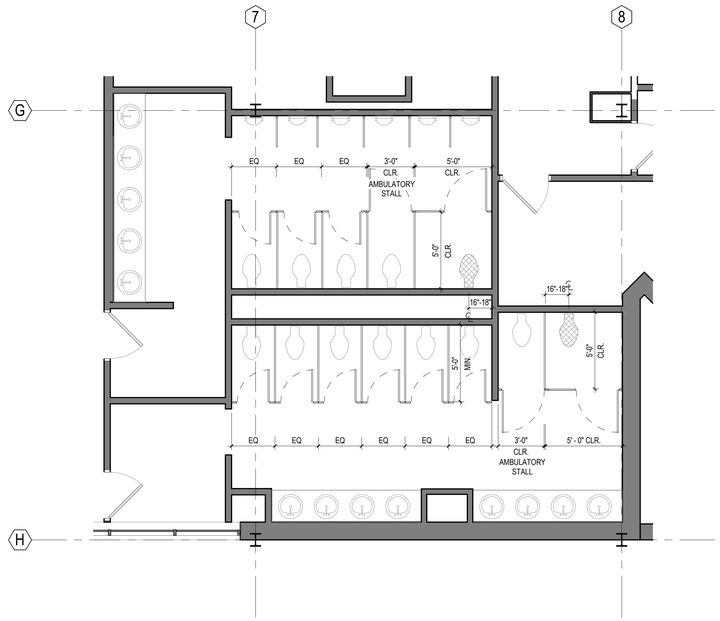
ORIGINAL SHEET - ARCH E1



D1 A401 LEVEL 1 ENLARGED TOILET ROOM PLAN

1/4" = 1'-0"

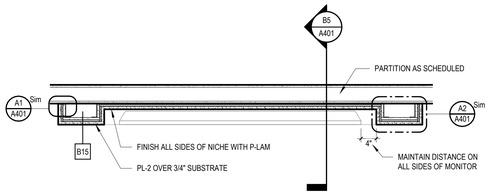
NOTE: ALL WALL MOUNTED FIXTURES AND ACCESSORIES WILL BE RETAINED DURING TILE REFINISHING AND REINSTALLED WITH THE EXCEPTION OF TOILET TISSUE DISPENSERS WHICH SHALL BE REPLACED WITH NEW. ANY GRAB BARS DAMAGED DURING REMOVAL SHALL BE REPLACED WITH NEW.



D3 A401 LEVEL 2 ENLARGED TOILET ROOM PLAN

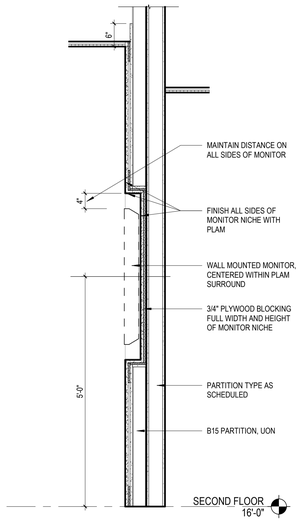
1/4" = 1'-0"

NOTE: ALL WALL MOUNTED FIXTURES AND ACCESSORIES WILL BE RETAINED DURING TILE REFINISHING AND REINSTALLED WITH THE EXCEPTION OF TOILET TISSUE DISPENSERS WHICH SHALL BE REPLACED WITH NEW. ANY GRAB BARS DAMAGED DURING REMOVAL SHALL BE REPLACED WITH NEW.



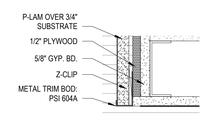
B4 A401 PLAN AT ISSC MONITOT SURROUND

3/4" = 1'-0"



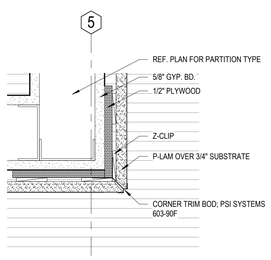
B5 A401 SECTION AT ISSC MONITOR SURROUND

3/4" = 1'-0"



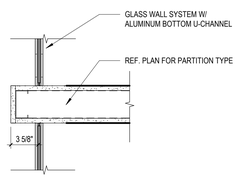
A1 A401 TERMINATION DETAIL AT P-LAM

3" = 1'-0"



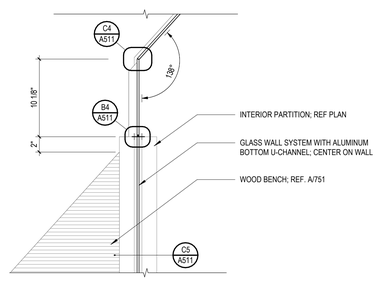
A2 A401 CORNER TRIM DETAIL AT P-LAM

3" = 1'-0"



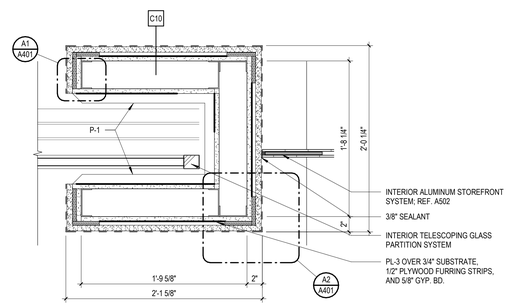
A3 A401 PLAN DETAIL AT FLEX ROOMS

1 1/2" = 1'-0"



A4 A401 PLAN DETAIL AT BENCH

1 1/2" = 1'-0"



A5 A401 ENLARGED PLAN - ISSC ENTRANCE

1 1/2" = 1'-0"

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ISSUE FOR CONSTRUCTION	AA	AS	2023/02/03
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REGISTERED ARCHITECT VICTORIA ROSE BROWN 22066 STATE OF TEXAS

02/10/2023

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Title
ENLARGED PLANS & DETAILS

Project No. 2140001088

Scale As indicated

Revision

Drawing No. **A401**

*Pick location in Project Information
1/10/2023 1:29:53 AM
ORIGINAL SHEET - ARCH E1

DOOR SCHEDULE - LEVEL 1

		Door											Frame							
		Clear Dim.			Panel Widths															
Number	Existing	Width	Height	No. of Panels	Panel 1 Width	Panel 2 Width	Thickness	Panel Type	Mat'l	Finish	Glazing	HDWR Set	Type	Mat'l	Finish	Head Detail	Jamb Detail	Sill Detail	Fire Label	Remarks
101A	●	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F				E551	-	-		-	-	-		1,5
101B	●	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F				E551	-	-		-	-	-		1,5
102	●	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F				E103	-	-		-	-	-		1,5
103	●	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F				E103	-	-		-	-	-		1,5
104	●	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F				E103	-	-		-	-	-		1,5
105	●	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F				E103	-	-		-	-	-		1,5
106A	-	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F	WD			C711	S3	STL		E3/A511	D3/A511		-	6,7
107	●	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F				E303	-	-		-	-	-		1,5
108	●	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F				E303S	-	-		-	-	-		1,5
109A	●	2'-6"	7'-0"	1	2'-6"	0"	1 3/4"	F				E551	-	-		-	-	-	-	1,5
109B	●	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F				E551	-	-		-	-	-		1,5
110	●	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F				E103	-	-		-	-	-		1,5
111	●	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F				E103	-	-		-	-	-		1,5
112	●	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F				E103	-	-		-	-	-		1,5
113	●	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F				E103	-	-		-	-	-		1,5
114	●	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F				E103	-	-		-		-		1,5
115	●	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F				E103	-	-		-	-	-		1,5
116	●	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F				E103	-	-		-	-	-		1,5
118	●	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F				E103S	-	-		-	-	-		1,5
120	●	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F				E103S	-	-		-	-	-		1,5
121	-	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F	WD			201C	S1	STL		E3/A511	D3/A511			6,7
122	●	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F				E103	-	-		-	-	-		1,5
123A	●	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F				E103	-	-		-	-	-		1,5
123B	●	6'-0"	7'-0"	2	3'-0"	3'-0"	1 3/4"	F				E107E	-	-		-	-	-		1,5
124A	●	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F				E103	-	-		-	-	-		1,5
124B	●	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F				E103	-	-		-	-	-		1,5
125	●	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F				E103S	-	-		-	-	-		1,5
126	●	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F				E203	-	-		-	-	-		1,5
127	-	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F	WD			C711C	S1	STL		E3/A511	D3/A511			6,7
128	●	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F				E103	-	-		-	-	-		1,5
129	●	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F				E103S	-	-		-	-	-		1,5
130	●	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F				E103S	-	-		-	-	-		1,5
132	●	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F				E103	-	-		-	-	-		1,5
133	●	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F				E103	-	-		-	-	-		1,5
134	●	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F				E801	-	-		-	-	-		1,5
135	●	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F				E801	-	-		-	-	-		1,5
135A	●	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F				E801	-	-		-	-	-		1,5

DOOR SCHEDULE - LEVEL 2

		Door											Frame							
		Clear Dim.			Panel Widths															
Number	Existing	Width	Height	No. of Panels	Panel 1 Width	Panel 2 Width	Thickness	Panel Type	Mat'l	Finish	Glazing	HDWR Set	Type	Mat'l	Finish	Head Detail	Jamb Detail	Sill Detail	Fire Label	Remarks
201A		23'-0"	8'-0"	8			1 3/4"	FP			GL1	001		AL		SEE FRAME TYPES	SEE FRAME TYPES			
201B	-	7'-10 1/4"	7'-10 1/4"	1	7'-10 1/2"	0"	1 3/4"	FG			GL1	C002				SEE FRAME TYPES	SEE FRAME TYPES			7
202	-	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F	WD			103	S1	STL		E3/A511	D3/A511			
203	●	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F				E103	-	-		-	-	-		1,5
204	●	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F				E103				-	-	-		1,5
205	-	3'-0"	7'-10 1/4"	1	3'-0"	0"	1 3/4"	FG			GL1	C002	A22	AL		SEE FRAME TYPES	SEE FRAME TYPES	SEE FRAME TYPES		7
206	-	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F	WD			103	S1	STL		E3/A511	D3/A511			
207	●	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F				E103	-			-	-	-		1,5
208	-	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F	WD			103	S1	STL		E3/A511	D3/A511			
209	-	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F	WD			103	S1	STL		E3/A511	D3/A511			
210A	-	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F	WD			C201	S1	STL		E3/A511	D3/A511			7
210B	-	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F	WD			201C	S1	STL		E3/A511	D3/A511			
212	-	3'-0"	7'-10 1/4"	1	3'-0"	0"	1 3/4"	FG			GL1	C002	A19	AL		SEE FRAME TYPES	SEE FRAME TYPES	SEE FRAME TYPES		7
213	●	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F				EC201C	-	-		-	-	-		1,5,7
214	●	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F				E103	-	-		-	-	-		1,5
215	-	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F	WD			103	S1	STL		E3/A511	D3/A511			
216	●	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F				E103	-	-		-	-	-		1,5
217	●	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F				E103	-	-		-	-	-		1,5
218	●	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F				E103	-	-		-	-	-		1,5
219	-	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F	WD			103	S1	STL		E3/A511	D3/A511			
220	●	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F				E103	-	-		-	-	-		1,5
221	●	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F				E551	-	-		-	-	-		1,5
221A	●	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F				E303	-	-		-	-	-		1,5
222	●	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F				E103S	-	-		-	-	-		1,5
223	●	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F				E103	-	-		-	-	-		1,5
224	●	6'-0"	6'-10"	2	3'-0"	3'-0"	1 3/4"	F				E810S	-	-		-	-	-		1,5
225	●	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F				E103	-	-		-	-	-		1,5
226	●	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F				E103	-	-		-	-	-		1,5
227	●	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F				E103	-	-		-	-	-		1,5
228	●	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F				E103S	-	-		-	-	-		1,5
229	●	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F				E103	-	-		-	-	-		1,5
230A	-	3'-0"	7'-10 1/4"	1	3'-0"	0"	1 3/4"	FG			GL1	002				SEE FRAME TYPES	SEE FRAME TYPES			7
230B	-	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F	WD			551	S1	STL		E3/A511	D3/A511			
231	-	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F	WD			103	S1	STL		E3/A511	D3/A511			
232	-	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F	WD			103	S1	STL		E3/A511	D3/A511			
233	-	3'-0"	7'-10 1/4"	1	3'-4"		1 3/4"	FG			GL1	003				B2/A511		B3/A511		
234	-	3'-0"	7'-10 1/4"	1	3'-4"		1 3/4"	FG			GL1	003				B2/A511		B3/A511		
235	-	3'-0"	7'-10 1/4"	1	3'-4"		1 3/4"	FG			GL1	003				B2/A511		B3/A511		
236	-	3'-0"	7'-10 1/4"	1	3'-4"		1 3/4"	FG			GL1	003				B2/A511		B3/A511		
238	●	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F				E801	-	-		-	-	-		1,5
239	●	3'-0"	7'-0"	1	3'-0"	0"	1 3/4"	F				E801	-	-		-	-	-		1,5

DOOR SCHEDULE - LEVEL 3

		Door																		
		Clear Dim.			Panel Widths															
Number	Existing	Width	Height	No. of Panels	Panel 1 Width	Panel 2 Width	Thickness	Panel Type	Mat'l	Finish	Glazing	HDWR Set	Type	Mat'l	Finish	Head Detail	Jamb Detail	Sill Detail	Fire Label	Remarks
301	-	3'-0"	7'-2"	1	3'-0"	0"	1 3/4"	FG			GL1	009				SEE FRAME TYPES	SEE FRAME TYPES			8

GENERAL NOTES - DOORS AND WINDOWS:

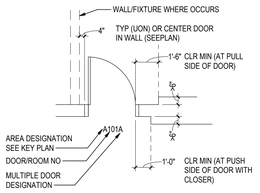
1. REFER TO SHEETS A501 FOR DOOR SCHEDULE.
2. ALL DOORS TO BE 1 3/4" THICK (UON)
3. ALL STL FRAMES TO HAVE A 2" FACE DIMENSION UON, W/ 5/8" STOP. 3/4" STOP REQUIRED FOR FIRE RATED FRAMES.
4. STEEL FRAME DEPTHS INDICATED IN THE DETAILS ARE NOMINAL. PROVIDE STANDARD WIDTH FRAME WITH THROAT OPENING APPROPRIATE TO PARTITION TYPE.
5. COORDINATE WITH MECH DOCUMENTS FOR DOOR UNDERCUTS AND DOOR LOUVERS, IF ANY.
6. ALL LIGHTS IN DOORS AND ADJACENT SIDE LIGHTS TO HAVE SAFETY GLAZING (UON).
7. INTERIOR DOORS TO HAVE CLEAR GLAZING.
8. FIELD VERIFY DIMENSIONS PRIOR TO FABRICATING FRAMES.
9. PROVIDE WD BLKG IN GYP BD WALLS BEHIND DOORS SCHEDULED TO HAVE WALL MOUNTED DOOR STOPS. (REFER HARDWARE SCHEDULE SUBMITTAL).
10. FIELD VERIFY DIMENSIONS OF EXISTING FRAMES TO REMAIN.
11. AT ALL EXISTING STL FRAMES WHERE DOOR SWING IS TO BE CHANGED, PATCH, REPAIR AND GRIND SMOOTH EXISTING STL DOOR FRAME. PRIME AND USE ONLY IF FRAME IS TO BE RETAINED. PAINT ACCORDING TO FINISH SCHEDULE SHEET A801.
12. DOOR HARDWARE (CLOSERS, LEVERS, PANIC HARDWARE, ETC.) SHALL NOT CONFLICT WITH THE GLASS OR TRIM FOR THE LITE.

FRAME TYPE LEGEND:

S# STEEL (HM) FRAME TYPE

A# ALUMINUM (STOREFRONT) FRAME TYPE

DOOR MARK KEY



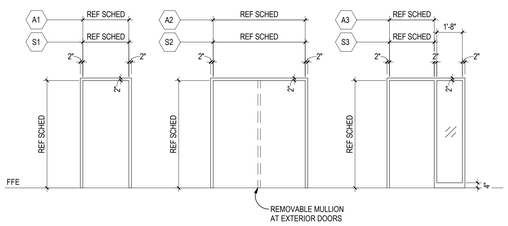
GLAZING KEY:

NAME	DESCRIPTION
GLZ 1	1/2" CLEAR SAFETY GLASS

*RE: SPECIFICATIONS FOR GLAZING TYPES

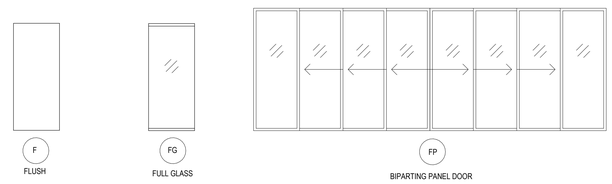
DOOR SCHEDULE REMARKS:

1. FILL HOLES AND PREP FRAME FOR NEW WORK.
2. NOT USED.
3. NOT USED.
4. NOT USED.
5. PATCH, REPAIR AND PAINT EXISTING DOOR FRAME AND PROVIDE NEW HARDWARE FOR EXISTING DOOR (REFER HARDWARE SCHEDULE). PAINT EXISTING DOOR PANEL (REF A801).
6. PROVIDE EXIT DEVICE.
7. CARD READER.
8. CONNECT TO FIRE ALARM SYSTEM. DOOR SHALL AUTOMATICALLY AND FULLY CLOSE IN CASE OF FIRE/SMOKE ALARM ACTIVATION.



A2 / A501 **A501_DOOR FRAME TYPES**

1/4" = 1'-0"



A4 / A501 **DOOR TYPES**

1/4" = 1'-0"

Stantec

Stantec Architecture Inc.
6080 Tennyson Parkway Suite 200
Plano, TX 75024-6003
Tel: (214) 473-2400 • www.stantec.com

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Notes

Revision	By	Appd	YYYY.MM.DD

Issued	By	Appd	YYYY.MM.DD
ISSUE FOR CONSTRUCTION	AA	AS	2023/02/03
ISSUE FOR CONSTRUCTION - DEMOLITION	AA	AS	2023/01/09

Permit/Seal

REGISTERED ARCHITECT VICTORIA ROSE BROWN 22065 STATE OF TEXAS

02/10/2023

Client/Project Logo

UNT

Client/Project

University of North Texas - Denton

EAGLE STUDENT SERVICES CENTER

Eagle Student Services Center 1147 Union Cir, Denton, TX 76201

Title

DOOR SCHEDULE, INFO, AND FRAME TYPES

Project No. 2140001088

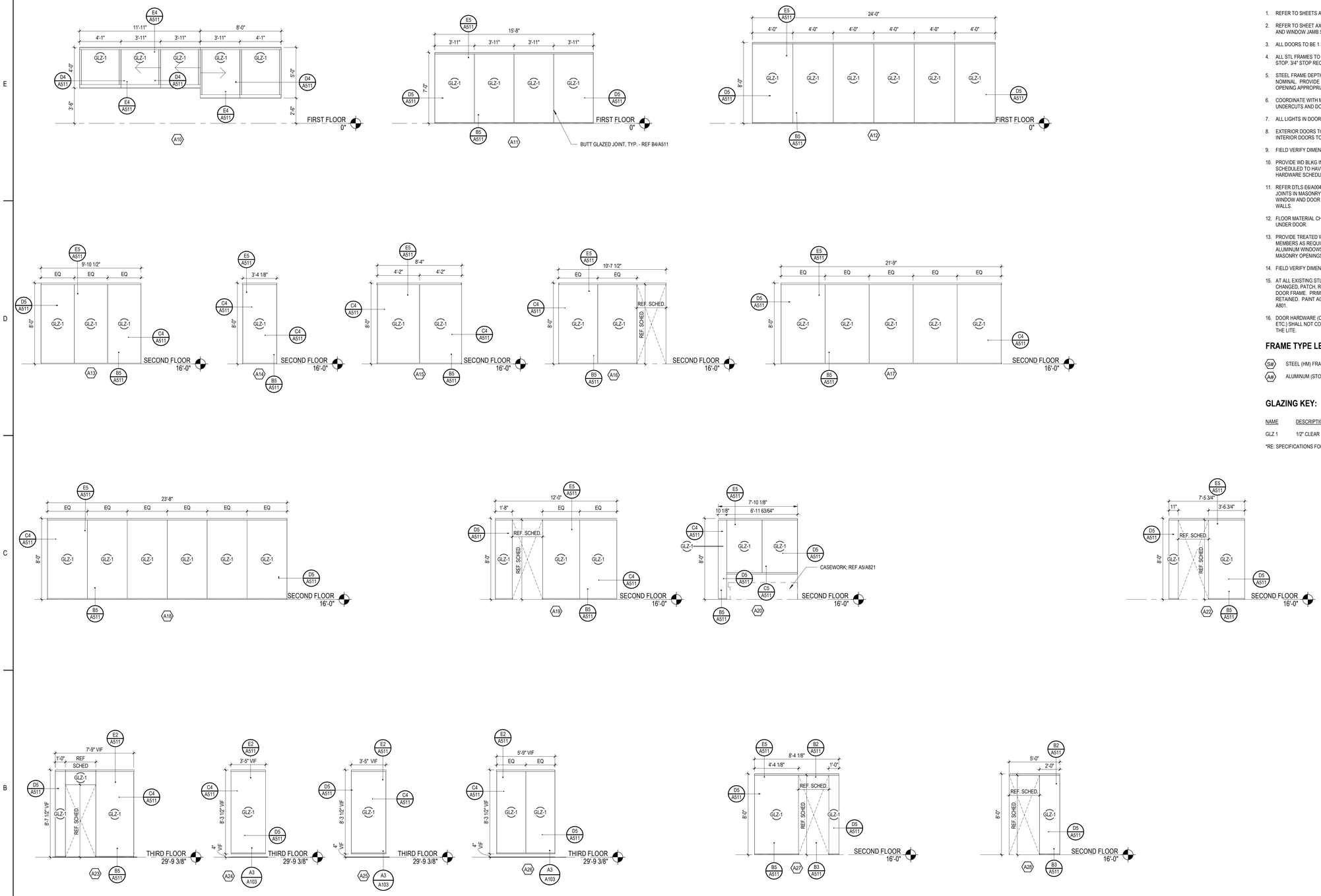
Scale As indicated

Revision

Drawing No. **A501**

Plot location in Project Information
2/10/2023 3:29:53 AM

ORIGINAL SHEET - ARCH E1



GENERAL NOTES - DOORS AND WINDOWS:

1. REFER TO SHEETS A501 FOR DOOR SCHEDULE.
2. REFER TO SHEET AXXX FOR LINTEL SCHEDULES AND DOOR AND WINDOW JAMB STUD FRAMING SCHEDULE.
3. ALL DOORS TO BE 1 3/4" THICK (UON)
4. ALL STL FRAMES TO HAVE A 2" FACE DIMENSION UON, W/ 5/8" STOP. 3/4" STOP REQUIRED FOR FIRE RATED FRAMES.
5. STEEL FRAME DEPTHS INDICATED IN THE DETAILS ARE NOMINAL. PROVIDE STANDARD WIDTH FRAME WITH THROAT OPENING APPROPRIATE TO PARTITION TYPE.
6. COORDINATE WITH MECH DOCUMENTS FOR DOOR UNDERCUTS AND DOOR LOUVERS, IF ANY.
7. ALL LIGHTS IN DOORS TO HAVE SAFETY GLAZING (UON).
8. EXTERIOR DOORS TO HAVE TINTED GLAZING (UON) AND INTERIOR DOORS TO HAVE CLEAR GLAZING.
9. FIELD VERIFY DIMENSIONS PRIOR TO FABRICATING FRAMES.
10. PROVIDE WD BLKG IN GYP BD WALLS BEHIND DOORS SCHEDULED TO HAVE WALL MOUNTED DOOR STOPS. (REFER HARDWARE SCHEDULE SUBMITTAL).
11. REFER DTLS E6/A004 FOR TYP WINDOW AND DOOR CONTROL JOINTS IN MASONRY WALLS. REFER DTLS B6/A004 FOR TYP WINDOW AND DOOR CONTROL JOINTS IN STEEL STUD FRAMED WALLS.
12. FLOOR MATERIAL CHANGES BETWEEN ROOMS TO OCCUR UNDER DOOR.
13. PROVIDE TREATED WOOD BLOCKING AT WINDOW SURROUND MEMBERS AS REQUIRED FOR PROPER ATTACHMENT WHERE ALUMINUM WINDOWS ARE TO BE INSTALLED IN EXISTING MASONRY OPENINGS.
14. FIELD VERIFY DIMENSIONS OF EXISTING FRAMES TO REMAIN.
15. AT ALL EXISTING STL FRAMES WHERE DOOR SWING IS TO BE CHANGED, PATCH, REPAIR AND GRIND SMOOTH EXISTING STL DOOR FRAME. PRIME AND USE ONLY IF FRAME IS TO BE RETAINED. PAINT ACCORDING TO FINISH SCHEDULE SHEET A801.
16. DOOR HARDWARE (CLOSERS, LEVERS, PANIC HARDWARE, ETC.) SHALL NOT CONFLICT WITH THE GLASS OR TRIM FOR THE LITE.

FRAME TYPE LEGEND:

S# STEEL (HM) FRAME TYPE

A# ALUMINUM (STOREFRONT) FRAME TYPE

GLAZING KEY:

NAME	DESCRIPTION
GLZ 1	1/2" CLEAR SAFETY GLASS

*RE: SPECIFICATIONS FOR GLAZING TYPES

Stantec

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Notes

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ISSUE FOR CONSTRUCTION	AA	AS	2023/02/03
ISSUE FOR CONSTRUCTION - DEMOLITION	AA	AS	2023/01/09
Issued	By	Appd	YYYY.MM.DD

Permit/Seal

REGISTERED ARCHITECT VICTORIA ROSE BROWN 22568 STATE OF TEXAS

02/10/2023

Client/Project Logo

UNT

Client/Project

University of North Texas - Denton

EAGLE STUDENT SERVICES CENTER

Eagle Student Services Center 1147 Union Cir, Denton, TX 76201

Title

FRAME ELEVATIONS

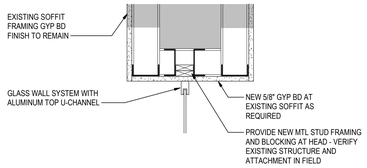
Project No. 2140001088

Scale As indicated

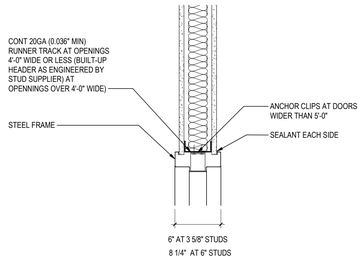
Revision

Drawing No. A502

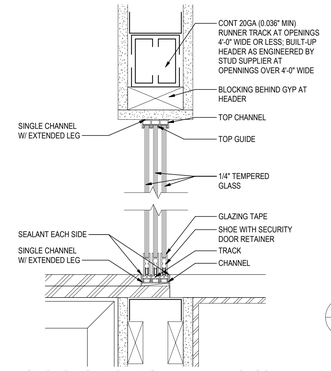
<Pick location in Project Information>
2/10/2023 1:29:58 AM
ORIGINAL SHEET - ARCH E1



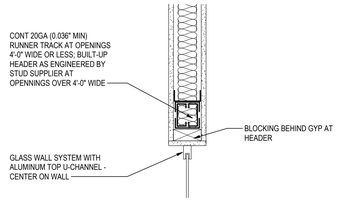
E2 A511 **HEAD DETAIL**
1 1/2" = 1'-0"



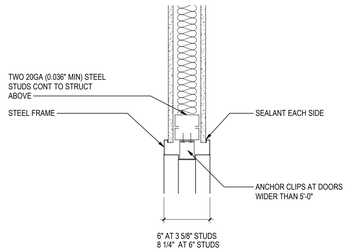
E3 A511 **HEAD DETAIL**
1 1/2" = 1'-0"



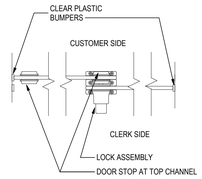
E4 A511 **SLIDING WINDOW HEAD & SILL**
3" = 1'-0"



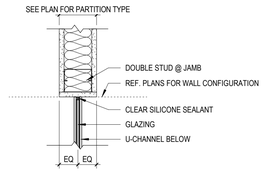
E5 A511 **HEAD DETAIL**
1 1/2" = 1'-0"



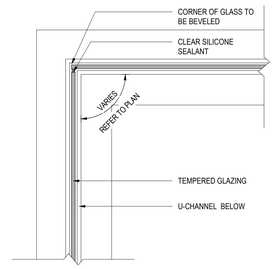
D3 A511 **JAMB DETAIL**
1 1/2" = 1'-0"



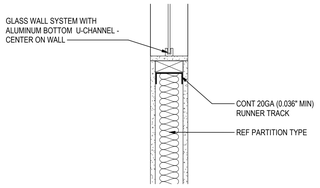
D4 A511 **SLIDING WINDOW JAMB**
3" = 1'-0"



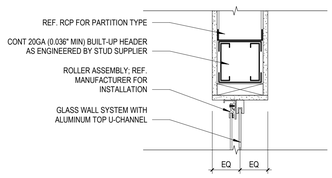
D5 A511 **WINDOW JAMB DETAIL - SEALANT**
1 1/2" = 1'-0"



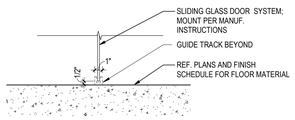
C4 A511 **BUTT GLAZING CORNER DETAIL**
3" = 1'-0"



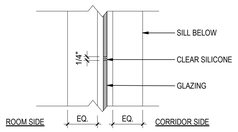
C5 A511 **SILL DETAIL AT GYP WALL**
1 1/2" = 1'-0"



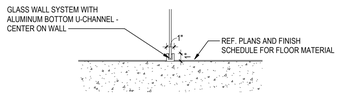
B2 A511 **HEAD DETAIL - SLIDING DOOR**
1 1/2" = 1'-0"



B3 A511 **SILL DETAIL - SLIDING DOOR TRACK**
1 1/2" = 1'-0"



B4 A511 **BUTT GLAZING DETAIL**
3" = 1'-0"



B5 A511 **SILL DETAIL TO FLOOR**
1 1/2" = 1'-0"

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ISSUE FOR CONSTRUCTION	AA	AS	2023/02/03
ISSUE FOR CONSTRUCTION - DEMOLITION	AA	AS	2023/01/09

Permit/Seal

REGISTERED ARCHITECT VICTORIA ROSE BROWN 29868 STATE OF TEXAS
02/10/2023

Client/Project Logo

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Client/Project
University of North Texas - Denton

EAGLE STUDENT SERVICES CENTER

Eagle Student Services Center 1147 Union Cir, Denton, TX 76201

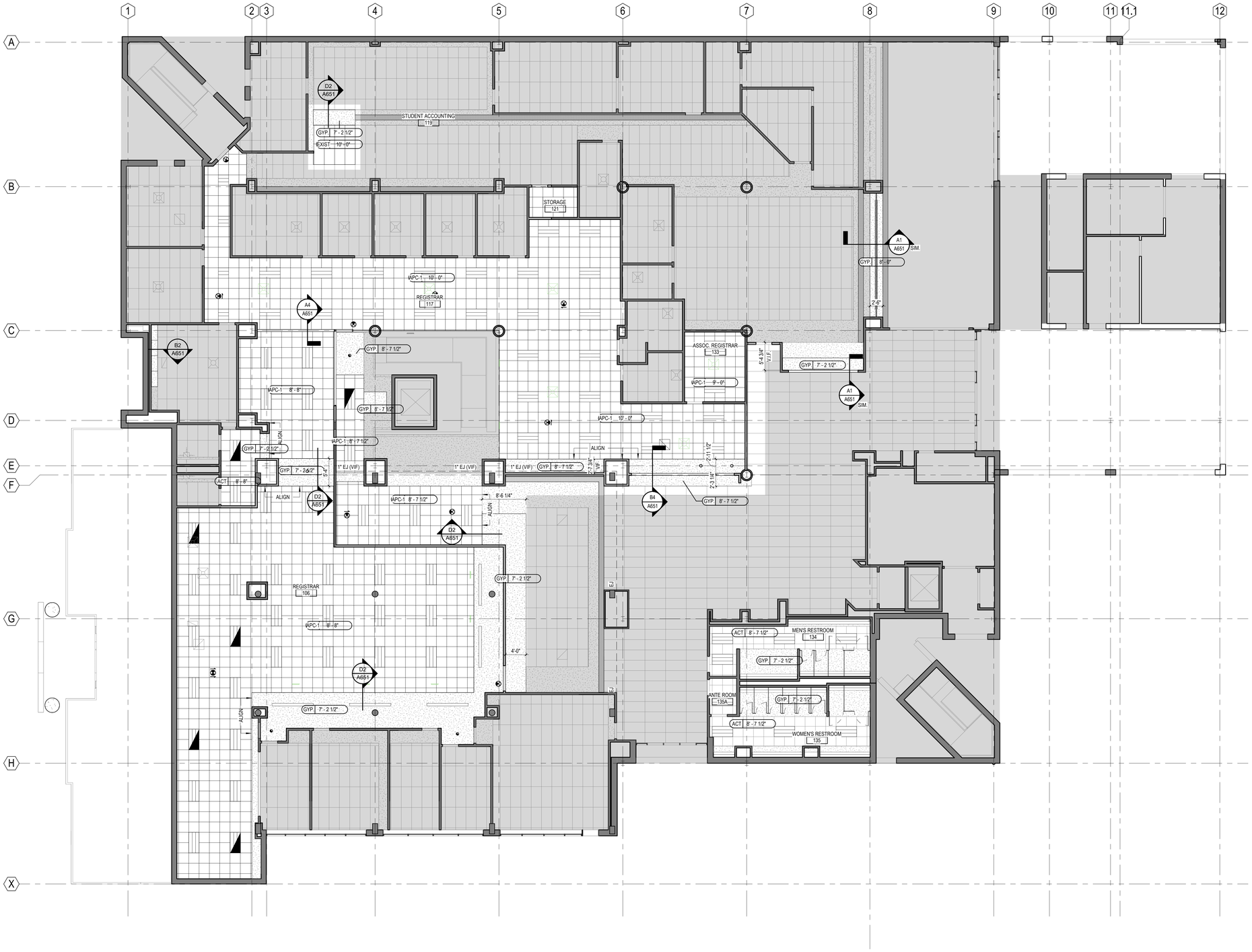
Title
HJS DETAILS

Project No. 2140001088
Scale As indicated
Revision
Drawing No. **A511**

ORIGINAL SHEET - ARCH E1
APPLE Stantec in Project Information
2/10/2023 12:26:59 AM

CEILING LEGEND:

- 2'-0"x4'-0" ACOUSTIC PANEL CEILING SYSTEM. REFER TO RCP FOR TYPE AND HEIGHT, TYP
- 2'-0"x2'-0" ACOUSTIC PANEL CEILING SYSTEM. REFER TO RCP FOR TYPE AND HEIGHT, TYP
- SUSPENDED GYP BD CEILING SYSTEM OR GYP BD BULKHEAD REFER TO RCP FOR HEIGHT, TYP
- CEILING NOT IN SCOPE
- NOT IN SCOPE
- EXISTING 2'-0"X4'-0" CEILING GRID TO REMAIN. ADDITIONAL GRID TEE TO BE ADDED TO CREATE 2'-0"x2'-0" GRID FOR NEW 2'-0"x2'-0" ACOUSTIC PANEL CEILING SYSTEM. REFER TO RCP FOR TYPE AND HEIGHT, TYP
- PLANK ACOUSTIC CEILING. REFER TO RCP FOR TYPE AND HEIGHT, TYP



A1 A601 **LEVEL 1 RCP**

1/8" = 1'-0"

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ISSUE FOR CONSTRUCTION	AA	AS	2023/02/03
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02/10/2023

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Title

LEVEL 1 CEILING PLAN

Project No. 2140001088

Scale As indicated

Revision

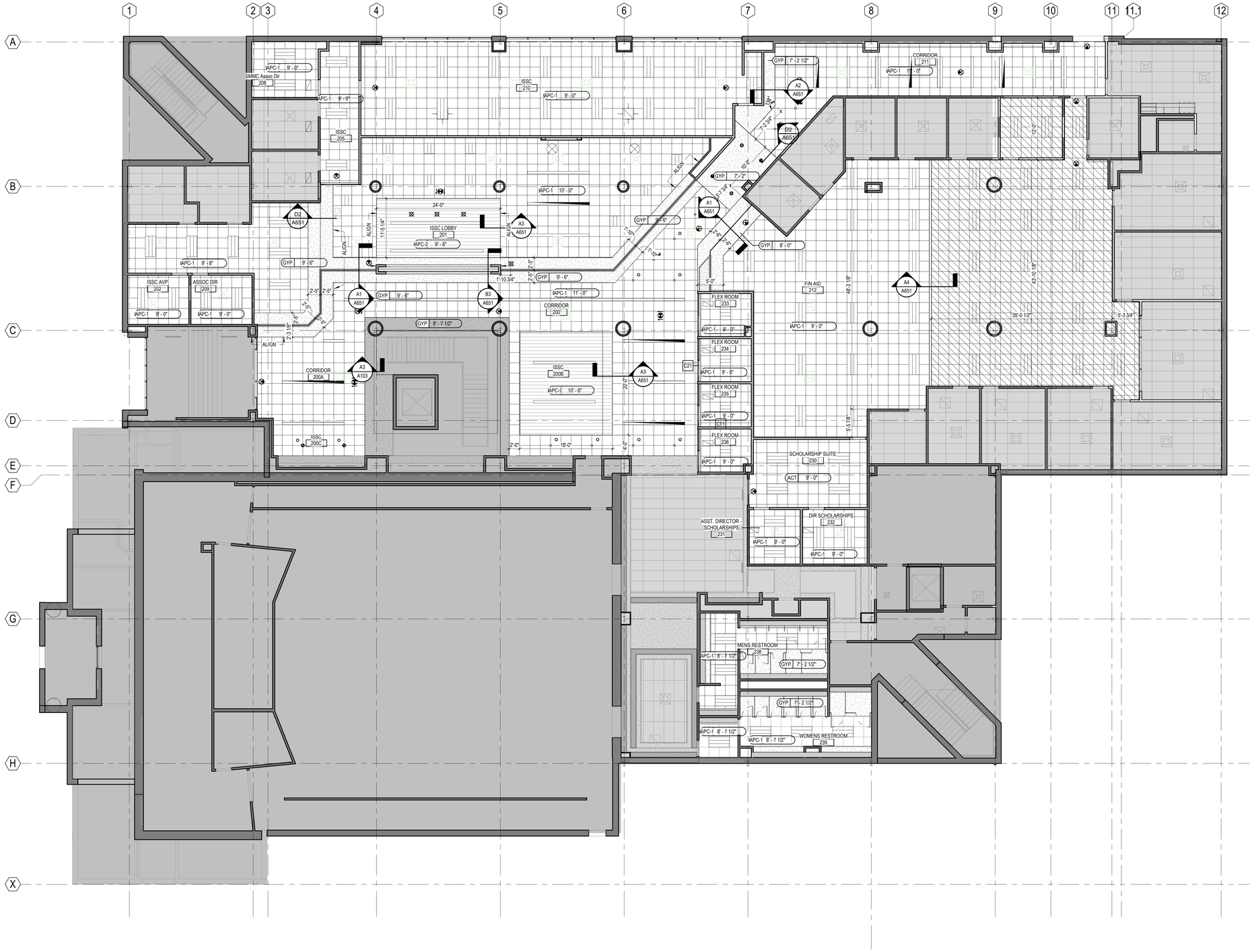
Drawing No. **A601**

Pick location in Project Information
2/10/2023 9:30:02 AM

ORIGINAL SHEET - ARCH E1

CEILING LEGEND:

- Z'-0"x4'-0" ACOUSTIC PANEL CEILING SYSTEM. REFER TO RCP FOR TYPE AND HEIGHT, TYP
- Z'-0"x2'-0" ACOUSTIC PANEL CEILING SYSTEM. REFER TO RCP FOR TYPE AND HEIGHT, TYP
- SUSPENDED GYP BD CEILING SYSTEM OR GYP BD BULKHEAD REFER TO RCP FOR HEIGHT, TYP
- CEILING NOT IN SCOPE
- NOT IN SCOPE
- EXISTING Z'-0"X4'-0" CEILING GRID TO REMAIN. ADDITIONAL GRID TEE TO BE ADDED TO CREATE Z'-0"x2'-0" GRID FOR NEW Z'-0"x2'-0" ACOUSTIC PANEL CEILING SYSTEM. REFER TO RCP FOR TYPE AND HEIGHT, TYP
- PLANK ACOUSTIC CEILING. REFER TO RCP FOR TYPE AND HEIGHT, TYP



A1 A602 **LEVEL 2 RCP**
1/8" = 1'-0"

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ISSUE FOR CONSTRUCTION	AA	AS	2023/02/03
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02/10/2023

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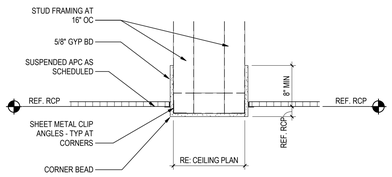
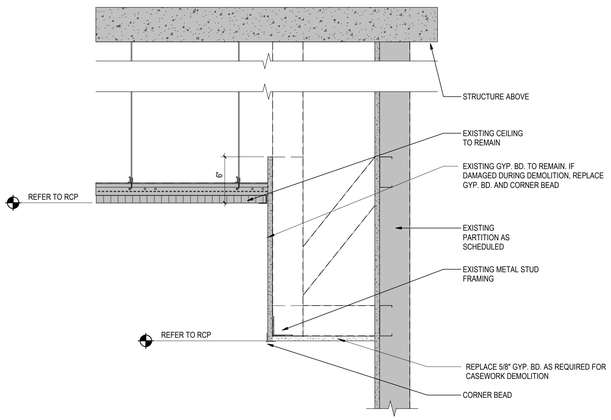
Title
LEVEL 2 CEILING PLAN

Project No. 2140001088
Scale As indicated
Revision
Drawing No. **A602**

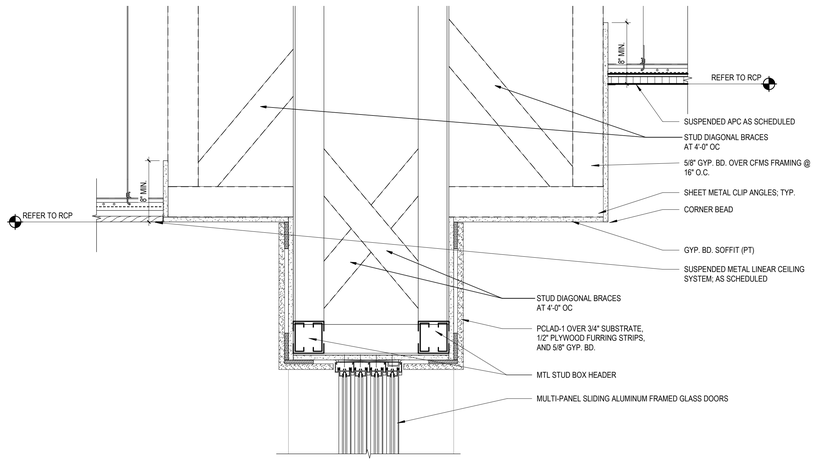
ORIGINAL SHEET - ARCH E1



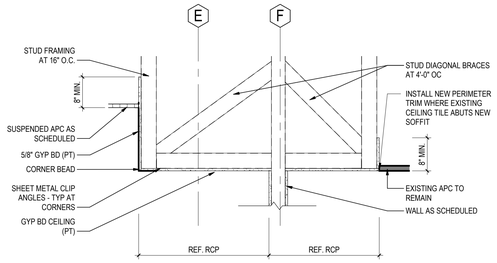
D2 / A651 **TYPICAL BULKHEAD DETAIL**
1" = 1'-0"



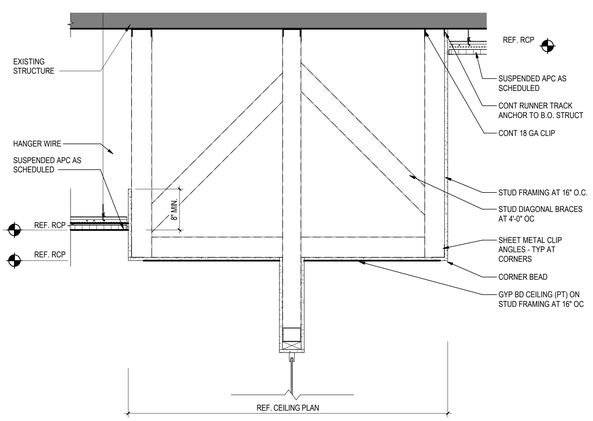
B2 / A651 **SOFFIT AT NEW CASEWORK**
1 1/2" = 1'-0"



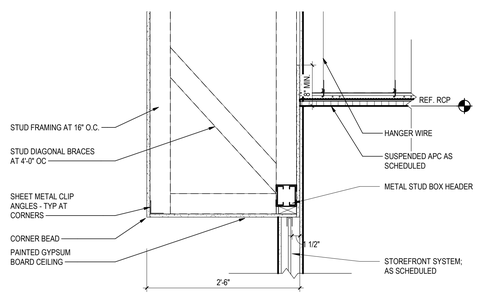
B3 / A651 **BULKHEAD AT MOVEABLE GLASS WALL**
1 1/2" = 1'-0"



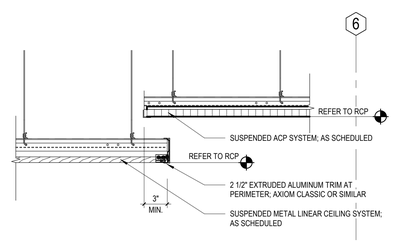
B4 / A651 **BULKHEAD AT STUDENT FINANCE STOREFRONT**
3/4" = 1'-0"



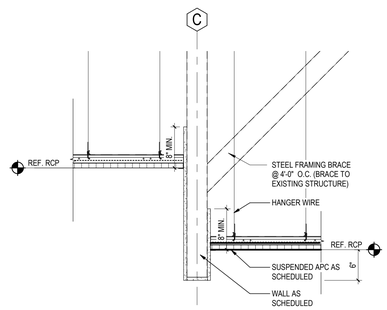
A1 / A651 **BULKHEAD AT INTERIOR STOREFRONT**
1" = 1'-0"



A2 / A651 **BULKHEAD AT ISSC STOREFRONT**
1" = 1'-0"



A3 / A651 **TRANSITION AT ISSC**
1 1/2" = 1'-0"



A4 / A651 **TYPICAL CEILING TRANSITION**
1" = 1'-0"

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ISSUE FOR CONSTRUCTION	AA	AS	2023/02/03
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02/10/2023

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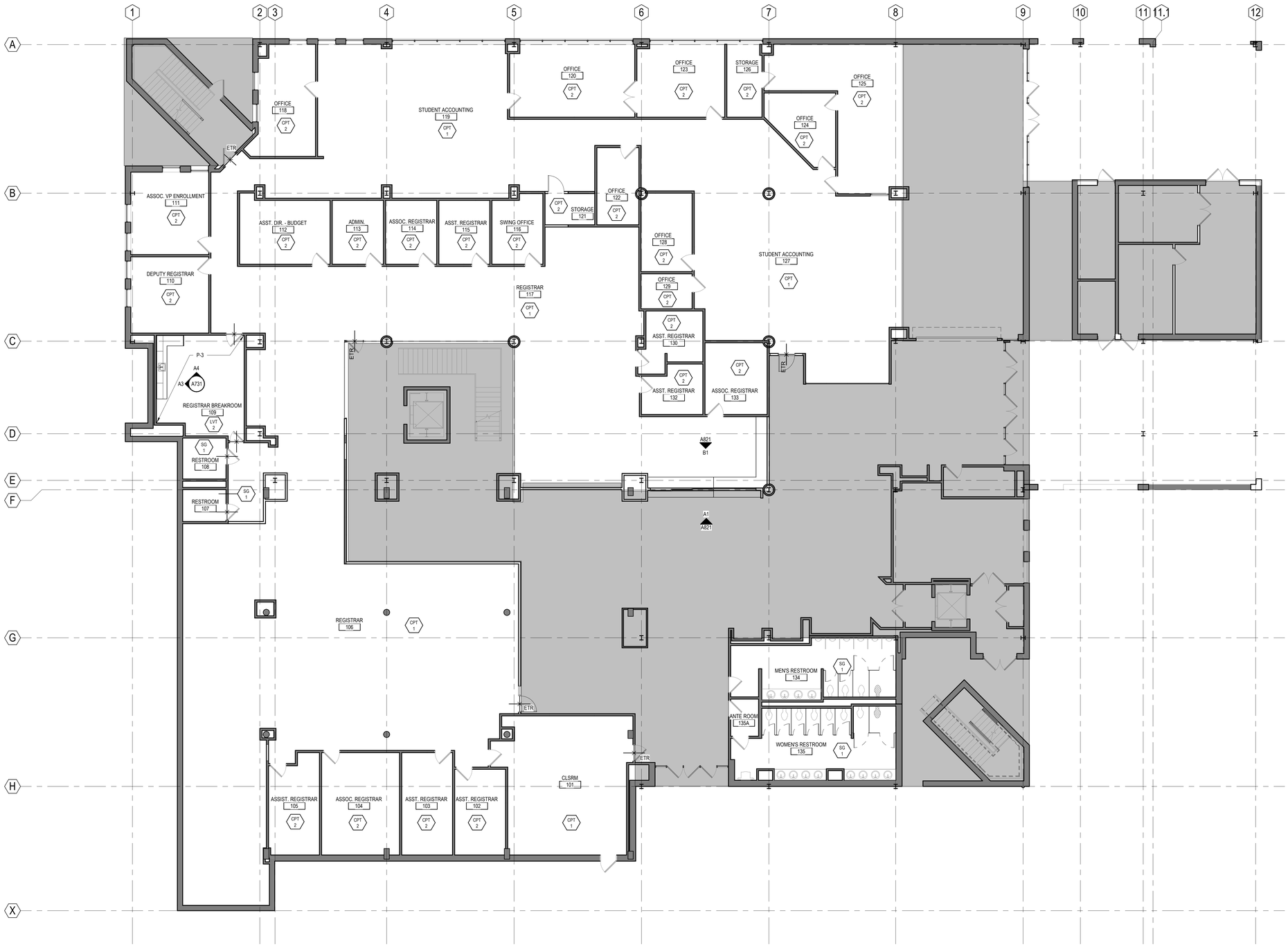
EAGLE STUDENT SERVICES CENTER

Eagle Student Services Center 1147 Union Cir, Denton, TX 76201

Title
CEILING DETAILS

Project No. 2140001088
Scale As indicated
Revision
Drawing No. **A651**

ORIGINAL SHEET - ARCH E1



1 A701 **FIRST FLOOR FINISH PLAN**
1/8" = 1'-0"

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02/10/2023

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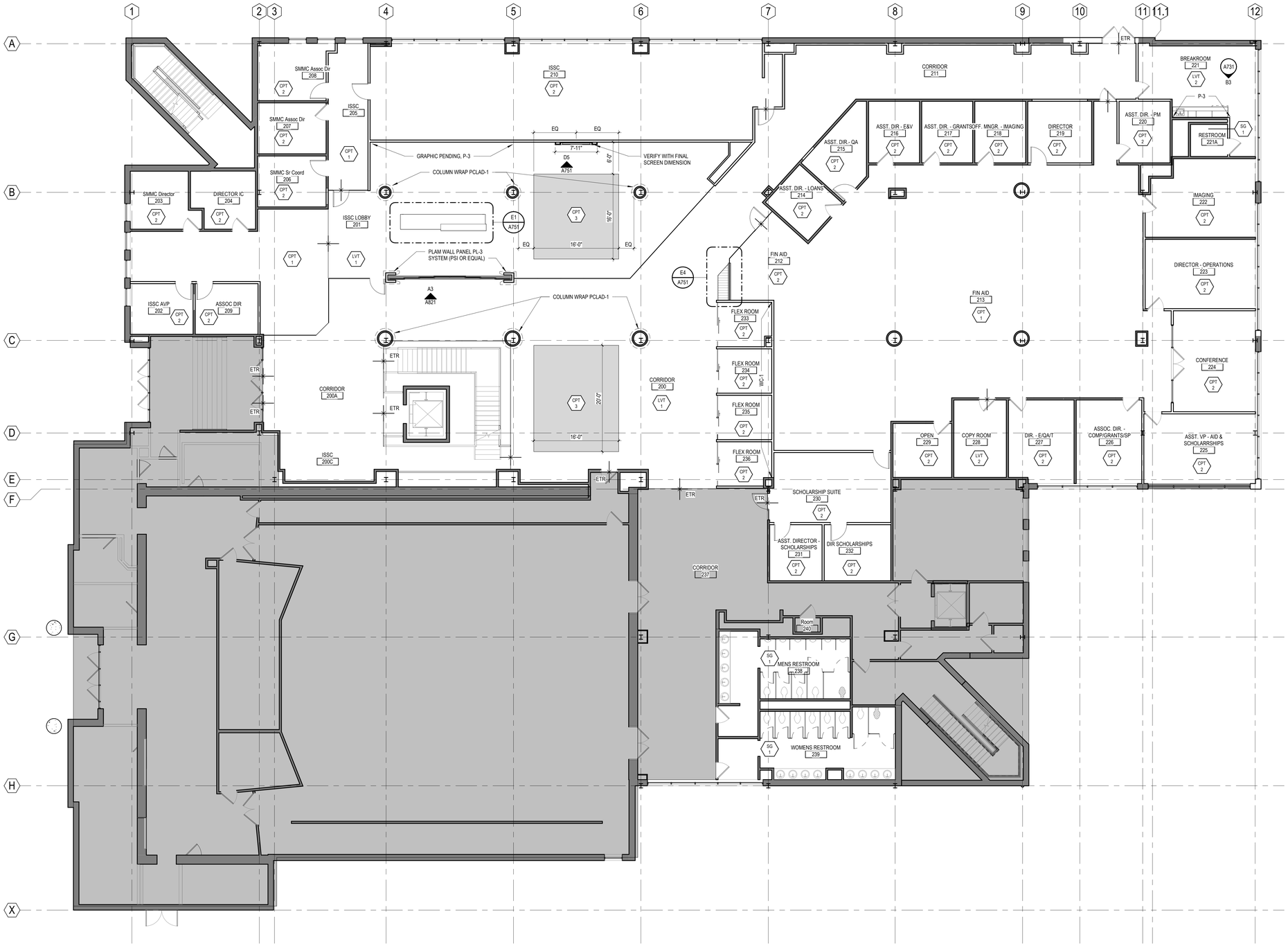
Title
FINISH PLAN LEVEL 1

Project No. 2140001088
Scale 1/8" = 1'-0"
Revision
Drawing No. A701

<Pick location in Project Information>
2/10/2023 9:30:12 AM

ORIGINAL SHEET - ARCH E1



1 A702 **SECOND FLOOR FINISH PLAN**
1/8" = 1'-0"

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02/10/2023

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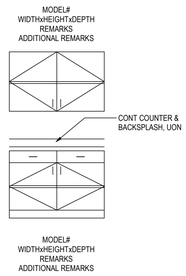
Title
FINISH PLAN LEVEL 2

Project No. 2140001088
Scale 1/8" = 1'-0"
Revision
Drawing No. **A702**

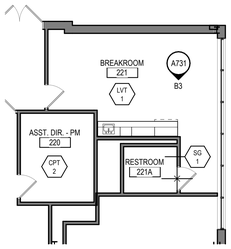
ORIGINAL SHEET - ARCH E1

CASEWORK KEY:

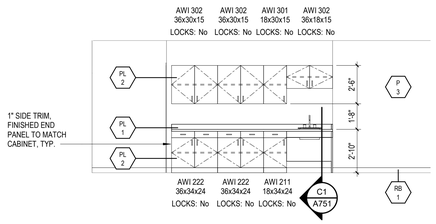


NOTES:

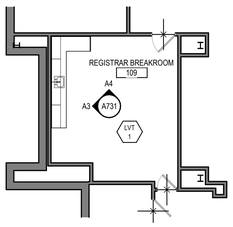
1. GENERAL CASEWORK MODEL NUMBERS REFERENCE THE ARCHITECTURAL WOODWORK INSTITUTE (AWI) AS BASIS OF DESIGN. REFER TO SPECIFICATIONS FOR ACCEPTABLE CASEWORK MANUFACTURERS.
2. BASE CABINET HEIGHT IS GIVEN TO THE TOP OF COUNTER TOP, UON.
3. REFER TO SHEET A801 FOR COLOR SCHED, NOTES, AND FINISHES, TYP.



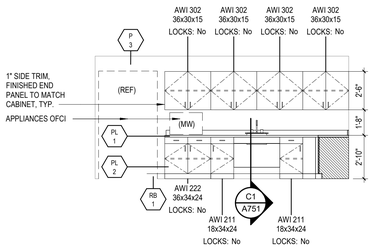
1 / A731 ENLARGED PLAN - BREAKROOM
1/8" = 1'-0"



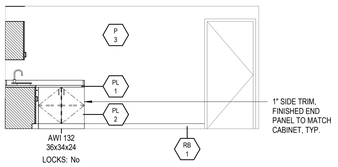
B3 / A731 BREAKROOM S ELEV
1/4" = 1'-0"



A1 / A731 ENLARGED PLAN -REGISTRAR BREAKROOM
1/8" = 1'-0"



A3 / A731 REGISTRAR BREAKROOM W ELEV
1/4" = 1'-0"



A4 / A731 REGISTRAR BREAKROOM N ELEV
1/4" = 1'-0"

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REGISTERED ARCHITECT VICTORIA ROSE BROWN 22666 STATE OF TEXAS

02/10/2023

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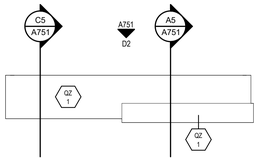
Title
ENLARGED PLANS AND ELEVATIONS

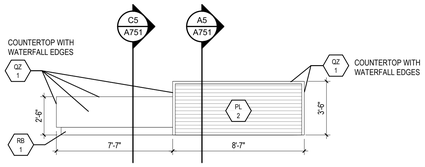
Project No. 2140001088
Scale As indicated
Revision
Drawing No. A731

Pick location in Project Information
2/10/2023 9:30:22 AM

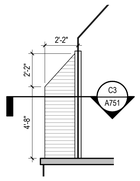
ORIGINAL SHEET - ARCH E1



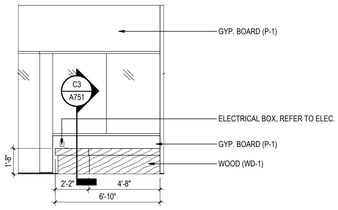
E1 A751 ENLARGED PLAN AT ISSC COUNTER
1/4" = 1'-0"



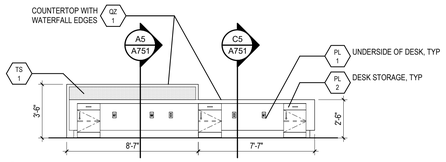
E2 A751 ELEVATION AT ISSC COUNTER
1/4" = 1'-0"



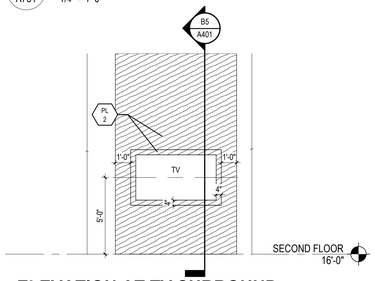
E4 A751 ENLARGED PLAN AT BENCH
1/4" = 1'-0"



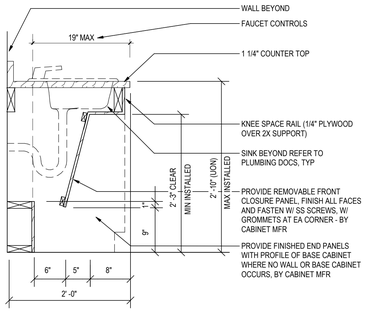
E5 A751 ELEVATION AT BENCH
1/4" = 1'-0"



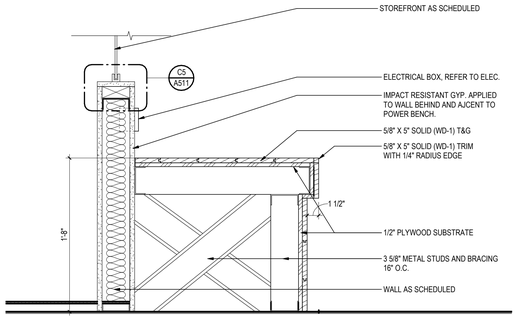
D2 A751 ELEVATION AT ISSC COUNTER - BACK
1/4" = 1'-0"



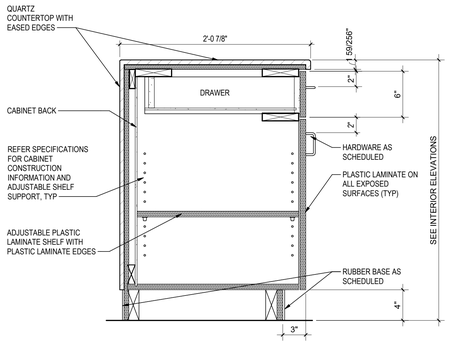
D5 A751 ELEVATION AT TV SURROUND
1/4" = 1'-0"



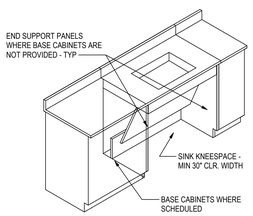
C1 A751 INTEGRAL ADA SINK SECTION
1" = 1'-0"



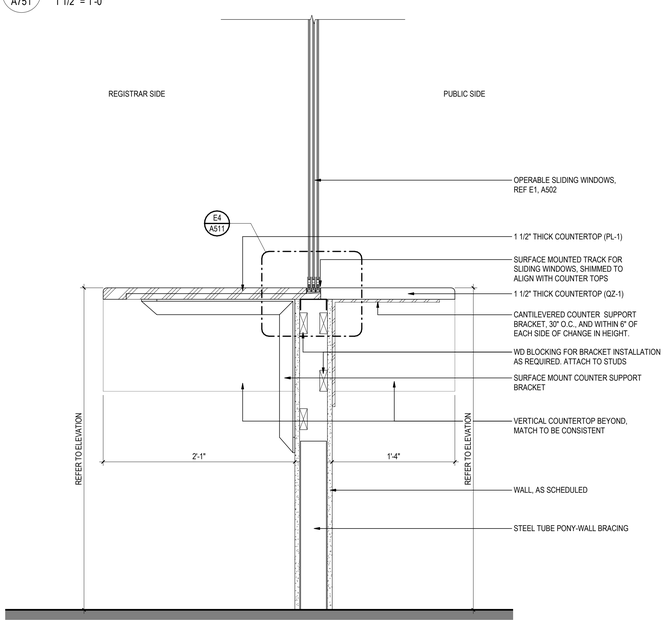
C3 A751 SECTION AT BENCH
1 1/2" = 1'-0"



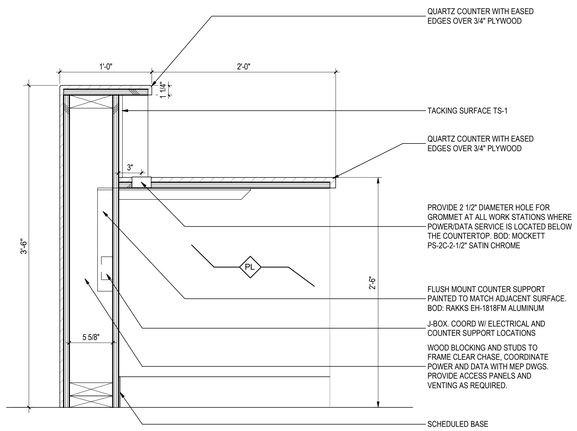
C5 A751 SECTION AT RECEPTION DESK - SEATED HEIGHT
1 1/2" = 1'-0"



A1 A751 ACCESSIBLE SINK ISOMETRIC VIEW
1" = 1'-0"



A3 A751 SECTION AT TRANSACTION COUNTER AND WORKSURFACE
1 1/2" = 1'-0"



A5 A751 SECTION AT RECEPTION DESK - TRANSACTION HEIGHT
1 1/2" = 1'-0"

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Notes

Revision	By	Appd	YYYY.MM.DD
ISSUE FOR CONSTRUCTION	AA	AS	2023/02/03
ISSUE FOR CONSTRUCTION - DEMOLITION	AA	AS	2023/01/09

Issued

By	Appd	YYYY.MM.DD

Permit/Seal

REGISTERED ARCHITECT VICTORIA ROSE BROWN 22086 STATE OF TEXAS

02/10/2023

Client/Project Logo

UNT

Client/Project
University of North Texas - Denton

EAGLE STUDENT SERVICES CENTER

Eagle Student Services Center 1147 Union Cir, Denton, TX 76201

Title
CASEWORK DETAILS

Project No. 2140001088

Scale As indicated

Revision

Drawing No. A751

ORIGINAL SHEET - ARCH E1

GENERAL NOTES - INTERIOR FINISH AND COLOR SCHEDULE:

1. MANUFACTURERS NAMES AND IDENTIFICATION NUMBERS ARE LISTED AS A MEANS OF ESTABLISHING A STANDARD OF TYPE, FUNCTION, COLOR, AND QUALITY. REFER TO PROJECT MANUAL FOR ADDITIONAL MANUFACTURERS & PROCEDURES.
2. THE CONTRACTOR SHALL SUBMIT TO THE ARCHITECT A SAMPLE OF ALL FINISH MATERIALS FOR APPROVAL BEFORE MATERIALS ARE APPLIED ON THE JOB.
3. VERIFY ALL GRAPHICS WITH THE ARCHITECT BEFORE PAINTING. GRAPHICS MAY NEED TO BE ADJUSTED AFTER ENLARGING TO REFLECT THE SAME COMPOSITION AS ON THE DRAWINGS.
4. TERMINATE ALL ACCENT PAINTS & VINYL WALL COVERING ON INSIDE CORNERS ONLY UNLESS OTHERWISE INDICATED.
5. PAINT ALL INTERIOR & EXTERIOR EXPOSED PIPING. VERIFY COLOR W/ ARCHITECT.
6. PAINT ANY VENTS, GRILLES, PIPING, FEC, ETC... SAME COLOR AS ADJACENT WALL.

   COLORS WILL BE MARKED AS SHOWN. NOTE ALL COLORS MAY NOT BE MARKED ON PLANS. MATERIALS NOT NOTED WILL BE COVERED UNDER GENERAL NOTES OR WILL BE PICKED ON THE JOB BY THE ARCHITECT.
7. UNDESIGNATED PAINTED GYPSUM BOARD WALLS TO BE MARK "P-1".
8. ALL INTERIOR WOOD DOORS & UNASSIGNED WOOD TRIM PIECES SHALL BE MARK "WS-1".
9. METAL HANDRAILS (INTERIOR) SHALL BE BRUSHED ALUMINUM.
10. ALL TOILET PARTITIONS SHALL BE AS SPECIFIED.
11. ALL BASE CABINETS, WALL CABINETS, AND MISC. CASE WORK SHALL BE MARK "PL-1".
12. ALL COUNTERTOPS SHALL BE MARK "PL-2", (U.O.N.); (I.E. TRANSACTION WINDOW OR RECEPTION DESK).
13. ALL EXPOSED STRUCTURAL STEEL INCLUDING ROOF DECK, JOISTS, GIRDERS, BEAMS AND ANY MISC. STEEL SHALL BE PAINTED MARK "P-X". DUCTS, DIFFUSERS AND AIR HANDLING UNITS SHALL BE GALVANIZED METAL.
14. LOW PROFILE TRANSITION STRIPS TO BE PLACED AT ANY FLOORING MATERIAL CHANGE.
15. SEAL ALL EXPOSED JOINTS BETWEEN DISSIMILAR MATERIALS INCLUDING, BUT NOT LIMITED TO: BETWEEN WALLS AND CASEWORK/ MILLWORK, WINDOW SILLS, BACKSPLASHES, PLUMBING FIXTURES, FIRE EXTINGUISHER CABINETS; WINDOW SILLS TO WINDOW FRAMES; RESILIENT FLOORING TO STAIR STRINGERS AND RISERS; BACKSPLASHES TO COUNTER TOPS; ETC. VERIFY SEALANT TYPE AND COLOR FOR EACH APPLICATION WITH ARCHITECT PRIOR TO INSTALLATION.

GENERAL NOTES - FURNISHING AND EQUIPMENT:

1. MODEL NUMBERS/MFR'S ARE LISTED ON CASEWORK ELEVATIONS SO THAT A MINIMUM DESIGN BASIS MAY BE ESTABLISHED. THE DIMENSIONS SHOWN (WXHXD) MAY DIFFER FROM THE SELECTED MFR'S STANDARD DIMENSIONS FOR THE LISTED MODEL NUMBERS.
2. PROVIDE SIDE, TOP, AND BOTTOM FILLER PIECES AS REQ'D TO COMPLETE CASEWORK INDICATED ON PLANS.
3. ALL FLOOR MOUNTED FIXTURES ARE TO HAVE THE SAME FINISH FACE MATERIAL AS THE ROOM IN WHICH THEY ARE LOCATED.
4. BLIND CABINETS, AT CORNERS, ARE TO BE LEFT OR RIGHT HAND AS REQ'D PER PLAN.
5. ALL CABINETS TO HAVE PLASTIC LAMINATE THROUGHOUT, INCLUDING ALL EXPOSED SUFACES INSIDE AND OUT.
6. PROVIDE PLASTIC LAMINATE FINISHED END PANELS AT EXPOSED CABINET ENDS INCLUDING KNEESPACES (TYP).
7. FIELD VERIFY DIMENSIONS PRIOR TO FABRICATION AND INSTALLATION OF ANY FIXTURES.
8. COUNTERTOPS TO HAVE PLASTIC LAMINATE SURFACE W/ 4" HIGH BACKSPLASH TYP, UON.
9. PROVIDE KEYED LOCKS AT CABINET DOORS AND DRAWERS, WHERE INDICATED.
10. KNEESPACE UNITS NOT RECEIVING SINKS SHALL RECEIVE GROMMETS CENTERED ON THE UNIT, 3" FROM THE BACK EDGE OF THE KNEESPACE UNIT (UON).
11. KNEESPACE UNITS IN THE ADMINISTRATION AREA TO HAVE MFR'S STANDARD COMPUTER KEYBOARD DRAWER (UON).
12. PROVIDE MFR'S STANDARD PENCIL DRAWER INSERT AT KNEESPACE UNITS W/ STANDARD DRAWERS (NOT KEYBOARD DRAWERS (UON).
13. SHELVES SHALL BE ADJUSTABLE (UON). SHELVES OVER 36" IN LENGTH SHALL BE 1" THICK.

INTERIOR FINISH SCHEDULE

MARK	MATERIAL	MANUFACTURER	COLOR	SPECS	REMARKS
CARPET TILE					
CPT-1	CARPET TILE	MILLIKEN	PATHWAY - PWY203 - FIELD	INSTALLED ASHLAR	OPEN OFFICE CARPET
CPT-2	CARPET TILE	MILLIKEN	PATHWAY - PWY108 - EXCURSION	INSTALLED ASHLAR	ENCLOSED OFFICE CARPET
CPT-3	CARPET TILE	MILLIKEN	PATHWAY - PWY276 - RIDGE	INSTALLED ASHLAR	ACCENT CARPET
CEILING TILE					
APC-1	CEILING TILE	ARMSTRONG	WHITE (WH)	1728 FINE FISSURED SQUARE LAYIN 24" X 24" TILE	GENERAL CEILING
APC-2	CEILING TILE	ARMSTRONG	COCOA BEAN	8223W06M1 (FXSE) METALWORKS LINEAR - SYNCHRO PLANKS 6" X 96" PERFORATED	ISSC LOBBY & CORRIDOR CLOUDS
COLUM WRAP					
PCLAD-1	COLUM WRAP	PAC-CLAD	BONE WHITE	100F	COLUMN WRAPS
LUXURY VINYL TILE					
LVT-1	LUXURY VINYL TILE	KARNDEAN	WORN FABRIC OAK LLP330	LOOSELAY LONGBOARD 59" X 10" PLANKS 20MIL WEAR LAYER	CORRIDORS
LVT-2	LUXURY VINYL TILE	MOHAWK	TERRAZZO C180	736 STRABE	BREAK ROOMS
PAINT					
P-1	PAINT	SHERWIN WILLIAMS	SW 7064 PASSIVE	SATIN FINISH	GENERAL PAINT
P-2	PAINT	SHERWIN WILLIAMS	SW 7005 PURE WHITE	FLAT FINISH	CEILING PAINT
P-3	PAINT	SHERWIN WILLIAMS	SW 6192 COASTAL PLAIN	SATIN FINISH	ACCENT PAINT
PLASTIC LAMINATE					
PL-1	PLASTIC LAMINATE	FORMICA	GREYSTONE 464-58 MATTE FINISH		COUNTERTOP
PL-2	PLASTIC LAMINATE	FORMICA	ASHWOOD OAK 5786-NG NATURAL GRAIN		CABINETS
PL-3	PLASTIC LAMINATE	PANOLAM	FRESH CUT GRASS SV750SD	TEXTURED/ SUEDE	PORTAL ENTRY
QUARTZ					
QZ-1	QUARTZ	SILESTONE	BLANCO MAPLE 14	SUEDE FINISH STANDARD SLAB 121" X 55"	RECEPTION AND TRANSACTION COUNTERTOP
RUBBER BASE					
RB-1	RUBBER BASE	TARKETT	168 THUNDER	4" RUBBER BASE	STRAIGHT BASE AT CARPET, COVED BASE AT HARD SURFACES
TACKING SURFACE					
TS-1	TACKING SURFACE	FORBO BULLETIN BOARD	2213 BABY LETTUCE	INSTALL IN RECEPTION DESK REFER TO DETAILS	CONFIRM FINAL SELECTION WITH CLIENT
TOILET PARTITION					
TP-1	TOILET PARTITION	FORMICA	FOG 961-58 MATTE FINISH		FLOOR MOUNTED OVERHEAD BRACED PARTITIONS
WALLCOVERING					
WC-1	WALLCOVERING	FILZFELT	CHEVRON BLOCK	4 COLOR RANDOM -378 OLIV, 713 KIWI, 170 ASCHE, 150 WEIB	PREP WALLS AS DRIECTED BY MANUFACTURER
WC-2	WALLCOVERING	TBD - WITH CLIENT APPROVAL	CUSTOM GRAPHICS	TYPE II VINYL WALLCOVERING	PREP WALLS TO SMOOTH LEVEL 5 FINISH
WOOD					
WD-1	WOOD	WOODWRIGHT	TEXAS POST OAK #67000	5" PLANK SOLID WOOD	MILLWORK BENCH

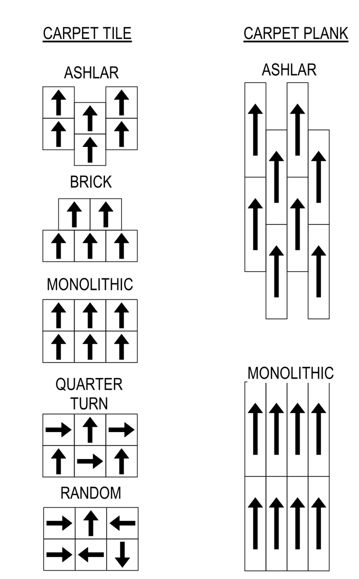
ALTERNATE NOTE:
A1 – DEDUCTIVE ALTERNATE TO PROVIDE CPT IN LIEU OF LVT AT SECOND FLOOR MAIN CORRIDOR.
IF ACCEPTED, CORRIDOR LVT-1 WILL BECOME CPT-2.

GENERAL NOTES - ROOM FINISHES:

1. COORDINATE INTERIOR FINISHES WITH PARTITION TYPES.
2. FLOOR MATERIAL CHANGES BETWEEN ROOMS TO OCCUR UNDER DOOR (UON)
3. PAINT EXPOSED JOISTS, DECK, & ALL MISC. ITEMS, TYP. REFER TO GENERAL FINISH SCHEDULE NOTES ON A801
4. ALL APC SHALL BE PER THE FOLLOWING GUIDELINES:
   APC-1 24"x24" STANDARD SIZE AS SPECIFIED
   APC-2 24"x48" STANDARD SIZE "VINYL FACED" AS SPECIFIED
5. REFER TO LIGHTING PLANS & REFLECTED CEILING PLAN SHEETS FOR ACP TYPE/HEIGHT, CEILING GRID LAYOUT & BULKHEAD LOCATIONS (U.O.N.). REFER MEP DOCS.
6. PROVIDE CJ's AT GYP. BD. CEILINGS AT 50'-0"OC MAX. (U.O) PROVIDE CJ's AT WALLS/BLKHDS AT 30'-0"OC MAX. (U.O.N.)
7. ALL SUSPENDED GYP. BD. TO BE PAINTED. REFER REFLECTED CEILING PLANS AND GENERAL FINISH SCHEDULE NOTES ON A801.
8. SEE FLOOR PATTERN PLANS FOR EXTENTS AND TYPE OF FLOORING FINISHES
9. ALL CMU TO BE PAINTED. REFER GENERAL FINISH SCHEDULE NOTES ON A801

ROOM FINISH SCHEDULE

Number	Room Name	Base Finish	Floor Finish	Wall Finish	Ceiling Finish
101	CLSRM	RB-1	CPT-1	P-1	EXIST
102	ASST. REGISTRAR	RB-1	CPT-2	P-1	EXIST
103	ASST. REGISTRAR	RB-1	CPT-2	P-1	EXIST
104	ASSOC. REGISTRAR	RB-1	CPT-2	P-1	EXIST
105	ASSIST. REGISTRAR	RB-1	CPT-2	P-1	EXIST
106	REGISTRAR	RB	CPT-1	P-1	APC-1/ GYP-1
107	RESTROOM	EXIST	EXIST	EXIST	EXIST
108	RESTROOM	EXIST	EXIST	EXIST	EXIST
109	REGISTRAR BREAKROOM	RB-1	LVT-1	P-1/ P-3	EXIST
110	DEPUTY REGISTRAR	RB-1	CPT-3	P-1	EXIST
111	ASSOC. VP ENROLLMENT	RB-1	CPT-3	P-1	EXIST
112	ASST. DIR. - BUDGET	RB-1	CPT-3	P-1	EXIST
113	ADMIN.	RB-1	CPT-3	P-1	EXIST
114	ASSOC. REGISTRAR	RB-1	CPT-3	P-1	EXIST
115	ASST. REGISTRAR	RB-1	CPT-3	P-1	EXIST
116	SWING OFFICE	RB-1	CPT-3	P-1	EXIST
117	REGISTRAR	RB-1	CPT-1	P-1	APC-1/ GYP-1
118	OFFICE	RB-1	CPT-3	P-1	EXIST
119	STUDENT ACCOUNTING	RB-1	CPT-1	P-1	APC-1/ GYP-1
120	OFFICE	RB-1	CPT-3	P-1	EXIST
121	STORAGE	RB-1	CPT-3	P-1	APC-1
122	OFFICE	RB-1	CPT-3	P-1	EXIST
123	OFFICE	RB-1	CPT-3	P-1	EXIST
124	OFFICE	RB-1	CPT-3	P-1	EXIST
125	OFFICE	RB-1	CPT-3	P-1	EXIST
126	STORAGE	RB-1	CPT-3	P-1	EXIST
127	STUDENT ACCOUNTING	RB-1	CPT-1	P-1	EXIST
128	OFFICE	RB-1	CPT-3	P-1	EXIST
129	OFFICE	RB-1	CPT-3	P-1	EXIST
130	ASST. REGISTRAR	RB-1	CPT-3	P-1	APC-1
132	ASST. REGISTRAR	RB-1	CPT-3	P-1	APC-1
133	ASSOC. REGISTRAR	RB-1	CPT-3	P-1	APC-1
134	MEN'S RESTROOM	EXIST	EXIST	EXIST	APC-1/ EXIST
135	WOMEN'S RESTROOM	EXIST	EXIST	EXIST	APC-1/ EXIST
135A	ANTE ROOM	RB-1	EXIST	EXIST	APC-1
200	CORRIDOR	RB-1	CPT-1	P-1	APC-1/ GYP-1
200A	CORRIDOR	RB-1	CPT-1/ CPT-3		APC-1/ GYP-1
200B	ISSC	RB-1	CPT-1/ CPT-3		APC-2
200C	ISSC	RB-1	CPT-1		APC-1
201	ISSC LOBBY	RB-1	CPT-1/ CPT-3	P-1	APC-1/ GYP-1/ APC-2
202	ISSC AVP	RB-1	CPT-2	P-1	APC-1
203	SMMC Director	RB-1	CPT-2	P-1	EXIST
204	DIRECTOR IC	RB-1	CPT-2	P-1	EXIST
205	ISSC	RB-1	CPT-1	P-1	APC-1
206	SMMC Sr Coord	RB-1	CPT-2	P-1	EXIST
207	SMMC Assoc Dir	RB-1	CPT-2	P-1	EXIST
208	SMMC Assoc Dir	RB-1	CPT-2	P-1	APC-1
209	ASSOC DIR	RB-1	CPT-2	P-1	APC-1/ GYP-1
210	ISSC	RB-1	CPT-2	P-1	APC-1
211	CORRIDOR	RB-1	LVT-1	P-1	APC-1/ GYP-1
212	FIN AID	RB-1	CPT-1	P-1	APC-1/ GYP-1
213	FIN AID	RB-1	CPT-1	P-1	APC-1
214	ASST. DIR. - LOANS	RB-1	CPT-2	P-1	EXIST
215	ASST. DIR.- QA	RB-1	CPT-2	P-1	EXIST
216	ASST. DIR - E&V	RB-1	CPT-2	P-1	EXIST
217	ASST. DIR. - GRANTS	RB-1	CPT-2	P-1	EXIST
218	OFF. MNGR. - IMAGING	RB-1	CPT-2	P-1	EXIST
219	DIRECTOR	RB-1	CPT-2	P-1	APC-1
220	ASST. DIR. - PM	RB-1	CPT-2	P-1	EXIST
221	BREAKROOM	RB-1	LVT-1	P-1/ P-3	EXIST
221A	RESTROOM	EXIST			EXIST
222	IMAGING	RB-1	CPT-2	P-1	EXIST
223	DIRECTOR - OPERATIONS	RB-1	CPT-2	P-1	EXIST
224	CONFERENCE	RB-1	CPT-2	P-1	EXIST
225	ASST. VP - AID & SCHOLARRSHIPS	RB-1	CPT-2	P-1	EXIST
226	ASSOC. DIR. - COMP/GRANTS/SP	RB-1	CPT-2	P-1	EXIST
227	DIR. - E/QA/T	RB-1	CPT-2	P-1	EXIST
228	COPY ROOM	RB-1	LVT-1	P-1	EXIST
229	OPEN	RB-1	CPT-2	P-1	EXIST
230	SCHOLARSHIP SUITE	RB-1	CPT-2	P-1	APC-1
231	ASST. DIRECTOR - SCHOLARSHIPS	RB-1	CPT-2	P-1	APC-1
232	DIR SCHOLARSHIPS	RB-1	CPT-2	P-1	APC-1
233	FLEX ROOM	RB-1	CPT-2	P-1	EXIST
234	FLEX ROOM	RB-1	CPT-2	P-1	EXIST
235	FLEX ROOM	RB-1	CPT-2	P-1	EXIST
236	FLEX ROOM	RB-1	CPT-2	P-1	EXIST
237	CORRIDOR	EXIST	EXIST	EXIST	EXIST
238	MENS RESTROOM	EXIST	EXIST	EXIST	EXIST
239	WOMENS RESTROOM	EXIST	EXIST	EXIST	EXIST



5 / A801 **INSTALLATION PATTERN LEGEND**
12" = 1'-0"

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Notes

Revision	By	Appd	YYYY.MM.DD

Issued	By	Appd	YYYY.MM.DD
ISSUE FOR CONSTRUCTION	AA	AS	2023/02/03
ISSUE FOR CONSTRUCTION - DEMOLITION	AA	AS	2023/01/09

Permit/Seal
REGISTERED ARCHITECT
VICTORIA ROSE BROWN
22568
STATE OF TEXAS
02/10/2023

Client/Project Logo
UNT

Client/Project
University of North Texas - Denton

EAGLE STUDENT SERVICES CENTER

Eagle Student Services Center 1147 Union Cir, Denton, TX 76201

Title
FINISH SCHEDULES

Project No.
2140001088

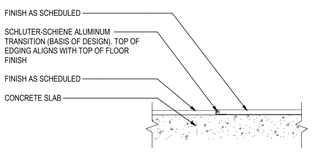
Scale
As indicated

Revision

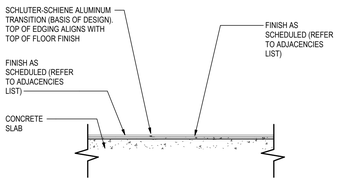
Drawing No.
A801

<Pick location in Project Information>
2/10/2023 9:30:25 AM

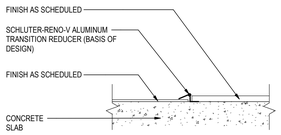
ORIGINAL SHEET - ARCH E1



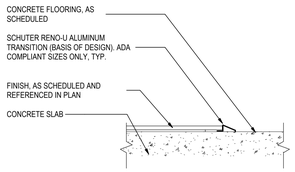
C1 A804 **FLOOR TRANSITION DETAIL**
3" = 1'-0"



C3 A804 **FLOOR TRANSITION "L" DETAIL, TYP.- AJS**
1 1/2" = 1'-0"



B1 A804 **FLOOR TRANSITION REDUCER, TYP.**
3" = 1'-0"



B2 A804 **FLOOR TRANSITION TO SUBFLOOR, TYP.**
3" = 1'-0"

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ISSUE FOR CONSTRUCTION	AA	AS	2023/02/03
ISSUE FOR CONSTRUCTION - DEMOLITION	AA	AS	2023/01/09

Issued

Permit/Seal

REGISTERED ARCHITECT VICTORIA ROSE BROWN 22686 STATE OF TEXAS
02/10/2023

Client/Project Logo

Client/Project
University of North Texas - Denton

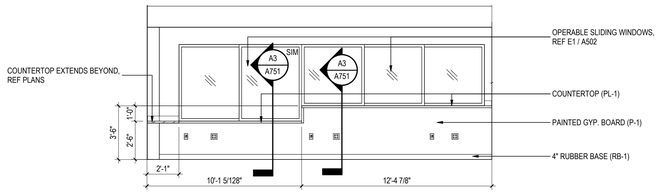
EAGLE STUDENT SERVICES CENTER

Eagle Student Services Center 1147 Union Cir, Denton, TX 76201

Title
TRANSITION DETAILS

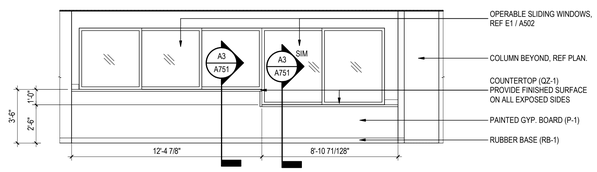
Project No. 2140001088
Scale As indicated
Revision
Drawing No. **A804**

ORIGINAL SHEET - ARCH E1



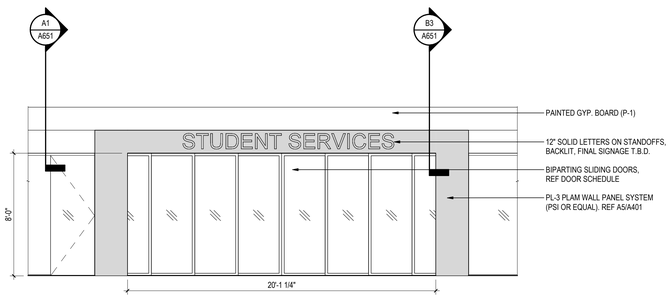
B1 / A821 **ELEVATION AT REGISTRAR TRANSACTION COUNTER - INT**

1/4" = 1'-0"



A1 / A821 **ELEVATION AT REGISTRAR TRANSACTION COUNTER - EXT**

1/4" = 1'-0"



A3 / A821 **ELEVATION AT ISSC ENTRANCE**

1/4" = 1'-0"

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Notes

Revision	By	Appd	YYYY.MM.DD
ISSUE FOR CONSTRUCTION	AA	AS	2023/02/03
ISSUE FOR CONSTRUCTION - DEMOLITION	AA	AS	2023/01/09

Issued

Permit/Seal

REGISTERED ARCHITECT VICTORIA ROSE BROWN 22668 STATE OF TEXAS

02/10/2023

Client/Project Logo

UNT

Client/Project

University of North Texas - Denton

EAGLE STUDENT SERVICES CENTER

Eagle Student Services Center 1147 Union Cir, Denton, TX 76201

Title

INTERIOR ELEVATIONS

Project No. 2140001088

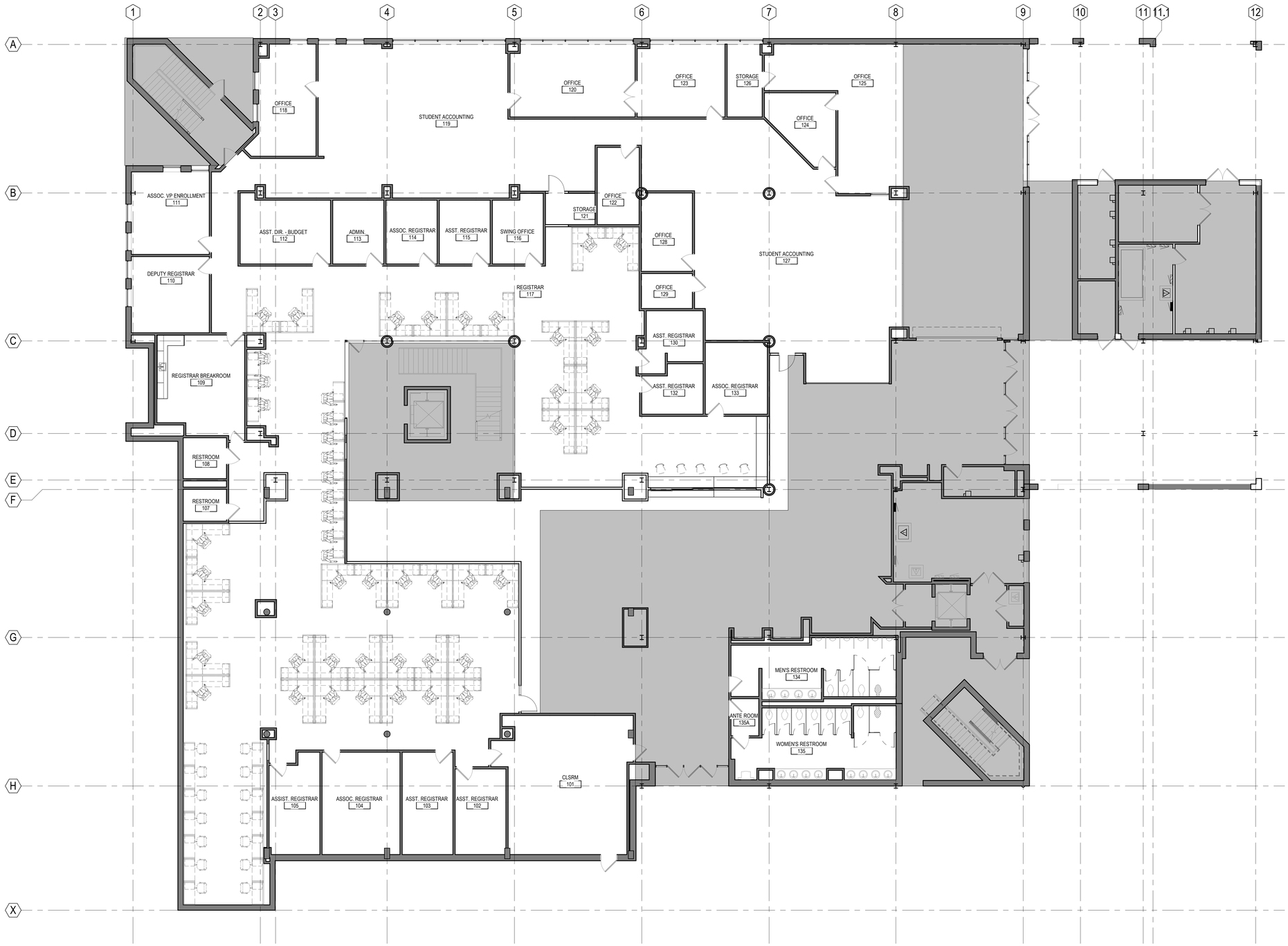
Scale 1/4" = 1'-0"

Revision

Drawing No. **A821**

Pick location in Project Information
2/10/2023 9:30:27 AM

ORIGINAL SHEET - ARCH E1



1 A901 **FIRST FLOOR FURNITURE PLAN**
1/8" = 1'-0"

NOTE: FURNITURE NOT IN SCOPE. LAYOUTS SHOWN FOR REFERENCE AND COORDINATION ONLY.

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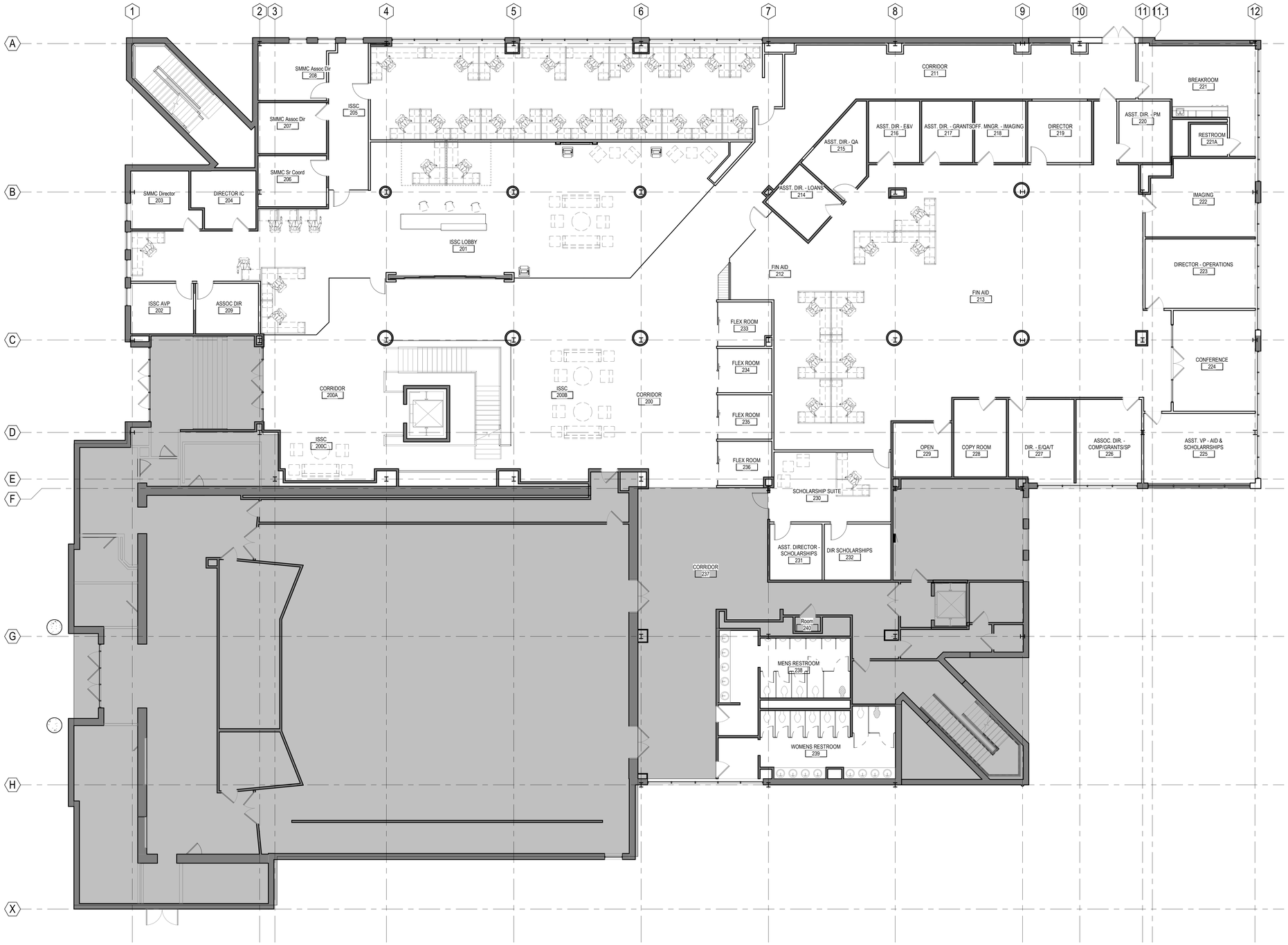
Title
LEVEL 1 FURNITURE PLAN

Project No. 2140001088
Scale 1/8" = 1'-0"
Revision
Drawing No. A901

<Pick location in Project Information>
2/10/2023 9:30:30 AM
ORIGINAL SHEET - ARCH E1



1 SECOND FLOOR FURNITURE PLAN

A902 1/8" = 1'-0"

NOTE: FURNITURE NOT IN SCOPE. LAYOUTS SHOWN FOR REFERENCE AND COORDINATION ONLY.

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ISSUE FOR CONSTRUCTION - DEMOLITION	AA	AS	2023/01/09

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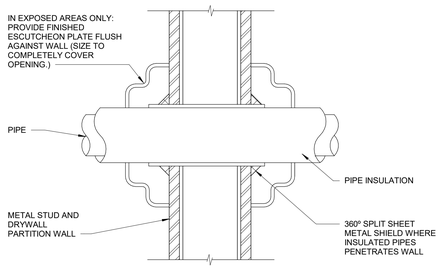
Title
LEVEL 2 FURNITURE PLAN

Project No. 2140001088
Scale 1/8" = 1'-0"
Revision
Drawing No. A902

ORIGINAL SHEET - ARCH E1

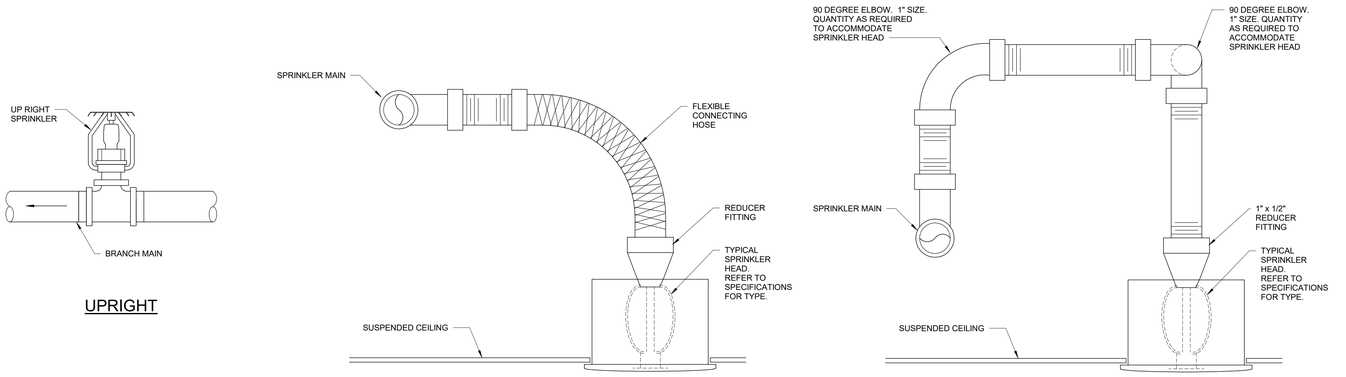


NOTES:

1. PIPE PENETRATION DETAIL SIMILAR FOR UNINSULATED PIPING.

METAL STUD AND DRYWALL WALL PIPE PENETRATION DETAIL

4 / FP100 N.T.S.



TYPICAL SPRINKLER HEAD DETAILS

3 / FP100 N.T.S.

FIRE PROTECTION GENERAL DEMOLITION NOTES

1. ANY INTERRUPTIONS OF EXISTING SERVICES OR EQUIPMENT SHALL BE PERFORMED AT A TIME APPROVED IN ADVANCE BY THE OWNER'S REPRESENTATIVE SO AS NOT TO INTERFERE WITH THE BUILDING OPERATION.
2. THESE DRAWINGS INDICATE THE GENERAL EXTENT OF WORK. THE EXTENT OF DEMOLITION SHALL BE AS REQUIRED BY THE NEW WORK AND REMOVAL OF MATERIALS/COMPONENTS NOT REQUIRED FOR THE NEW AND RENOVATED SYSTEMS.
3. ALL FIRE PROTECTION SYSTEMS TO BE REMOVED SHALL BE REMOVED COMPLETE WITH ALL RELATED ITEMS INCLUDING HANGERS, SUPPORTS, CONTROLS, ETC., CAP ALL OPEN PIPES. PATCH AND SEAL ALL OPENINGS AS A RESULT OF DEMOLITION IN RATED WALLS TO MAINTAIN EXISTING WALL'S FIRE OR SMOKE RATING AND TO MATCH EXISTING ADJACENT SURFACES.
4. ALL ITEMS AND EQUIPMENT REMOVED SHALL REMAIN PROPERTY OF THE OWNER UNLESS POSSESSION RIGHTS ARE WAIVED. CONTRACTOR SHALL MEET WITH OWNER PRIOR TO START OF DEMOLITION TO DETERMINE WHICH ITEMS ARE TO BE SALVAGED. CONTRACTOR SHALL REMOVE REMAINING ITEMS FROM SITE.
5. FIELD VERIFY EXACT SIZE AND LOCATION OF ALL EXISTING SERVICES PRIOR TO START OF DEMOLITION.

FIRE PROTECTION GENERAL NOTES

1. THE INFORMATION CONTAINED ON THESE DRAWINGS IS GENERAL INFORMATION AND FOR BID PURPOSES ONLY. FIRE SPRINKLER CONTRACTOR SHALL LAYOUT SYSTEM, PERFORM REQUIRED CALCULATIONS, AND COORDINATE WITH WORK OF ALL OTHER TRADES.
2. THE SCOPE OF WORK FOR THIS PROJECT INCLUDES MODIFYING EXISTING WET-PIPE, AUTOMATIC FIRE SPRINKLER SYSTEM FOR THE AREA OF WORK SHOWN ON THE DRAWINGS. THE FIRE SPRINKLER CONTRACTOR WHO WILL BE PERFORMING THE SCOPE OF WORK SHALL BE APPROVED AND STATE LICENSED FOR THE DESIGN AND INSTALLATION OF FIRE PROTECTION SYSTEMS. THE WORK SHALL BE PERFORMED ONLY BY A CONTRACTOR WHOSE WORKMEN ARE EXPERIENCED AND REGULARLY ENGAGED IN THE INSTALLATION OF FIRE PROTECTION SYSTEMS. CONTRACTOR SHALL BE CAPABLE OF PREPARING HYDRAULIC CALCULATIONS AND SYSTEM LAYOUTS.
3. FLOOR PLANS INCLUDED IN THIS SET SHOW THE PORTIONS OF THE BUILDING THAT ARE LOCATED WITHIN THE SCOPE OF WORK FOR THE PROJECT. AREAS LOCATED IMMEDIATELY ADJACENT TO THE SCOPE OF WORK FOR THE PROJECT, SHOWN AS BEING OUTSIDE OF THE SCOPE OF WORK WITH GRAY SHADING, SHALL NOT BE MODIFIED AS A PART OF THIS PROJECT.
4. SPRINKLER SYSTEM DESIGN, INSTALLATION AND MATERIALS UTILIZED SHALL BE IN ACCORDANCE WITH NFPA13. SYSTEM SHALL MEET ALL APPLICABLE BUILDING CODES, FIRE CODES, AND THE REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION AND INSURANCE CARRIER. FIRE SPRINKLER CONTRACTOR SHALL VERIFY REQUIREMENTS PRIOR TO BID.
5. THE FIRE PROTECTION CONTRACTOR SHALL COMPLY WITH ALL SPECIFICATIONS ISSUED BY THE UNIVERSITY OF NORTH TEXAS SYSTEM FIRE MARSHALL. CONTACT THE UNIVERSITY OF NORTH TEXAS SYSTEM FACILITIES OFFICE TO OBTAIN THE MOST CURRENT SPECIFICATIONS FOR THE FIRE PROTECTION SYSTEM.
6. SHOP DRAWINGS SHALL BE PROVIDED BY THE FIRE PROTECTION CONTRACTOR AND SHALL BE REVIEWED BY THE AUTHORITY HAVING JURISDICTION. APPROVAL BY THE AUTHORITY HAVING JURISDICTION MUST BE RECEIVED PRIOR TO PROCEEDING WITH THE WORK.
7. THE FIRE SPRINKLER CONTRACTOR SHALL VERIFY DESIGN CRITERIA AND RATING HAZARDS WITH THE OWNER'S INSURER PRIOR TO DESIGNING THE SYSTEM. WATERFLOW AND PRESSURE TEST DATA SHALL BE ACQUIRED BEFORE SYSTEM IS CALCULATED AND BE DATED NO MORE THAN 12 MONTHS PRIOR TO THE SUBMITTAL OF THE FIRE SPRINKLER SHOP DRAWINGS. ARRANGEMENTS FOR AND COST OF THE FLOW TESTS SHALL BE THE FIRE SPRINKLER CONTRACTOR'S RESPONSIBILITY.
8. HYDRAULIC CALCULATIONS SHALL BE SUBMITTED, INCLUDING SUPPLY AND DEMAND GRAPH. ALL HYDRAULIC REFERENCE POINTS AND AREA OF APPLICATION SHALL APPEAR ON THE PLAN. FIRE SPRINKLER CONTRACTOR SHALL VERIFY WITH AUTHORITY HAVING JURISDICTION ANY MINIMUM SAFETY FACTOR REQUIREMENTS. DEMAND SHALL NOT BE LESS THAN 10 PERCENT BELOW THE SUPPLY AT THE DEMAND POINT.
9. THE FIRE PROTECTION CONTRACTOR SHALL UTILIZE THE FOLLOWING HAZARD CLASSIFICATIONS DESIGN DENSITIES AS REQUIRED PER NFPA 13. FOR LIGHT HAZARD AREAS – 0.10 GPM/SF OVER THE HYDRAULICALLY REMOTE 1500 SF AREA. INCLUDE MINIMUM 100 GPM HOSE ALLOWANCE ADDED AT THE BASE OF RISER. FOR ORDINARY HAZARD GROUP 1 AREAS - 0.15 GPM/SF OVER THE HYDRAULICALLY REMOTE 1500 SF AREA OR ENTIRE AREA, WHICHEVER IS SMALLER. INCLUDE MINIMUM 250 GPM HOSE ALLOWANCE ADDED AT THE BASE OF RISER.
10. RELOCATE AND / OR PROVIDE ADDITIONAL SPRINKLERS, PIPING, HANGERS, ETC.. COORDINATE WITH WALLS, CEILINGS, LIGHTS, DIFFUSERS, DUCTWORK, PIPING, STRUCTURAL COMPONENTS, AND ANY OTHER OBSTRUCTIONS IN AREAS AFFECTED BY SCOPE OF WORK.
11. COORDINATE SPRINKLER SYSTEM MODIFICATIONS TO MINIMIZE SYSTEM IMPAIRMENT. ALL SYSTEMS TO BE LEFT IN SERVICE PRIOR TO THE END OF EACH WORKDAY. PROVIDE FIRE WATCH AND INTERIM FIRE PROTECTION MEASURES WHERE REQUIRED BY THE AUTHORITY HAVING JURISDICTION, INSURANCE CARRIER, OR OWNER.
12. ALL NEW SYSTEM COMPONENTS SHALL BE INSTALLED IN STRICT ACCORDANCE WITH THE EQUIPMENT MANUFACTURER'S RECOMMENDATIONS AND NFPA 13.
13. INSPECT AND REPLACE ALL EQUIPMENT AND PIPING THAT IS DAMAGED OR BENT. HEADS THAT ARE PAINTED OTHER THAN THE ORIGINAL PAINT SHALL BE REPLACED.
14. REMOVE ALL UNUSED AND DEMOLISHED SYSTEM COMPONENTS FROM SITE. ABANDONING UNUSED PORTIONS OF THE SYSTEM WILL NOT BE ACCEPTABLE.
15. AVOID DAMAGING EXISTING SURFACES AND EQUIPMENT TO REMAIN FOR NEW INSTALLATION. REPAIR ANY DAMAGE CAUSED DURING WORK AT NO EXTRA COST TO THE OWNER.
16. PROVIDE ALL FITTINGS, TRANSITIONS, VALVES, AND OTHER DEVICES REQUIRED FOR A COMPLETE WORKABLE INSTALLATION.
17. COORDINATE LOCATIONS OF ALL SPRINKLER HEADS WITH ARCHITECTURAL REFLECTED CEILING PLANS AND ELECTRICAL LIGHTING LAYOUT. SUBMIT LAYOUT DRAWINGS FOR ARCHITECTURAL APPROVAL.
18. ALL SPRINKLER HEADS SHALL BE CENTERED BOTH WAYS IN ACOUSTICAL CEILING TILES UNLESS NOTED OTHERWISE.

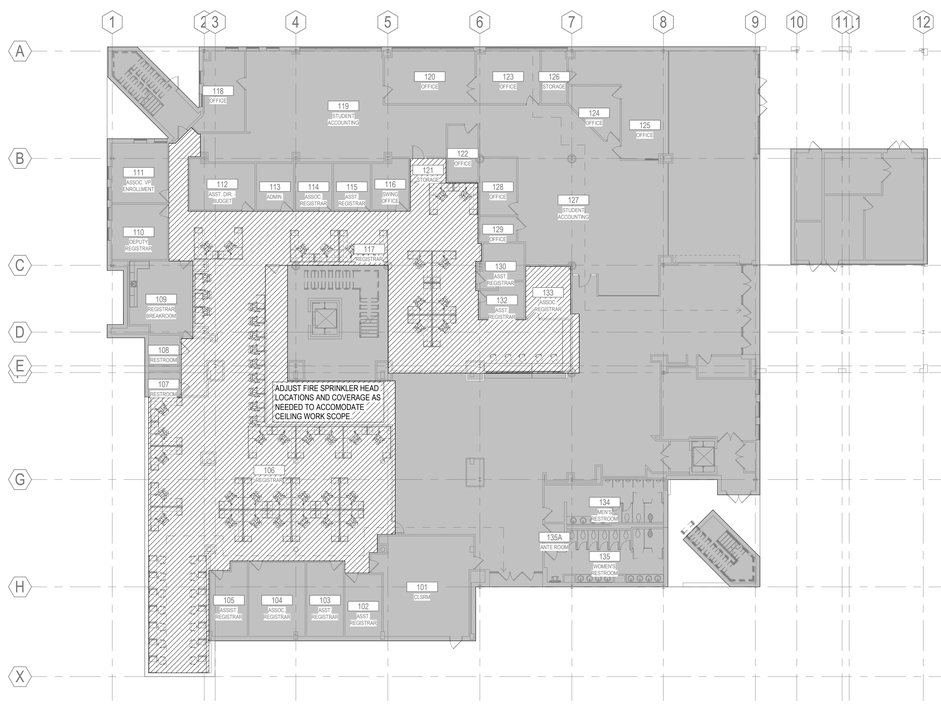
FIRE PROTECTION GENERAL NOTES

19. ALL SPRINKLER HEADS SHALL BE UL LISTED.
20. SPRINKLER PIPING 2 INCHES AND SMALLER SHALL BE SCHEDULE 40 BLACK STEEL. SPRINKLER PIPING 2-1/2 INCHES AND LARGER SHALL BE SCHEDULE 10 OR SCHEDULE 40 BLACK STEEL. PIPES SHALL HAVE WELDED, THREADED, OR MECHANICALLY JOINED FITTINGS, BASED ON THE PIPE MATERIAL AND SIZE PER NFPA 13 REQUIREMENTS.
21. PROVIDE QUICK RESPONSE SPRINKLERS IN ALL LIGHT HAZARD AREAS. THE HYDRAULIC AREA OF OPERATION SHALL NOT BE REDUCED AS ALLOWED BY NFPA 13 FOR AREAS UTILIZING QUICK RESPONSE SPRINKLERS.
22. SPRINKLER HEAD SPACING SHALL CONFORM TO NFPA 13.
23. PIPES SHALL BE SUPPORTED AND BRACED ACCORDING TO NFPA 13.
24. PROVIDE A ONE-INCH MINIMUM BRANCH TO SPRINKLER HEADS. DO NOT CONNECT MORE THAN ONE SPRINKLER TO AN EXISTING ONE-INCH BRANCH PIPE.
25. DESIGN SHALL ALLOW FOR SUITABLE DRAINAGE OF SYSTEM.
26. COORDINATE PIPE ROUTING NEAR ELECTRICAL EQUIPMENT WITH NFPA 70.
27. COORDINATE SPRINKLER TEMPERATURES NEAR HEAT-PRODUCING SOURCES WITH NFPA-13.
28. SPRINKLERS IN AREAS WITH GYPSUM BOARD CEILINGS SHALL BE FULLY CONCEALED TYPE WITH WHITE COVERPLATES.
29. SPRINKLERS IN AREAS WITH SUSPENDED ACOUSTICAL CEILINGS SHALL BE CHROME PLATED RECESSED TYPE WITH CHROME PLATED ESCUTCHEONS.
30. SPRINKLERS IN AREAS WITH EXPOSED PIPING MAY BE PENDENT OR UPRIGHT TYPES WITH ROUGH BRASS FINISH.
31. UPON COMPLETION OF INSTALLATION, SPRINKLER SYSTEM SHALL BE TESTED IN CONFORMANCE WITH THE AUTHORITY HAVING JURISDICTION. THE FIRE SPRINKLER CONTRACTOR SHALL NOTIFY THE AUTHORITY HAVING JURISDICTION A MINIMUM OF FIVE (5) WORKING DAYS PRIOR TO MAKING SPRINKLER SYSTEM TESTS. CONCEALED WORK SHALL REMAIN UNCOVERED UNTIL THE REQUIRED TESTS HAVE BEEN COMPLETED, BUT IF NECESSARY DUE TO CONSTRUCTION PROCEDURE. TESTS ON PORTIONS OF THE WORK MAY BE MADE, AND IF SATISFACTORY, THE WORK MAY BE CONCEALED. FORWARD COMPLETED CONTRACTOR TEST CERTIFICATES TO THE OWNER AFTER THE TESTS HAVE BEEN COMPLETED AND SIGN OFF BY THE AUTHORITY HAVING JURISDICTION HAS OCCURRED.

THIS DOCUMENT IS A DELEGATED DESIGN DOCUMENT. IT IS NOT INTENDED FOR PERMITTING AND IS ONLY PROVIDED AS INFORMATION TO ASSIST THE FIRE PROTECTION SUB-CONTRACTOR DURING THE BID PHASE TO PROVIDE A MORE COMPREHENSIVE BID.

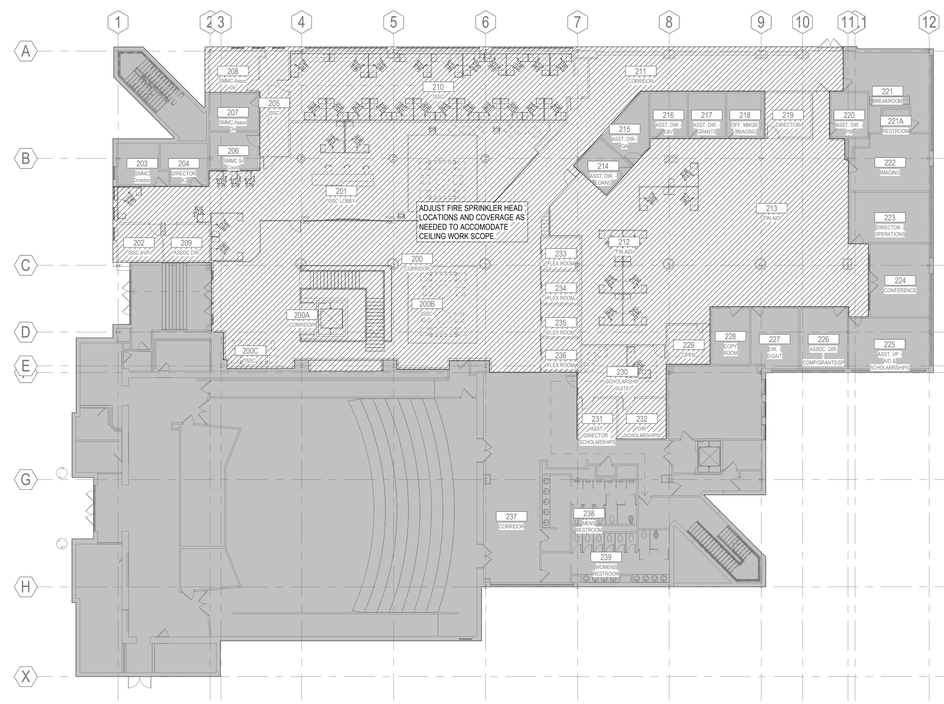
FIRE SPRINKLER HAZARD LEGEND (REF. NFPA 13)

- LIGHT HAZARD CLASSIFICATION
- LIGHT HAZARD CLASSIFICATION - DRY PIPE SYSTEM
- ORDINARY HAZARD GROUP 1 CLASSIFICATION
- ORDINARY HAZARD GROUP 2 CLASSIFICATION
- NOT IN SCOPE



FIRE PROTECTION PLAN - FIRST FLOOR

1 / FP100 1/16" = 1'-0"



FIRE PROTECTION PLAN - SECOND FLOOR

2 / FP100 1/16" = 1'-0"

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ISSUE FOR CONSTRUCTION			2023.02.03
Issued	By	Appd	YYYY.MM.DD

Permit/Seal

Texas Firm Registration No. 13678
ISP: 2023.11.30

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University of North Texas - Denton

EAGLE STUDENT SERVICES CENTER

Eagle Student Services Center 1147 Union Cir, Denton, TX 76201

Title
FIRE PROTECTION PLANS - OVERALL

Project No. 2140001088
Scale As indicated
Revision
Drawing No. **FP100**

ORIGINAL SHEET - ARCH E1
*PCS location in Project Information
2/3/2023 12:39:10 PM

DOOR BUZZERS

- PUSH BUTTON
- BUZZER HORN
- BUZZER HORN AND VISUAL INDICATOR

SITE UTILITIES

- HH — HANDHOLE
- M — SITE METER
- MH — MANHOLE
- PMH — PRIMARY MANHOLE
- SMH — SECONDARY MANHOLE
- TMH — TELECOMMUNICATIONS MANHOLE

SITE UTILITY POLES

- CATV ONLY
- COMBINED SERVICES
- POWER ONLY
- TELECOM ONLY
- STEPDOWN TRANSFORMER, POLE MOUNTED

POWER DEVICES

- TV — TELEVISION/LED/MONITOR. RF SIGNAL AND POWER OUTLET (JUNCTION BOX AND CONDUIT BY ELECTRICAL CONTRACTOR, DEVICES BY OTHERS). REFER TO DETAIL ON E500 SERIES DRAWINGS.
- TW1 — TEACHER'S WORK STATION. REFER TO DETAILS ON E500 SERIES DRAWINGS.
- WSX — WORK STATION OUTLET DETAIL. REFER TO DETAILS ON E500 SERIES DRAWINGS.
- PR — CEILING MOUNTED VIDEO PROJECTOR STATION. REFER TO DETAIL ON DRAWING E500 SERIES DRAWINGS.
- PR — SHORT-THROW VIDEO PROJECTOR STATION. REFER TO DETAIL ON DRAWING E500 SERIES DRAWINGS.

TELECOM OUTLETS

- OUTLET
- OUTLET, CEILING MOUNTED
- FURNITURE SYSTEMS OUTLET
- OUTLET, MOUNTED IN FLOOR BOX
- OUTLET, MOUNTED IN POKE THRU
- OUTLET, MOUNTED IN POWER POLE

TELECOM OUTLET TYPES

- \# — # INDICATES QUANTITY OF DATA JACKS, PULLSTRING ALWAYS PROVIDED. WHERE NO QUANTITY IS NOTED, 2 DATA JACKS AND PULLSTRING.
- AC — MOUNTED 3" ABOVE COUNTER BACKSPLASH
- B — BLANK FACEPLATE, ROUGH-IN ONLY
- D — DIRECT CONNECTION TO PANEL
- M — PATIENT MONITORING
- P — PAY TELEPHONE
- R — RACEWAY MOUNTED
- W — WALL MOUNTED TELEPHONE HANDSET OUTLET
- WAP — WIRELESS ACCESS POINT CONNECTION

FIRE ALARM

- FAA — FIRE ALARM ANNUNCIATOR
- FACP — FIRE ALARM CONTROL PANEL
- DH — DOOR HOLDER

WORK DEFINITION

- NEW WORK
- EXISTING
- REMOVE EXISTING
- REMOVE EXISTING ELECTRICAL EQUIPMENT
- FUTURE
- TEMPORARY, AS NOTED
- ?:## — KEY NOTE
- ??? — EQUIPMENT IDENTIFICATION

CIRCUITS

- RACEWAY CONCEALED IN CEILING OR WALL. EXPOSED RACEWAY IS ALLOWED ONLY WHERE NOTED.
- RACEWAY BELOW SLAB OR UNDERGROUND
- RACEWAY UP
- RACEWAY DOWN
- RACEWAY CONTINUATION
- RACEWAY STUB-OUT WITH BUSHING
- J — JUNCTION BOX, CEILING OR ABOVE CEILING MOUNTED
- J — JUNCTION BOX, WALL MOUNTED
- J — JUNCTION BOX, IN-GROUND
- PB — PULL BOX

ELECTRONIC SECURITY

- CR — CARD READER

LUMINAIRES

CIRCUITS EMERGENCY	CIRCUITS NORMAL	DESCRIPTION
N/A	L01	LUMINAIRE IDENTIFICATION, SEE LUMINAIRES SCHEDULE
N/A	a	LOWER-CASE LETTER(S) NEAR LUMINAIRE DENOTE SWITCH LEG(S)
		RECESSED RECTANGULAR LUMINAIRE, DRAWN TO SCALE
		SURFACE MOUNTED RECTANGULAR LUMINAIRE, DRAWN TO SCALE
		RECESSED VOLUMETRIC LUMINAIRE, DRAWN TO SCALE
		STRIP LUMINAIRE, LENGTH TO SCALE
		WALL MOUNTED RECTANGULAR LUMINAIRE, LENGTH TO SCALE (NUMBER OF MOUNTING POINTS WILL VARY WITH THE LUMINAIRE LENGTH AND ARE NOT INDICATED.)
		RECESSED DOWNLIGHT LUMINAIRE
		SURFACE MOUNTED CEILING LUMINAIRE
		PENDANT MOUNTED LUMINAIRE
		LINEAR PENDANT MOUNTED LUMINAIRE, LENGTH TO SCALE (NUMBER OF MOUNTING POINTS WILL VARY WITH THE LUMINAIRE LENGTH AND ARE NOT INDICATED.)
		WALL MOUNTED LUMINAIRE
		WALL MOUNTED VERTICALLY ORIENTED LUMINAIRE
		WALL MOUNTED RECESSED LINEAR LUMINAIRE, LENGTH TO SCALE
	N/A	EXIT SIGN, FILLED SIDES INDICATE ILLUMINATED ANNOTATION, ARROWS INDICATE DIRECTIONAL GRAPHICS
	N/A	WALL MOUNTED EXIT SIGN, FILLED SIDES INDICATE ILLUMINATED ANNOTATION, ARROWS INDICATE DIRECTIONAL GRAPHICS
	N/A	EXIT SIGN WITH EMERGENCY BATTERY PACK
	N/A	WALL MOUNTED EXIT SIGN WITH EMERGENCY BATTERY PACK
	N/A	EMERGENCY BATTERY PACK, NUMBER OF LAMPS NOT INDICATED
	N/A	WALL MOUNTED EMERGENCY BATTERY PACK, NUMBER OF LAMPS NOT INDICATED
	N/A	EMERGENCY WITH REMOTE BATTERY PACK, NUMBER OF LAMPS NOT INDICATED
	N/A	WALL MOUNTED EMERGENCY WITH REMOTE BATTERY PACK, NUMBER OF LAMPS NOT INDICATED
		RECESSED LINEAR WALL WASH LUMINAIRE, LENGTH TO SCALE
		LINEAR PENDANT MOUNTED WALL WASH LUMINAIRE, LENGTH TO SCALE
		RECESSED WALL WASH LUMINAIRE
		SURFACE MOUNTED WALL WASH LUMINAIRE
		PENDANT MOUNTED WALL WASH LUMINAIRE
		RECESSED ACCENT LUMINAIRE
		SURFACE MOUNTED ACCENT LUMINAIRE
		PENDANT MOUNTED ACCENT LUMINAIRE
		MONOPOINT LUMINAIRE
N/A		TRACK LIGHTING
N/A		CONTINUOUS SOURCE LUMINAIRE, PATH AS INDICATED
		MULTI-LAMP ACCENT LUMINAIRE, NUMBER OF LAMPS NOT INDICATED
		WALL MOUNTED MULTI-LAMP ACCENT LUMINAIRE, NUMBER OF LAMPS NOT INDICATED
		OVERCOUNTER TASK LUMINAIRE
		UNDERCABINET TASK LUMINAIRE
		FIBER OPTIC REMOTE SOURCE
		STEP LUMINAIRE
		ILLUMINATED SIGN
		WALL MOUNTED ILLUMINATED SIGN
		NIGHT LIGHT
		WALL MOUNTED STROBE LIGHT

LIGHTING CONTROLS

- $ — SINGLE POLE SWITCH
- INDICATES WIRELESS CONTROL
- $a — LOWER-CASE LETTER(S) NEAR SWITCH DENOTE SWITCH LEG(S)
- $2 — DOUBLE POLE SWITCH
- $3 — THREE-WAY SWITCH
- $4 — FOUR-WAY SWITCH
- $D — DIMMER SWITCH
- $K — KEY OPERATED SWITCH
- $LV — MOMENTARY CONTACT LOW VOLTAGE SWITCH
- $O — OCCUPANCY SENSOR SWITCH
- $OD — OCCUPANCY SENSOR/DIMMER SWITCH
- $P — SWITCH WITH PILOT LIGHT
- $PC — PHOTOCELL SWITCH
- $T — TIMER SWITCH
- CS# — LOW VOLTAGE CONTROL STATION, # INDICATES STATION IDENTIFICATION
- DSC — DIMMING SYSTEM CONTROL PANEL
- ELCU — EMERGENCY LIGHTING CONTROL UNIT
- LCP — LIGHTING CONTROL PANEL
- OS — OCCUPANCY SENSOR SWITCH, CEILING MOUNTED
- PS — PHOTO SENSOR CONTROL
- PS — PHOTO SENSOR CONTROL, CEILING MOUNTED
- R — RELAY
- T — LOW VOLTAGE TRANSFORMER

SITE/LANDSCAPE/GARAGE LUMINAIRES

(CIRCUITS: EMERGENCY / NORMAL)

- LIGHTING STANDARD: LUMINAIRE, POLE, AND BASE
- POST TOP LUMINAIRE
- ILLUMINATED BOLLARD
- IN-GROUND LUMINAIRE
- ADJUSTABLE IN-GROUND LUMINAIRE
- PENDANT MOUNTED GARAGE LUMINAIRE
- PENDANT MOUNTED SHIELDED GARAGE LUMINAIRE, LINES INDICATE NUMBER AND POSITION OF SHIELD(S)
- SURFACE MOUNTED GARAGE LUMINAIRE
- SURFACE MOUNTED SHIELDED GARAGE LUMINAIRE, LINES INDICATE NUMBER AND POSITION OF SHIELD(S)
- WALL PACK

RECEPTACLES

CIRCUITS EMERGENCY	CIRCUITS NORMAL	DESCRIPTION
		SINGLE RECEPTACLE, 120V
		SINGLE RECEPTACLE, 120V, CEILING MOUNTED
		DUPLEX RECEPTACLE, 120V
		DUPLEX RECEPTACLE, 120V, CEILING MOUNTED
		DOUBLE DUPLEX RECEPTACLE, 120V
		DOUBLE DUPLEX RECEPTACLE, 120V, CEILING MOUNTED
		SPLIT WIRED RECEPTACLE, 120V, TOP SWITCHED
#	#	RECEPTACLE, NEMA #
#	#	RECEPTACLE, NEMA #, CEILING MOUNTED
#	#	COMBINATION RECEPTACLE, NEMA # AND 120V
		FURNITURE SYSTEMS RECEPTACLE, 120V
N/A		INDICATES CONTROLLED
N/A		INDICATES 15A
N/A		INDICATES TWIST LOCK
N/A		INDICATES MOUNTED 3" (75 MM) ABOVE COUNTER BACKSPLASH
N/A		MULTI-SERVICE FLOOR BOX (RECEPTACLES/OUTLETS AS INDICATED)
N/A		MULTI-SERVICE POKE THRU (RECEPTACLES/OUTLETS AS INDICATED)
N/A		MULTI-SERVICE POWER POLE (RECEPTACLES/OUTLETS AS INDICATED)
N/A		MULTI-SERVICE ASSEMBLY (RECEPTACLES/OUTLETS AS INDICATED)
N/A		CLOCK RECEPTACLE, 120V
		CORD DROP, 120V
		CEILING CORD DROP, 120V

RECEPTACLE TYPES

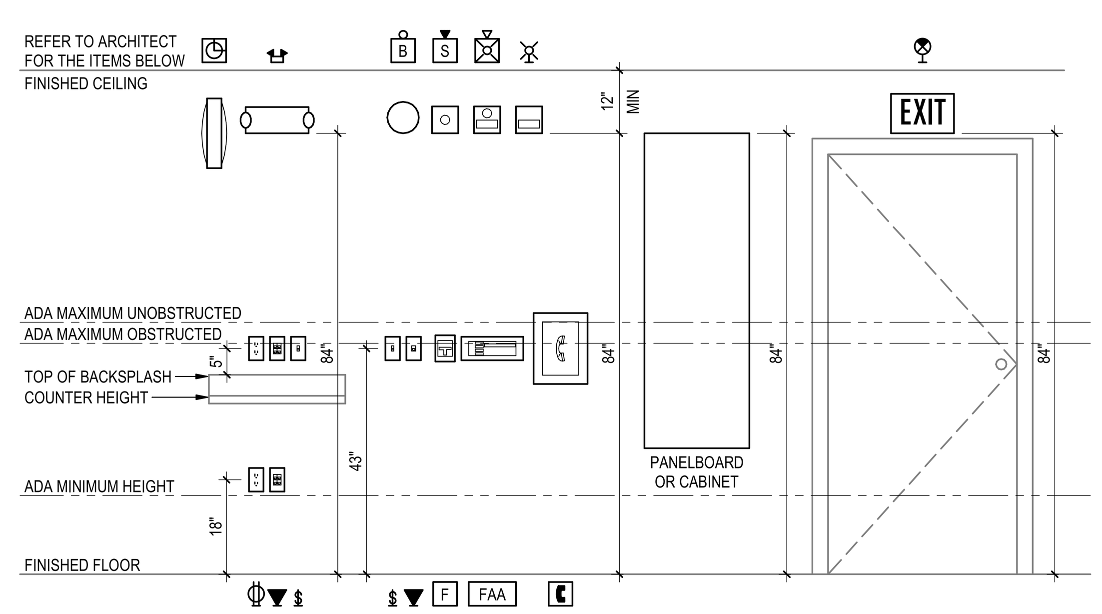
- A — ARC FAULT CIRCUIT INTERRUPTER
- AT — ARC FAULT CIRCUIT INTERRUPTER AND TAMPER RESISTANT
- D — DEDICATED CIRCUIT
- G — GROUND FAULT CIRCUIT INTERRUPTER
- GT — GROUND FAULT CIRCUIT INTERRUPTER AND TAMPER RESISTANT
- IG — ISOLATED GROUND
- S — SURGE PROTECTOR
- T — TAMPER RESISTANT
- U — INTEGRAL USB PORT(S)
- WP — WEATHER RESISTANT COVER

CONTROLS

- NON-FUSED SAFETY SWITCH
- FUSED SAFETY SWITCH, FUSE RATING INDICATED
- COMBINATION MOTOR STARTER AND FUSED SAFETY SWITCH, FUSE RATING INDICATED
- MOTOR STARTER
- MANUAL MOTOR STARTER
- AUTOMATIC DOOR PUSHPLATE
- DEAD FRONT GFCI
- EMERGENCY SHUTDOWN
- ENCLOSED CIRCUIT BREAKER
- ENCLOSED CONTACTOR
- PUSH BUTTON CONTROL STATION
- $M — TOGGLE SWITCH, MOTOR RATED
- TOUCHLESS AUTOMATIC DOOR OPENER
- DDC — DIRECT DIGITAL CONTROL PANEL
- R — RELAY
- THERMOSTAT
- TC — TIME CLOCK
- VFD — VARIABLE FREQUENCY DRIVE

ELECTRICAL EQUIPMENT

- 208V OR 240V POWER PANELBOARD
- 480V OR 600V POWER PANELBOARD
- EQUIPMENT CABINET OR PANEL
- EQUIPMENT CONNECTION, FILL INDICATES EMERGENCY CIRCUIT
- GROUND BAR
- MOTOR CONNECTION, 1Ø
- MOTOR CONNECTION, 3Ø
- BUS DUCT
- ATS — AUTOMATIC TRANSFER SWITCH
- B — BUS DUCT PLUG
- SPD — SURGE PROTECTIVE DEVICE
- T — TRANSFORMER, NOT TO SCALE
- TRANSFORMER, DRAWN TO SCALE



ABBREVIATIONS

1/C	SINGLE CONDUCTOR
A	AMPS
A/C	AIR CONDITIONING UNIT
AC	ALTERNATING CURRENT
ACH	ABOVE COUNTER HEIGHT
ACT	ABOVE CEILING TILE
ADA	AMERICANS WITH DISABILITIES ACT
ADJ	ADJUSTABLE
AF	AMP FRAME
AFC	ABOVE FINISHED CEILING
AFCI	ARC FAULT CIRCUIT INTERRUPTER
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AHJ	AUTHORITY HAVING JURISDICTION
AHU	AIR HANDLING UNIT
AIC	AMPS INTERRUPTING CAPACITY
AL	ALUMINUM
ALD	ASSISTED LISTENING DEVICE
ALT	ALTERNATE
ARCH	ARCHITECTURAL
AS	AMP SWITCH
AT	AMP TRIP
ATS	AUTOMATIC TRANSFER SWITCH
AUTO	AUTOMATIC
AV	AUDIO VISUAL
AVG	AVERAGE
AWG	AMERICAN WIRE GAUGE
BC	BONDING CONDUCTOR
BCU	BARE COPPER
BFC	BELOW FINISHED CEILING
BFG	BELOW FINISHED GRADE
BKR	BREAKER
BLDG	BUILDING
BOF	BOTTOM OF FIXTURE
BTM	BOTTOM
C	CONDUIT
C/W	COMPLETE WITH
CAP	CAPACITY
CATV	CABLE ANTENNA TELEVISION
CB	CIRCUIT BREAKER
CCTV	CLOSED CIRCUIT TELEVISION
CEC	CANADIAN ELECTRIC CODE
CFOI	CONTRACTOR FURNISHED, OWNER INSTALLED
CIRC	CIRCULATING
CKT	CIRCUIT
CL	CENTERLINE
CLG	CEILING
CM	CEILING MOUNTED
CMU	CONCRETE MASONRY UNIT
CO	CONDUIT ONLY
COMM	COMMUNICATIONS
CONC	CONCRETE
CONN	CONNECTION
CONST	CONSTRUCTION
CONT	CONTINUOUS
CONTR	CONTRACTOR
CPT	CONTROL POWER TRANSFORMER
CPU	CENTRAL PROCESSING UNIT
CR	CRITICAL BRANCH
CT	CURRENT TRANSFORMERS
CTR	CENTER
CU	COPPER
CUH	CABINET UNIT HEATER
D	DEDICATED
DC	DIRECT CURRENT
DET	DETAIL
DIAM	DIAMETER
DIM	DIMENSION
DISC	DISCONNECT
DIV	DIVISION
DL	DAMP LOCATION
DN	DOWN
DP	DISTRIBUTION PANEL
DPDT	DOUBLE POLE, DOUBLE THROW
DPR	DAMPER
DPST	DOUBLE POLE, SINGLE THROW
DWG	DRAWING
DWH	DOMESTIC WATER HEATER
EA	EACH
EC	ELECTRICAL CONTRACTOR
EF	EXHAUST FAN
ELEC	ELECTRICAL
ELEV	ELEVATOR
EM	EMERGENCY
EM GEN	EMERGENCY GENERATOR
EMT	ELECTRICAL METALLIC TUBING
ENCL	ENCLOSURE
EP	ELECTRIC-PNEUMATIC
EPO	EMERGENCY POWER OFF
EQ	EQUIPMENT BRANCH
EQUIP	EQUIPMENT
ERL	EXISTING TO BE RELOCATED
ETD	EMERGENCY TRANSFER DEVICE
EWC	ELECTRIC WATER COOLER
EXH	EXHAUST
EXIST, E, EX	EXISTING
EXP	EXPLOSION PROOF
EXTER	EXTERIOR
F&I	FURNISHED AND INSTALLED
FA	FIRE ALARM
FAA	FIRE ALARM ANNUNCIATOR
FACP	FIRE ALARM CONTROL PANEL
FB	FLOOR BOX
FCU	FAN COIL UNIT
FLR	FLOOR
FLUOR	FLUORESCENT
FO	FIBER (FIBRE) OPTIC
FP	FIRE PROTECTION
FS	FUSIBLE SWITCH
FSCS	FIRE FIGHTER SMOKE CONTROL STATION
FU	FUSE
FVNR	FULL VOLTAGE NON REVERSING
FVR	FULL VOLTAGE REVERSING
G, GND	GROUND
G/Y	GREEN YELLOW
GA	GAUGE
GAL	GALLONS
GC	GENERAL CONTRACTOR
GEC	GROUNDING ELECTRODE CONDUCTOR
GEN	GENERATOR
GFI, GFCI	GROUND FAULT (CIRCUIT) INTERRUPTER
H	HOT CONDUCTOR
HC	HORIZONTAL CROSS CONNECT
HD	HAND DRYER
HFF	HAND FREE FIXTURE
HGT	HEIGHT
HH	HANDHOLE
HID	HIGH INTENSITY DISCHARGE
HK	HOUSE KEEPING PAD
HM	HORIZONTALLY MOUNTED
HOA	HAND-OFF-AUTO
HOR	HORIZONTAL
HP	HORSEPOWER
HTG	HEATING
HV	HIGH VOLTAGE
HVCB	HIGH VOLTAGE CIRCUIT BREAKER
HW	HOT WATER
HZ	HERTZ
IC	INTERMEDIATE CROSS CONNECT
ID	INSIDE DIAMETER
IDF	INTERMEDIATE DISTRIBUTION FRAME
IG	ISOLATED GROUND

ABBREVIATIONS

IMC	INTERMEDIATE METAL CONDUIT
INST	INSTANTANEOUS
IP	INTERNET PROTOCOL
JB	JUNCTION BOX
K	KIRK KEY INTERLOCK
KAIC	KILO-AMPS INTERRUPTING CAPACITY
KV	KILOVOLT
KVA	KILOVOLT-AMPERES
KW	KILOWATT
LED	LIGHT EMITTING DIODE
LR	LEGALLY REQUIRED
LS	LIFE SAFETY BRANCH
LSIG	LONG TIME, SHORT TIME, INSTANTANEOUS, GROUND FAULT
LTG	LIGHTING
LV	LOW VOLTAGE
MAU	MAKE UP AIR UNIT
MAX	MAXIMUM
MC	METAL CLAD CABLE
MCA	MINIMUM CIRCUIT AMPS
MCB	MAIN CIRCUIT BREAKER
MCC	MOTOR CONTROL CENTER
MCCB	MOLDED CASE CIRCUIT BREAKER
MCP	MOTOR CIRCUIT PROTECTOR
MCT	MAIN CROSS CONNECT
MDF	MAIN DISTRIBUTION FRAME
MDP	MAIN DISTRIBUTION PANEL
MECH	MECHANICAL
MET	MAIN EARTHING TERMINAL
MFR	MANUFACTURER
MH	MANHOLE
MIN	MINIMUM
MISC	MISCELLANEOUS
MLO	MAIN LUG ONLY
MM	MULTIMODE FIBER (FIBRE) OPTIC STRAND
MSB	MAIN SWITCHBOARD
MTD	MOUNTED
MTG	MOUNTING
MTS	MAIN TERMINAL SPACE
MV	MEDIUM VOLTAGE
MVCB	MEDIUM VOLTAGE CIRCUIT BREAKER
MW	MICROWAVE OVEN
N	NEUTRAL
NAC	NOTIFICATION APPLIANCE CIRCUIT
NC	NORMALLY CLOSED
NEC	NATIONAL ELECTRIC CODE
NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
NIC	NOT IN CONTRACT
NL	NIGHT LIGHT
NO	NORMALLY OPEN
NTS	NOT TO SCALE
OC	ON CENTER
OD	OUTSIDE DIAMETER
OFCI	OWNER FURNISHED, CONTRACTOR INSTALLED
OFE	OWNER FURNISHED EQUIPMENT
OH	OVERHEAD
OL	OVERLOAD
OS	OCCUPANCY SENSOR, OPTIONAL STANDBY
OSP	OUTSIDE PLANT
P	POLE
PA	PUBLIC ADDRESS
PB	PULL BOX
PD	PUNCHDOWN
PF	POWER FACTOR
PH	PHASE
PNL	PANEL
POE	POINT OF ENTRANCE
POS	POINT OF SERVICE
PR	PAIR
PT	POTENTIAL TRANSFORMERS
PTS	PNEUMATIC TUBE STATION
PTZ	PAN/TILT/ZOOM
PV	PHOTOVOLTAIC
PVC	POLYVINYL CHLORIDE CONDUIT
PWR	POWER
R	RELOCATED
RA	RETURN AIR
REC	RECESSED
RECP	RECEPTACLE
REQD	REQUIRED
REX	REQUEST TO EXIT
RM	ROOM
RNC	RIGID NON-METALLIC CONDUIT
RO	RACEWAY ONLY
RSC, RGS	RIGID STEEL CONDUIT
SCCR	SHORT CIRCUIT CURRENT RATING
SEC	SECURITY
SECT	SECTION
SIM	SIMILAR
SM	SINGLE MODE FIBER OPTIC STRAND
SMR	SURFACE MOUNTED RACEWAY
SPD	SURGE PROTECTED DEVICE
SPDT	SINGLE POLE DOUBLE THROW
SPECS	SPECIFICATIONS
SPST	SINGLE POLE SINGLE THROW
SS	STAINLESS STEEL
ST	SHUNT TRIP
STD	STANDARD
SW	SWITCH
SWBD	SWITCHBOARD
SWGR	SWITCHGEAR
SYS	SYSTEM
TBB	TELECOMMUNICATIONS BACKBONE
TC	TEMPERATURE CONTROL OR TERMINAL CABINET
TE	TELECOMMUNICATIONS ENCLOSURE
TELE	TELEPHONE
TELECOM	TELECOMMUNICATIONS
TEMP	TEMPERATURE
TERM	TERMINAL
TGB	TELECOMMUNICATIONS GROUND BAR
TMGB	TELECOMMUNICATIONS MAIN GROUND BAR
TOF	TOP OF FIXTURE
TP	TAMPER RESISTANT
TR	TELECOMMUNICATIONS ROOM
TSP	TWISTED SHIELDED PAIR
TSTAT	THERMOSTAT
TTB	TELECOM TERMINAL BOARD
TV	TELEVISION
TYP	TYPICAL
UG	UNDERGROUND
UH	UNIT HEATER
UNO	UNLESS NOTED OTHERWISE
UPS	UNINTERRUPTIBLE POWER SUPPLY
USB	UNIVERSAL SERIAL BUS
UTP	UNSHIELDED TWISTED PAIR
UV	UNIT VENTILATOR
V	VOLTS
VA	VOLT-AMPS
VAV	VARIABLE AIR VOLUME
VC	VOLUME CONTROL
VDT	VISUAL DISPLAY TERMINAL
VERT	VERTICAL
VFD	VARIABLE FREQUENCY DRIVE
VIF	VERIFY IN FIELD
VOL	VOLUME
VT	VAPOR TIGHT
W	WIRE, WATT
WAP	WIRELESS ACCESS POINT
WG	WIREGUARD
WL	WET LOCATION
WP	WEATHERPROOF
WT	WATERTIGHT
XFMR	TRANSFORMER
Φ	PHASE

PROJECT NOTES

1. CONTRACTOR SHALL REVIEW ALL DIVISION 01 SPECIFICATIONS FOR TERM DEFINITIONS, UNIT PRICING, ALLOWANCE, SUBSTITUTION, SUBMITTAL, ETC. PROJECT REQUIREMENTS.
2. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS FROM AUTHORITIES HAVING JURISDICTION AND PAY ALL ASSOCIATED FEES.
3. ALL EQUIPMENT TO BE CONSIDERED "AS-EQUAL" MUST BE SUBMITTED TO THE ENGINEER FOR APPROVAL NO LATER THAN (1) WEEK PRIOR TO BID DATE.
4. LOCATE JUNCTION AND PULL BOXES AS REQUIRED TO ALLOW ACCESS AFTER EQUIPMENT AND APPURTENANCES ARE INSTALLED. COORDINATE EXACT LOCATIONS WITH THE OTHER TRADES.
5. COORDINATE LOCATIONS AND ELEVATIONS OF ELECTRICAL DEVICES WITH DRAWINGS AND OTHER TRADES PRIOR TO INSTALLATION.
6. PROTECT PERMANENT BUILDING FINISHES FROM DAMAGE DURING CONSTRUCTION PERIOD. PROVIDE PLYWOOD OR SIMILAR MATERIAL UNDER EQUIPMENT OR MATERIALS STORED ON FLOORS, AND IN AREAS WHERE CONSTRUCTION MAY DAMAGE FINISHES. SURFACES OR FINISHES DAMAGED DURING CONSTRUCTION SHALL BE REPLACED AT THE COST OF THE CONTRACTOR AT FAULT.
7. WHERE DIRECTED TO USE OR RETAIN EXISTING CIRCUITS, AND THE CIRCUIT NUMBERS DIFFER FROM THE DRAWING, UPDATE DIRECTORIES AND RECORD DRAWINGS.
8. ALL NON-METALLIC INSULATED CABLING SHALL NOT BE PAINTED. THIS INCLUDES BUT IS NOT LIMITED TO FIRE ALARM, DATA, TEMPERATURE CONTROLS, ETC. ALL INSTALLATIONS NOT IN COMPLIANCE WITH THIS REQUIREMENT SHALL BE REMOVED AND REINSTALLED AT CONTRACTOR'S EXPENSE.
9. CONTRACTORS SHALL COORDINATE LOCATIONS OF LUMINAIRES, SPEAKERS, FIRE ALARM DEVICES, AIR DIFFUSERS/GRILLES, ELECTRICAL DEVICES, AND THE LIKE INSTALLED IN OR ON THE CEILING WITH ARCHITECTURAL REFLECTED CEILING PLAN. CEILING MOUNTED ELECTRICAL DEVICES SHALL BE MOUNTED IN THE CENTER OF THE CEILING TILES, UNLESS OTHERWISE NOTED.
10. PROPERLY SUPPORT ALL LOW VOLTAGE CABLING NOT IN CONDUIT AS DESCRIBED IN DIVISION 27 AND 28 SPECIFICATIONS AND DRAWINGS. SUPPORT CABLES AT 5 FOOT MAXIMUM INTERVALS OR PER CODE, WHICHEVER IS LESS FOR EACH RESPECTIVE SYSTEM CABLE. IN NO CIRCUMSTANCE SHALL CABLING BE PINCHED OR CRIMPED IN ANY MANOR THAT WOULD COMPROMISE THE INTEGRITY OF THE CABLE OVER TIME.
11. CONTRACTOR SHALL NOT USE THE CEILING SYSTEM ASSEMBLY AS A MEANS OF SUPPORT FOR ANY CABLING, RACEWAY, AND EQUIPMENT. PROVIDE SUPPORT DIRECTLY FROM STRUCTURE, INDEPENDENT OF THE CEILING SYSTEM, UNLESS WRITTEN DOCUMENTATION FROM THE CEILING SYSTEM MANUFACTURER IS PROVIDED PERMITTING THE CEILING SYSTEM TO BE USED FOR SUPPORT.
12. ALL CABLING, INCLUDING METAL-CLAD TYPE AND LOW VOLTAGE CABLING (FIRE ALARM, DATA, TEMPERATURE CONTROLS, ETC.), LOCATED IN EXPOSED STRUCTURE (CEILING) AREAS SHALL BE INSTALLED IN CONDUIT (OR CABLE TRAY, IF APPLICABLE) AND BE ROUTED TIGHT TO DECK. BAFFLE AND FLOATING TYPE CEILINGS WHERE STRUCTURE IS VISIBLE IS CONSIDERED EXPOSED STRUCTURE. IN NO CIRCUMSTANCES SHALL THE CABLING BE VISIBLE FROM BELOW, UNLESS INSTALLED IN CABLE TRAY OR OTHERWISE SPECIFICALLY APPROVED BY ARCHITECT. INSTALLATIONS NOT IN COMPLIANCE WITH THIS REQUIREMENT SHALL BE REMOVED AND REINSTALLED AT CONTRACTOR'S EXPENSE.
13. WHERE PROJECT PHASING IS INDICATED IN ANY PART OF THE WORKING DOCUMENT PACKAGE, CONTRACTOR SHALL PLAN WORK SO AS TO FACILITATE SUCH PHASING.
14. DO NOT SCALE THE DRAWINGS. BECAUSE OF THE SCALE OF THE DRAWINGS, IT IS NOT POSSIBLE TO INDICATE ALL OFFSETS, FITTINGS OR OTHER SIMILAR ITEMS WHICH MAY BE REQUIRED TO MAKE A COMPLETE OPERATING SYSTEM. CAREFULLY INVESTIGATE CONDITIONS AFFECTING WORK AND INSTALL WORK IN SUCH MANNER THAT INTERFERENCES BETWEEN PIPES, CONDUITS, DUCTS, EQUIPMENT, ARCHITECTURAL AND STRUCTURAL FEATURES SHALL BE AVOIDED.
15. CONTRACTOR IS RESPONSIBLE FOR SUPPORTING ALL ELECTRICAL DEVICES AND EQUIPMENT. WHERE STRUT IS REQUIRED, CONTRACTOR SHALL PROCURE SUPPORT SYSTEM DESIGN SERVICES FROM MANUFACTURER AS NECESSARY AND INCLUDE ALL COST IN BASE BID.
16. ALL EMERGENCY SYSTEM WIRING SHALL BE IN SEPARATE RACEWAY IN ACCORDANCE WITH ARTICLE 700 OF N.E.C.
17. ALL DEVICES, EQUIPMENT, LUMINAIRES, AND THE LIKE SHALL BE GROUNDED BY USE OF A PROPERLY SIZED GROUNDING CONDUCTOR. MECHANICAL AND ELECTRICAL BONDS OF THE METALLIC RACEWAY SYSTEM SHALL BE MAINTAINED.
18. UNLESS OTHERWISE NOTED, ALL DEVICE ELEVATIONS REFER TO CENTERLINE OF OUTLET BOX. THE CONTRACTOR SHALL COORDINATE ALL OUTLET LOCATIONS WITH OTHER TRADES.
19. PROVIDE "SEAL-OFFS" WHEN PIPING PASSES THROUGH AREAS OF DIFFERENT AMBIENT TEMPERATURES AND/OR HAZARDOUS AREAS.
20. SLOPE ALL CONDUIT, WHICH IS INSTALLED OUTSIDE OF BUILDING AND ROUTED TO INSIDE OF BUILDING, AWAY FROM BUILDING TO MITIGATE WATER MIGRATION INTO BUILDING. PROVIDE POLYWATER SEALS OR EQUAL FOR ALL CONDUIT ENTERING BUILDING.
21. IF MORE THAN THREE CURRENT-CARRYING CONDUCTORS ARE ROUTED IN THE SAME CONDUIT, DERATING SHALL BE TAKEN INTO ACCOUNT. INCREASING THE CONDUCTOR AMPACITY (BY INCREASING WIRE SIZE) AND CONDUIT SIZE IN COMPLIANCE WITH NEC.
22. ALL FIRE ALARM DEVICES SHALL BE MOUNTED AT HEIGHTS AS SPECIFIED BY NFPA 70 AND ADA.
23. PROVIDE PROTECTION IN FIRE RATED WALL MEMBRANE PENETRATIONS. PROTECTION SHALL WRAP THE OUTSIDE OF THE BOX OR ENCLOSURE TO MAINTAIN WALL RATING. DO NOT USE PENETRATION PROTECTION ON THE INTERIOR OF THE BOX/ENCLOSURE OR COVER PLATE TYPE PROTECTION. REFER TO THE SPECIFICATIONS FOR ADDITIONAL INFORMATION.
24. CONTRACTOR SHALL COMPLY WITH APPLICABLE ENERGY CODE.
25. ALL FIRE ALARM BOOSTER PANELS SHALL BE CONNECTED TO A NEW DEDICATED 20A/1P CIRCUIT BREAKER IN NEAREST 208Y/120V PANELBOARD WITH (2)#12 AND (1)#12 GND-3/4"C. ELECTRICAL CONTRACTOR SHALL VERIFY EXACT LOCATION AND QUANTITIES WITH FIRE ALARM CONTRACTOR. CONTRACTOR SHALL UPSIZE WIRE AS NECESSARY FOR VOLTAGE DROP.
26. THE ELECTRICAL CONTRACTOR SHALL CALCULATE THE VOLTAGE DROP AND PROVIDE AN APPROPRIATE CONDUCTOR SIZE TO ACHIEVE NO MORE THAN 2% MAXIMUM ALLOWABLE VOLTAGE DROP FOR ALL FEEDERS BASED ON LOAD OF 80% OF UPSTREAM BREAKER HANDLE RATING.
27. FOR BRANCH CIRCUITS OVER 75'(25 METERS) IN LENGTH (TOTAL ONE WAY) FROM THE PANEL, THE ELECTRICAL CONTRACTOR SHALL CALCULATE THE VOLTAGE DROP AND PROVIDE AN APPROPRIATE CONDUCTOR SIZE TO ACHIEVE NO MORE THAN 3% MAXIMUM ALLOWABLE VOLTAGE DROP BASED ON LOAD OF 80% OF UPSTREAM BREAKER TRIP RATING.
28. PROVIDE CONDUIT FITTINGS WITH BONDING JUMPERS AT ALL EXPANSION JOINTS. REFER TO SPECIFICATIONS.
29. DUCTBANK IS DEFINED AS TWO OR MORE DUCTS (CONDUITS) INSTALLED WITHIN THE SAME TRENCH. INSTALLATIONS SHALL COMPLY WITH UNDERGROUND DUCT SPECIFICATIONS AND DETAILS. PROVIDE SPACERS AS REQUIRED. DUCT BANKS SHALL BE OBSERVED BY ENGINEER PRIOR TO BEING COVERED BY CONCRETE OR FILL. AT ENGINEER'S DISCRETION, PHOTOS OF INSTALLATION FOR REVIEW MAY BE ACCEPTABLE.
30. CONTRACTOR SHALL INCLUDE QUANTITY OF ADDITIONAL ITEMS IN BID AS INDICATED IN SPECIFICATIONS.

FIRE ALARM REQUIREMENTS:

TBPE POLICY ADVISORY: PER POLICY ADVISORY OPINION 04-04-FA PLANNING OF FIRE ALARM SYSTEMS ISSUED BY THE TEXAS BOARD OF PROFESSIONAL ENGINEERS (TBPE), THE FOLLOWING STATEMENT IS MADE: THE LICENSED ENGINEER OF RECORD FOR THIS PROJECT ELECTRICAL DESIGN WILL NOT PREPARE FIRE ALARM SYSTEM DRAWINGS NOR SHOW FIRE ALARM SYSTEM DEVICES ON ELECTRICAL DRAWINGS. PROVIDE A COMPLETE AUTOMATIC BUILDING FIRE ALARM SYSTEM. THE FIRE ALARM PLANNER SHALL BE LICENSED BY THE STATE FIRE MARSHALL'S OFFICE. THE PLANNING OF THE FIRE ALARM SYSTEM SHALL MEET ALL POLICY CRITERIA STATED IN THE TBPE POLICY ADVISORY OPINION. SUGGESTED LOCATION OF FIRE ALARM CONTROL PANEL AND ALARM ANNUNCIATOR PANEL ARE SHOWN ON THESE PLANS BASED ON OWNER PREFERENCE. CONTRACTOR SHALL CONFIRM EXACT LOCATION AND QUANTITIES WITH FIRE MARSHALL. REFER TO SPECIFICATION 283111 FOR REQUIREMENTS. NEW DEVICES SHALL INTEGRATE WITH EXISTING FIRE ALARM SYSTEM.

TELECOM AND AV REQUIREMENTS:

DATA, AV, AND SECURITY (CARD READERS) DEVICES AND WIRING TO BE PROVIDED BY OWNER. ELECTRICAL CONTRACTOR SHALL PROVIDE BACKBOXES AND CONDUIT INDICATED ON PLANS AND DETAILS FOR OWNER PROVIDE DEVICES AND WIRING. RING AND STRING MAY BE USED FOR NEW DEVICES IN EXISTING WALLS. IF NO CONDUIT SIZE IS INDICATED PROVIDE 1-1/4" CONDUIT TO ACCESIBLE CEILING SPACE.

DRAWING INDEX

NO.	DRAWING NAME
ELECTRICAL	
E001	ELECTRICAL LEGENDS, ABBREVIATIONS AND SYMBOLS
E002	ELECTRICAL COMCHECK
ED201	LEVEL 1 - ELECTRICAL PLAN DEMOLITION - PHASE 2
ED202	LEVEL 2 - ELECTRICAL PLAN DEMOLITION - PHASE 2
E111	LEVEL 1 - LIGHTING PLAN
E121	LEVEL 2 - LIGHTING PLAN
E211	LEVEL 1 - POWER PLAN
E221	LEVEL 2 - POWER PLAN
E401	ELECTRICAL ONE LINE DIAGRAM
E411	PANEL SCHEDULES
E501	ELECTRICAL DETAILS
E601	LIGHTING FIXTURE SCHEDULE AND DETAILS

Stantec

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Consultant

Notes

Revision — By — Appd — YYYY.MM.DD

ISSUED FOR BIDDING AND CONSTRUCTION — 2023.02.03

Issued — By — Appd — YYYY.MM.DD

Permit/Seal

02/10/2023

STATE OF TEXAS — STACY G. CARR — 94803 — LICENSED PROFESSIONAL ENGINEER

Texas Firm Registration No. 13678
EXP. 2023.11.30

Client/Project Logo

Client/Project
University of North Texas - Denton

ESSC Renovation

Eagle Student Services Center 1147 Union Cir, Denton, TX 76201

Title
ELECTRICAL LEGENDS, ABBREVIATIONS AND SYMBOLS

Project No. 2140001088

Scale As indicated

Revision

Drawing No. E001

COM*check* Software Version COMcheckWeb

Interior Lighting Compliance Certificate

Project Information

Energy Code:	2021 IECC
Project Title:	UNT ESSC
Project Type:	Alteration

Construction Site:	Owner/Agent:	Designer/Contractor:
1147 Union Cir Denton, Texas 76201	University of North Texas 1155 Union Circle #311040 Denton, Texas 76203-5017 940-565-3870	Stantec 6080 Tennyson Pkwy Suite 200 Plano, Texas 75024

Allowed Interior Lighting Power

A Area Category	B Floor Area (ft2)	C Allowed Watts / ft2	D Allowed Watts
1-First Floor (School/University)	7500	0.72	5400
2-Second Floor (School/University)	11600	0.72	8352
		Total Allowed Watts =	13752

Proposed Interior Lighting Power

A Fixture ID : Description / Lamp / Wattage Per Lamp / Ballast	B Lamps/ Fixture	C # of Fixture	D Fixture Watt.	E (C X D)
First Floor (School/University, 7500 sq.ft.)				
LED: A: 2x4 LED: Other:	1	77	40	3080
LED: A2: 2x2 LED: Other:	1	4	36	144
LED: B2: LED Linear: Other:	1	40	5	184
LED: C: LED 4" Downlight: Other:	1	8	20	156
LED: H: LED Cove Light: Other:	1	89	5	409
Second Floor (School/University, 11600 sq.ft.)				
LED: A: 2x4 LED: Other:	1	81	40	3240
LED: A2: 2x2 LED: Other:	1	15	36	540
LED: B: LED Linear: Other:	1	232	5	1067
LED: B2: LED Linear: Other:	1	60	5	276
LED: C: LED 4" Downlight: Other:	1	17	20	332
LED: D: LED Pendant: Other:	1	3	22	66
LED: D2: LED Pendant: Other:	1	3	102	306
LED: H: LED Cove Light: Other:	1	91	5	419
		Total Proposed Watts =		10219

Interior Lighting PASSES

Interior Lighting Compliance Statement

Compliance Statement: The proposed interior lighting alteration project represented in this document is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed interior lighting systems have been designed to meet the 2021 IECC requirements in COM*check* Version COMcheckWeb and to comply with any applicable mandatory requirements listed in the Inspection Checklist.

Joe Zehentbauer, PE — Name - Title
Signature
02/10/2023 — Date

COM*check* Software Version COMcheckWeb

Inspection Checklist

Energy Code: 2021 IECC

Requirements: 0.0% were addressed directly in the COM*check* software

Text in the "Comments/Assumptions" column is provided by the user in the COMcheck Requirements screen. For each requirement, the user certifies that a code requirement will be met and how that is documented, or that an exception is being claimed. Where compliance is itemized in a separate table, a reference to that table is provided.

Section # & Req.ID	Plan Review	Complies?	Comments/Assumptions
C103.2 [PR4][1]	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the interior lighting and electrical systems and equipment and document where exceptions to the standard are claimed. Information provided should include interior lighting power calculations, wattage of bulbs and ballasts, transformers and control devices.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	

Additional Comments/Assumptions:

1 High Impact (Tier 1) | 2 Medium Impact (Tier 2) | 3 Low Impact (Tier 3)

Section # & Req.ID	Rough-In Electrical Inspection	Complies?	Comments/Assumptions
C405.2.3.1 [EL22][1]	Spaces required to have light-reduction controls have a manual control that allows the occupant to reduce the connected lighting load in a reasonably uniform illumination pattern >= 50 percent.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C405.2.1, C405.2.1.1 [EL18][1]	Occupancy sensors installed in classrooms/lecture/training rooms, conference/meeting/multipurpose rooms, copy/print rooms, lounges/breakrooms, enclosed offices, open plan office areas, restrooms, storage rooms, locker rooms, corridors, warehouse storage areas, and other spaces <= 300 sqft that are enclosed by floor-to-ceiling height partitions. Reference section language C405.2.1.2 for control function in warehouses and section C405.2.1.3 for open plan office spaces.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C405.2.1.2 [EL19][1]	Occupancy sensors control function in warehouses: In warehouses, the lighting in aisleways and open areas is controlled with occupant sensors that automatically reduce lighting power by 50% or more within 20 minutes of when the areas are unoccupied. The occupant sensors control lighting in each aisleway independently and do not control lighting beyond the aisleway being controlled by the sensor. Lights not turned off by occupant sensors is done so by time-switch.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C405.2.1.3 [EL20][1]	Occupant sensor control function in open plan office areas: Occupant sensor controls in open office spaces >= 300 sq.ft. have controls 1) configured so that general lighting can be controlled separately in control zones with floor areas <= 600 sq.ft. within the space, 2) general lighting in each zone permitted to turn on upon occupancy in control zone, 3) automatically turn off general lighting in all control zones within 20 minutes after all occupants have left the space, 4) are configured so that general lighting power in each control zone is reduced by >= 80% of the full zone general lighting power within 20 minutes of all occupants leaving that control zone.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C405.2.2, C405.2.2.1 [EL21][2]	Each area not served by occupancy sensors (per C405.2.1.1) have time-switch controls and functions detailed in sections C405.2.2.1.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	

1 High Impact (Tier 1) | 2 Medium Impact (Tier 2) | 3 Low Impact (Tier 3)

Section # & Req.ID	Rough-In Electrical Inspection	Complies?	Comments/Assumptions
C405.2.4, C405.2.4.1, C405.2.4.2 [EL23][2]	Daylight zones provided with individual controls that control the lights independent of general area lighting. See code section C405.2.3 Daylight-responsive controls for applicable spaces, C405.2.3.1 Daylight responsive control function and section C405.2.3.2 Sidelit zone.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C405.2.5 [EL27][1]	Additional interior lighting power allowed for special functions per the approved lighting plans and is automatically controlled and separated from general lighting.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C405.7 [EL26][2]	Low-voltage dry-type distribution electric transformers meet the minimum efficiency requirements of Table C405.6.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C405.8 [EL27][2]	Electric motors meet the minimum efficiency requirements of Tables C405.7(1) through C405.7(4). Efficiency verified through certification under an approved certification program or the equipment efficiency ratings shall be provided by motor manufacturer (where certification programs do not exist).	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C405.9.1, C405.9.2 [EL28][2]	Escalators and moving walks comply with ASME A17.1/CSA B44 and have automatic controls configured to reduce speed to the minimum permitted speed in accordance with ASME A17.1/CSA B44 or applicable local code when not conveying passengers.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C405.10 [EL29][2]	Total voltage drop across the combination of feeders and branch circuits <= 5%.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C405.1.1 [EL30][2]	At least 90% of dwelling unit permanently installed lighting shall have lamp efficacy >= 65 lm/W or luminaires with efficacy >= 45 lm/W or comply with C405.2.4 or C405.3.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C405.11, C405.11.1 [EL31][2]	50% of 15/20 amp receptacles installed in enclosed offices, conference rooms, copy rooms, break rooms, classrooms and workstations and > 25% of branch circuit feeders for modular furniture will have automatic receptacle control in accordance with C405.11.1.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	

Additional Comments/Assumptions:

1 High Impact (Tier 1) | 2 Medium Impact (Tier 2) | 3 Low Impact (Tier 3)

Section # & Req.ID	Final Inspection	Complies?	Comments/Assumptions
C303.3, C408.2.5.2 [FI17][3]	Furnished O&M instructions for systems and equipment to the building owner or designated representative.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C408.1.1 [FI57][1]	Building operations and maintenance documents will be provided to the owner. Documents will cover manufacturers' information, specifications, programming procedures and means of illustrating to owner how building, equipment and systems are intended to be installed, maintained, and operated.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C408.2.5 [FI16][3]	Furnished as-built drawings for electric power systems within 90 days of system acceptance.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C408.3 [FI33][1]	Lighting systems have been tested to ensure proper calibration, adjustment, programming, and operation.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	

Additional Comments/Assumptions:

1 High Impact (Tier 1) | 2 Medium Impact (Tier 2) | 3 Low Impact (Tier 3)

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STATE OF TEXAS
STACY G. CARR
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02/10/2023

Texas Firm Registration No. 13678
EXP. 2023.11.30

Client/Project Logo

Client/Project
University of North Texas - Denton

ESSC Renovation

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Title
ELECTRICAL COMCHECK

Project No.
2140001088

Scale

Revision

Drawing No.
E002

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ORIGINAL SHEET - ARCH E1

GENERAL DEMOLITION NOTES

1. ANY EXISTING WIRING SERVING DEVICES TO REMAIN IN SERVICE, AND WHICH IS INTERRUPTED BY WORK PERFORMED UNDER THIS CONTRACT, SHALL BE REROUTED TO MAINTAIN CIRCUIT CONTINUITY. CONTRACTOR SHALL ASSUME THE RISK OF MAINTAINING EXISTING SYSTEMS EXCEPT RELOCATION OF WIRING OF #2 AWG AND ABOVE SHALL BE CONSIDERED AN ADDITIONAL COST IF NOT SHOWN TO BE RELOCATED. IF SUCH WIRING IS FOUND THE CONTRACTOR SHALL NOTIFY THE OWNER OF WIRING LOCATION, REASON IT MUST BE REMOVED AND COST OF RELOCATION AND RECEIVE THE OWNER'S APPROVAL BEFORE PROCEEDING WITH THE WORK PRIOR TO COMMENCING WITH DEMOLITION. IDENTIFY ALL POWER, LIGHTING, COMMUNICATION, AND SIGNAL CIRCUITS PASSING THROUGH THE DEMOLITION AREA OR EXTENDING BEYOND THE DEMOLITION AREA. COORDINATE WITH DEMOLITION WORK OF OTHER TRADES.
2. THE EXISTING BUILDING MUST BE KEPT IN OPERATION AT ALL TIMES. MAINTAIN ELECTRICAL SERVICES AND SYSTEMS AT ALL TIMES TO AREAS BEYOND THE CONSTRUCTION AREA AND MAINTAIN CONTINUITY OF FIRE ALARM, LIFE SAFETY AND SECURITY SYSTEMS TO ALL OCCUPIED AREAS OF THE BUILDING THROUGHOUT THE CONSTRUCTION PERIOD. PROVIDE TEMPORARY WIRING AND BRANCH CIRCUITING AS NECESSARY TO MAINTAIN OPERATION OF EXISTING CIRCUITS AND SYSTEMS EXTENDING BEYOND REMODEL AREA. ASSUME FULL RESPONSIBILITY FOR ANY DISRUPTION TO EXISTING SERVICES. RECONNECT ANY SERVICES WHICH ARE TO REMAIN, AND WHICH HAVE BEEN DISCONNECTED DURING DEMOLITION OR CONSTRUCTION. ARRANGE WORK IN SUCH A MANNER THAT INTERRUPTIONS IN SERVICES OCCUR ONLY AT PRE-SCHEDULED TIMES. CARRY OUT THE WORK WITH A MINIMUM OF NOISE, DUST AND DISTURBANCE.
3. PERMANENTLY REMOVE ABANDONED ELECTRICAL EQUIPMENT, LIGHTING FIXTURES, ELECTRICAL DEVICES, POWER AND SIGNALLING WIRING DEVICES AND ASSOCIATED WIRE, RACEWAYS, AND/OR JUNCTION BOXES. THE REMOVAL OR RELOCATION OF EXISTING ELECTRICAL EQUIPMENT PRESENTLY CONCEALED IN EXISTING CONSTRUCTION SHALL BE COORDINATED WITH THE OWNER PRIOR TO REMOVAL OR RELOCATION. RACEWAYS AND CONDUCTORS SHALL BE REMOVED BACK TO THE SOURCE OR NEAREST REMAINING JUNCTION BOX OR DEVICE AS FAR AS PRACTICAL, OR WHERE COMPLETE REMOVAL NOT PRACTICAL, RENDERED PERMANENTLY SAFE.
4. ANY EXISTING SYSTEM OUTAGES SHALL BE OF MINIMUM DURATION AND AT A TIME ACCEPTABLE TO THE OWNER, ARRANGED A MINIMUM OF 10 WORKING DAYS IN ADVANCE. LONGER NOTICES AND/OR ADDITIONAL RESTRICTIONS PERTAINING TO OUTAGES MAY BE REQUIRED IN SOME INSTANCES, AS PER SPECIFICATIONS. VERIFY PROTOCOL WITH ALL PROJECT STAKEHOLDERS INCLUDING OWNER, CONSTRUCTION MANAGER AND/OR USER GROUP(S) AS APPLICABLE.
5. ELECTRICAL EQUIPMENT, FIXTURES, AND/OR DEVICES SCHEDULED TO REMAIN OR TO BE RELOCATED THAT ARE DAMAGED DURING DEMOLITION SHALL BE REPLACED WITH SIMILAR TYPE AS APPROVED BY THE OWNER, AT NO ADDITIONAL CHARGE TO THE OWNER.
6. IN THE EVENT THAT DEMOLITION WORK AFFECTS THE STRUCTURAL SUPPORT OF EXISTING ELECTRICAL EQUIPMENT THAT IS TO REMAIN IN SERVICE, IT SHALL BE RE-SUPPORTED IN ACCORDANCE WITH ALL APPLICABLE CODES. PROVIDE TEMPORARY SUPPORTS WHERE REQUIRED.
7. UNUSED FLUSH MOUNTED DEVICES, OUTLET AND OTHER BOXES IN FINISHED AREAS SHALL BE REMOVED FROM WALL AND THE REMAINING HOLE PATCHED TO MATCH ADJACENT WALL SURFACES. UNUSED RACEWAYS AND SLEEVES SHALL BE CUT FLUSH AT CEILING, FLOOR OR WALL AND FILLED WITH GROUT OR REQUIRED FIRE SEALANT. UNUSED RACEWAYS ABOVE ACCESSIBLE CEILINGS SHALL BE REMOVED.
8. ELECTRICAL MATERIAL SCHEDULED FOR REMOVAL IS TO BE REMOVED FROM THE SITE AND PROPERLY DISPOSED OF AS PART OF THIS CONTRACT. ANY ELECTRICAL MATERIAL THE OWNER WISHES TO RETAIN TO BECOME THE PROPERTY OF THE OWNER AND TO BE REMOVED AND PLACED AT A LOCATION ON THE SITE AS DIRECTED BY THE OWNER.
9. THE DEMOLITION DRAWINGS SHOW THE GENERAL SCOPE OF THE DEMOLITION AND NOT EXACT DETAILS OR TOTAL EXTENT. FOR EXACT DETAILS AND TOTAL EXTENT, EACH SERVICE MUST BE CAREFULLY CHECKED ON SITE. BEFORE REMOVING SERVICES FOLLOW THE SERVICE THROUGH TO ENSURE OTHER AREAS OF THE BUILDING ARE NOT AFFECTED.
10. OWNER IS RESPONSIBLE FOR THE REMOVAL AND TERMINATION OF DATA DEVICES AND CABLING.
11. PRIOR TO BID, CONTRACTOR SHALL VISIT THE SITE TO CONFIRM THE EXTENT OF DEMOLITION SCOPE. REFER TO ARCHITECTURAL PLANS FOR ADDITIONAL INFORMATION.

KEYNOTES - DEMOLITION

D01 REMOVE ALL DEVICES ON WALLS TO BE REMOVED IN DEMOLITION AND ALL FLOOR DEVICES NOTED WITH (D). REMOVE ALL WIRING AND CONDUIT BACK TO NEAREST UNAFFECTED DEVICE ON SAME CIRCUIT OR BACK TO SOURCE IF ALL DEVICES ON CIRCUIT ARE REMOVED. MARK CIRCUITS REMOVED IN DEMOLITION AS 'SPARE' ON PANEL SCHEDULE AND SWITCH BREAKER TO 'OFF' POSITION. DEVICES NOTED WITH (D) ARE TO BE SHOWN FOR REFERENCE. FILL FLOOR BOXES WITH CONCRETE AND LEVEL WITH EXISTING FLOOR SURFACE PRIOR TO NEW FLOOR COVERING INSTALLATION.

D02 DEVICES NOTED WITH (E) ARE EXISTING TO REMAIN.

D03 REMOVE LIGHTING AND CONTROLS IN AREA WITHIN SCOPE. RETAIN CIRCUIT IN CEILING SPACE FOR CONNECTION TO NEW LIGHTING.

D04 REMOVE ALL WIRING, CONDUIT, DEVICES, AND EQUIPMENT ASSOCIATED WITH OVERHEAD DOORS TO BE REMOVED IN DEMOLITION. REMOVE WIRING AND CONDUIT BACK TO SOURCE. MARK CIRCUITS REMOVED IN DEMOLITION AS 'SPARE' ON PANEL SCHEDULE AND SWITCH BREAKER TO 'OFF' POSITION.

D07 VAV TO BE RELOCATED. DISCONNECT AND RETAIN CONTROL CIRCUIT FOR EXTENSION TO NEW VAV LOCATION.

PHASING NOTE: PHASE 1 DEMO SCOPE ISSUED UNDER SEPARATE PACKAGE AND IS NOT PART OF THIS SCOPE OF WORK.

1 ED201 **LEVEL 1 - ELECTRICAL PLAN DEMOLITION PHASE 2**

1/8" = 1'-0"

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ESSC Renovation

Eagle Student Services Center 1147 Union Cir, Denton, TX 76201

Title
LEVEL 1 - ELECTRICAL PLAN DEMOLITION - PHASE 2

Project No. 2140001088

Scale As indicated

Revision

Drawing No. **ED201**

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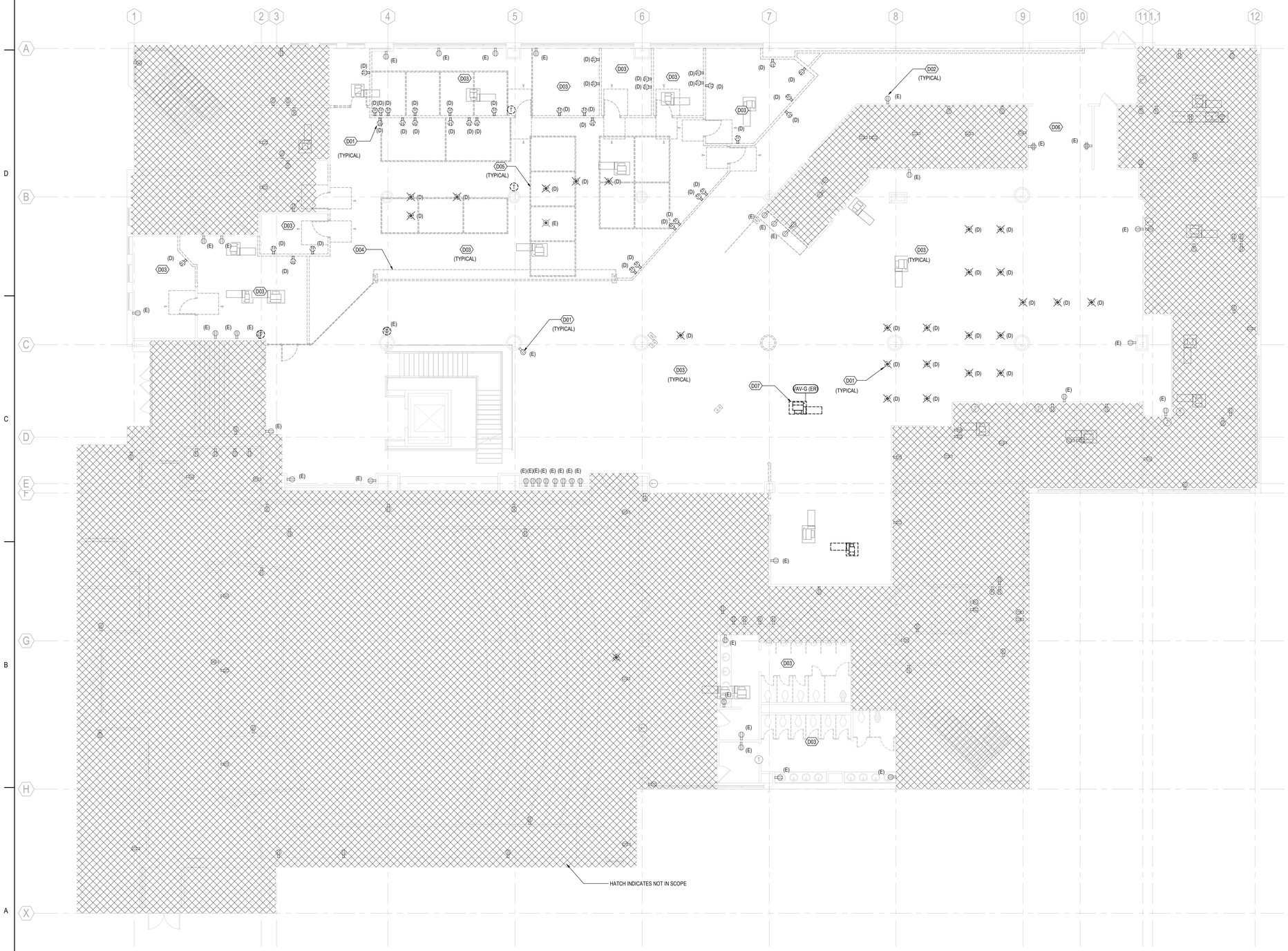
ORIGINAL SHEET - ARCH E1



1 ED202 **LEVEL 2 - ELECTRICAL PLAN DEMOLITION PHASE 2**
1/8" = 1'-0"

GENERAL DEMOLITION NOTES

1. ANY EXISTING WIRING SERVING DEVICES TO REMAIN IN SERVICE, AND WHICH IS INTERRUPTED BY WORK PERFORMED UNDER THIS CONTRACT, SHALL BE REROUTED TO MAINTAIN CIRCUIT CONTINUITY. CONTRACTOR SHALL ASSUME THE RISK OF MAINTAINING EXISTING SYSTEMS EXCEPT RELOCATION OF WIRING OF #2 AWG AND ABOVE SHALL BE CONSIDERED AN ADDITIONAL COST IF NOT SHOWN TO BE RELOCATED. IF SUCH WIRING IS FOUND THE CONTRACTOR SHALL NOTIFY THE OWNER OF WIRING LOCATION, REASON IT MUST BE REMOVED AND COST OF RELOCATION AND RECEIVE THE OWNER'S APPROVAL BEFORE PROCEEDING WITH THE WORK PRIOR TO COMMENCING WITH DEMOLITION. IDENTIFY ALL POWER, LIGHTING, COMMUNICATION, AND SIGNAL CIRCUITS PASSING THROUGH THE DEMOLITION AREA OR EXTENDING BEYOND THE DEMOLITION AREA. COORDINATE WITH DEMOLITION WORK OF OTHER TRADES.
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5. ELECTRICAL EQUIPMENT, FIXTURES, AND/OR DEVICES SCHEDULED TO REMAIN OR TO BE RELOCATED THAT ARE DAMAGED DURING DEMOLITION SHALL BE REPLACED WITH SIMILAR TYPE AS APPROVED BY THE OWNER, AT NO ADDITIONAL CHARGE TO THE OWNER.
6. IN THE EVENT THAT DEMOLITION WORK AFFECTS THE STRUCTURAL SUPPORT OF EXISTING ELECTRICAL EQUIPMENT THAT IS TO REMAIN IN SERVICE, IT SHALL BE RE-SUPPORTED IN ACCORDANCE WITH ALL APPLICABLE CODES. PROVIDE TEMPORARY SUPPORTS WHERE REQUIRED.
7. UNUSED FLUSH MOUNTED DEVICES, OUTLET AND OTHER BOXES IN FINISHED AREAS SHALL BE REMOVED FROM WALL AND THE REMAINING HOLE PATCHED TO MATCH ADJACENT WALL SURFACES. UNUSED RACEWAYS AND SLEEVES SHALL BE CUT FLUSH AT CEILING, FLOOR OR WALL AND FILLED WITH GROUT OR REQUIRED FIRE SEALANT. UNUSED RACEWAYS ABOVE ACCESSIBLE CEILINGS SHALL BE REMOVED.
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10. OWNER IS RESPONSIBLE FOR THE REMOVAL AND TERMINATION OF DATA DEVICES AND CABLING.
11. PRIOR TO BID, CONTRACTOR SHALL VISIT THE SITE TO CONFIRM THE EXTENT OF DEMOLITION SCOPE. REFER TO ARCHITECTURAL PLANS FOR ADDITIONAL INFORMATION.

KEYNOTES - DEMOLITION

D01 REMOVE ALL DEVICES ON WALLS TO BE REMOVED IN DEMOLITION AND ALL FLOOR DEVICES NOTED WITH (D). REMOVE ALL WIRING AND CONDUIT BACK TO NEAREST UNAFFECTED DEVICE ON SAME CIRCUIT OR BACK TO SOURCE IF ALL DEVICES ON CIRCUIT ARE REMOVED. MARK CIRCUITS REMOVED IN DEMOLITION AS 'SPARE' ON PANEL SCHEDULE AND SWITCH BREAKER TO 'OFF' POSITION. DEVICES NOTED WITH (D) ARE TO BE SHOWN FOR REFERENCE. FILL FLOOR BOXES WITH CONCRETE AND LEVEL WITH EXISTING FLOOR SURFACE PRIOR TO NEW FLOOR COVERING INSTALLATION.

D02 DEVICES NOTED WITH (E) ARE EXISTING TO REMAIN.

D03 REMOVE LIGHTING AND CONTROLS IN AREA WITHIN SCOPE. RETAIN CIRCUIT IN CEILING SPACE FOR CONNECTION TO NEW LIGHTING.

D04 REMOVE ALL WIRING, CONDUIT, DEVICES, AND EQUIPMENT ASSOCIATED WITH OVERHEAD DOORS TO BE REMOVED IN DEMOLITION. REMOVE WIRING AND CONDUIT BACK TO SOURCE. MARK CIRCUITS REMOVED IN DEMOLITION AS 'SPARE' ON PANEL SCHEDULE AND SWITCH BREAKER TO 'OFF' POSITION.

D05 REMOVE ALL FURNITURE WHIPS ASSOCIATED WITH FURNITURE SYSTEMS TO BE REMOVED IN DEMOLITION. REMOVE ALL WIRING AND CONDUIT BACK TO SOURCE. MARK CIRCUITS REMOVED IN DEMOLITION AS 'SPARE' ON PANEL SCHEDULE AND SWITCH BREAKER TO 'OFF' POSITION.

D06 DISCONNECT AND REMOVE EXISTING PROJECTOR AND ALL ASSOCIATED POWER. RETURN PROJECTOR TO OWNER.

D07 VAV TO BE RELOCATED. DISCONNECT AND RETAIN CONTROL CIRCUIT FOR EXTENSION TO NEW VAV LOCATION.

PHASING NOTE: PHASE 1 DEMO SCOPE ISSUED UNDER SEPARATE PACKAGE AND IS NOT PART OF THIS SCOPE OF WORK.

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Title
LEVEL 2 - ELECTRICAL PLAN DEMOLITION - PHASE 2

Project No. 2140001088
Scale As indicated
Revision
Drawing No. **ED202**

ORIGINAL SHEET - ARCH E1

ALTERNATE E1: PROVIDE 1 FOR 1 LIGHTING REPLACEMENT IN GREY HATCHED AREA. UPDATE AND REPLACE CONTROLS AS REQUIRED TO MEET IECC 2018. FIXTURES SHALL MATCH TYPES SPECIFIED FOR PROJECT.

GENERAL NOTES

1. REFER TO DRAWING E001 FOR ELECTRICAL LEGEND, ABBREVIATIONS AND PROJECT NOTES.
2. REFER TO E600 SERIES DRAWINGS FOR LUMINAIRE SCHEDULE, LIGHTING CONTROL SEQUENCE OF OPERATION, AND LIGHTING DETAILS.
3. PROVIDE A DEDICATED NEUTRAL CONDUCTOR FOR EACH BRANCH CIRCUIT.
4. COORDINATE ALL DEVICE MOUNTING LOCATIONS, HEIGHTS, SPACING, AND PHASING WITH ARCHITECTURAL FLOOR PLANS AND ELEVATIONS. BIDDERS SHALL EXAMINE ARCHITECTURAL DRAWINGS TO INCLUDE ANY NECESSARY COORDINATION COSTS.
5. REFER TO ARCHITECTURAL REFLECTED CEILING PLAN AND/OR ROOM FINISH SCHEDULE AND VERIFY LUMINAIRE TRIM TYPE FOR THE CEILING CONSTRUCTION PRIOR TO ORDERING THE LUMINAIRES. PROVIDE LUMINAIRES THAT ARE COMPATIBLE WITH THE CEILING SYSTEM.
6. OCCUPANCY LIGHTING CONTROL IS A DELEGATED PERFORMANCE BASED PROJECT DESIGN REQUIREMENT. THE LIGHTING PLANS SHOW DESIGN INTENT ONLY FOR SPACES THAT REQUIRE OCCUPANCY CONTROL COVERAGE. CONTRACTOR SHALL SUBMIT A FULL SET OF OCCUPANCY CONTROL SHOP DRAWING TO THE ENGINEER PRIOR TO PURCHASE AND INSTALLATION. OCCUPANCY CONTROL LOCATIONS AND QUANTITIES SHALL BE BASED ON THE MANUFACTURER'S RECOMMENDATIONS. PROVIDE ADDITIONAL OR LESS OCCUPANCY SENSORS WITHIN EACH SPACE AS NECESSARY FOR FULL SMALL HAND MOTION COVERAGE (AT NO ADDITIONAL COST). THESE ADDITIONAL SENSORS SHALL BE INCLUDED IN SHOP DRAWING SUBMITTAL.
7. SPACE OCCUPANCY CONTROLS SHALL BE WIRED SUCH THAT ALL GENERAL ROOM LIGHTING, DISPLAY LIGHTING, AND UNDERCABINET TASK LIGHTING ARE CONTROLLED BY RESPECTIVE SENSOR(S).
8. ALL EXIT SIGNS SHALL BE CONNECTED TO NEAREST UNSWITCHED EMERGENCY GENERATOR CIRCUIT.
9. ALL LUMINAIRES DESIGNATED AS EMERGENCY SHALL BE CONNECTED TO UNSWITCHED EMERGENCY GENERATOR CIRCUIT PER MANUFACTURER'S WIRING DIAGRAM. EMERGENCY FIXTURES SHALL BE NIGHT LIGHTS FOR CONSTANT ILLUMINATION OF EGRESS PATHWAYS.
10. PROVIDE UL924 LOAD CONTROL DEVICE FOR EACH LIGHTING CONTROL ZONE WHERE LUMINAIRES ARE DESIGNATED AS EMERGENCY LIGHT FIXTURES ON EMERGENCY GENERATOR. REFER TO MANUFACTURER'S WIRING DIAGRAMS FOR WIRING REQUIREMENTS TO MEET LIGHTING CONTROL REQUIREMENTS, WHICH MAY INCLUDE 0-10V DIMMING.
11. LIMIT CONDUIT ROUTING IN AREAS WITH OPEN CEILINGS TO LOADS IN THAT AREA. ROUTE CONDUIT IN ENCLOSED CEILINGS AND CONCEALED BULKHEADS WHERE POSSIBLE.
12. WHERE "PS" PHOTO SENSOR CONTROLS ARE INSTALLED, PROVIDE AN ADDITIONAL 10' OF CABLE SLACK TO RELOCATE PHOTO SENSOR AS NECESSARY IN FIELD DURING COMMISSIONING.
13. LIGHTING CONTROLS SHALL COMPLY WITH APPLICABLE ENERGY CODE. WHERE DAYLIGHT ZONES ARE APPLICABLE, THEY HAVE BEEN INDICATED ON FLOOR PLANS. OTHERWISE, CODE EXCEPTION IS TO BE APPLIED (ZONE WATTAGE NO MORE THAN 150 WATTS).
14. IN SERVICE SPACES (MECHANICAL, ELECTRICAL, MDF/IDF, ETC.), ADJUST FIXTURE LOCATIONS AS NECESSARY TO AVOID CONFLICTS WITH OTHER SYSTEMS/EQUIPMENT AND OPTIMIZE GENERAL ILLUMINATION.
15. ALL LINEAR LUMINAIRES SHALL BE CONTINUOUS AND NOT SEGMENTED. REFERENCE LIGHTING PLANS FOR FIXTURE LENGTHS. WHERE LIGHTING IS ALIGNED WITH ARCHITECTURAL ELEMENT (I.E. COVE LIGHTING), CONTRACTOR SHALL PROVIDE FIXTURES IN LENGTHS AS REQUIRED ACCORDING TO DIMENSIONS OF ARCHITECTURAL ELEMENT.

KEYNOTES LIGHTING

L01 CONNECT NEW LIGHTING TO EXISTING LIGHTING CIRCUIT RETAINED FROM DEMOLITION. CONTRACTOR SHALL VERIFY LOAD ON ANY INDIVIDUAL CIRCUIT DOES NOT EXCEED 16A.

L02 CONNECT EMERGENCY (HATCHED) LIGHTING TO EXISTING EMERGENCY CIRCUIT RETAINED FROM DEMOLITION. CONTRACTOR SHALL VERIFY LOAD ON ANY INDIVIDUAL CIRCUIT DOES NOT EXCEED 16A. PROVIDE UL924 DEVICES AS REQUIRED FOR CONTROL OF EMERGENCY FIXTURES.

L03 NEW EXIT SIGN. CONNECT TO NEAREST UNSWITCHED LEG OF EXISTING EMERGENCY CIRCUIT. LIGHTING

L04 PROVIDE DUAL CIRCUIT FEED FOR FIXTURE WITH 4' EMERGENCY SECTIONS EVERY 16'. CONNECT TO EMERGENCY AND NORMAL CIRCUITS RETAINED FROM DEMOLITION.

L05 DIGITAL CONTROL STATION FOR DMX DIMMING AND COLOR CHANGING OF TYPE 'D2' FIXTURE. STATION SHALL INCLUDE PRESETS AND FULL ADJUSTMENT CAPABILITY FOR COLOR AND DIMMING. PROVIDE ADDITIONAL DEVICES AND POWER PACKS AS REQUIRED IN CEILING TO INTERFACE WITH THE FIXTURES DMX DRIVE. FIXTURES SHALL STILL BE TIED IN TO LOCAL AREA ON/OFF AND OCCUPANCY CONTROLS.

1 E111 **LEVEL 1 - LIGHTING PLAN**

1/8" = 1'-0"

ORIGINAL SHEET - ARCH E1

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Notes

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STATE OF TEXAS
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94803
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PROFESSIONAL ENGINEER
02/10/2023

Texas Firm Registration No. 13678
EXP. 2023.11.30

Client/Project Logo

Client/Project
University of North Texas - Denton

ESSC Renovation

Eagle Student Services Center 1147 Union Cir, Denton, TX 76201

Title
LEVEL 1 - LIGHTING PLAN

Project No.	Scale
2140001088	As indicated
Revision	Drawing No.
	E111

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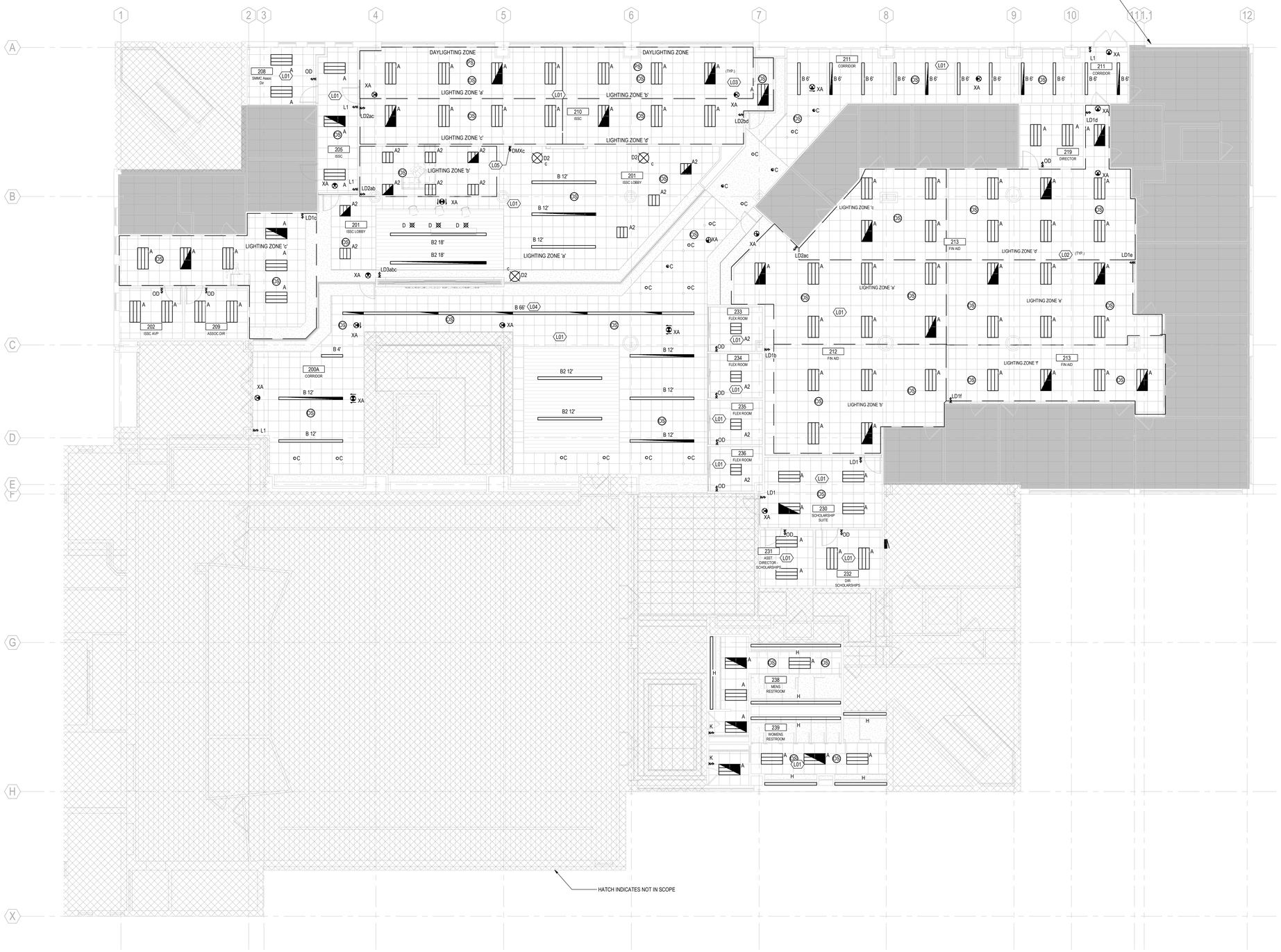
ALTERNATE E1: PROVIDE 1 FOR 1 LIGHTING REPLACEMENT IN GREY HATCHED AREA. UPDATE AND REPLACE CONTROLS AS REQUIRED TO MEET IECC 2018. FIXTURES SHALL MATCH TYPES SPECIFIED FOR PROJECT.



GENERAL NOTES

1. REFER TO DRAWING E001 FOR ELECTRICAL LEGEND, ABBREVIATIONS AND PROJECT NOTES.
2. REFER TO E600 SERIES DRAWINGS FOR LUMINAIRE SCHEDULE, LIGHTING CONTROL SEQUENCE OF OPERATION, AND LIGHTING DETAILS.
3. PROVIDE A DEDICATED NEUTRAL CONDUCTOR FOR EACH BRANCH CIRCUIT.
4. COORDINATE ALL DEVICE MOUNTING LOCATIONS, HEIGHTS, SPACING, AND PHASING WITH ARCHITECTURAL FLOOR PLANS AND ELEVATIONS. BIDDERS SHALL EXAMINE ARCHITECTURAL DRAWINGS TO INCLUDE ANY NECESSARY COORDINATION COSTS.
5. REFER TO ARCHITECTURAL REFLECTED CEILING PLAN AND/OR ROOM FINISH SCHEDULE AND VERIFY LUMINAIRE TRIM TYPE FOR THE CEILING CONSTRUCTION PRIOR TO ORDERING THE LUMINAIRES. PROVIDE LUMINAIRES THAT ARE COMPATIBLE WITH THE CEILING SYSTEM.
6. OCCUPANCY LIGHTING CONTROL IS A DELEGATED PERFORMANCE BASED PROJECT DESIGN REQUIREMENT. THE LIGHTING PLANS SHOW DESIGN INTENT ONLY FOR SPACES THAT REQUIRE OCCUPANCY CONTROL COVERAGE. CONTRACTOR SHALL SUBMIT A FULL SET OF OCCUPANCY CONTROL SHOP DRAWING TO THE ENGINEER PRIOR TO PURCHASE AND INSTALLATION. OCCUPANCY CONTROL LOCATIONS AND QUANTITIES SHALL BE BASED ON THE MANUFACTURER'S RECOMMENDATIONS. PROVIDE ADDITIONAL OR LESS OCCUPANCY SENSORS WITHIN EACH SPACE AS NECESSARY FOR FULL SMALL HAND MOTION COVERAGE (AT NO ADDITIONAL COST). THESE ADDITIONAL SENSORS SHALL BE INCLUDED IN SHOP DRAWING SUBMITTAL.
7. SPACE OCCUPANCY CONTROLS SHALL BE WIRED SUCH THAT ALL GENERAL ROOM LIGHTING, DISPLAY LIGHTING, AND UNDERCABINET TASK LIGHTING ARE CONTROLLED BY RESPECTIVE SENSOR(S).
8. ALL EXIT SIGNS SHALL BE CONNECTED TO NEAREST UNSWITCHED EMERGENCY GENERATOR CIRCUIT.
9. ALL LUMINAIRES DESIGNATED AS EMERGENCY SHALL BE CONNECTED TO UNSWITCHED EMERGENCY GENERATOR CIRCUIT PER MANUFACTURER'S WIRING DIAGRAM. EMERGENCY FIXTURES SHALL BE NIGHT LIGHTS FOR CONSTANT ILLUMINATION OF EGRESS PATHWAYS.
10. PROVIDE UL924 LOAD CONTROL DEVICE FOR EACH LIGHTING CONTROL ZONE WHERE LUMINAIRES ARE DESIGNATED AS EMERGENCY LIGHT FIXTURES ON EMERGENCY GENERATOR. REFER TO MANUFACTURER'S WIRING DIAGRAMS FOR WIRING REQUIREMENTS TO MEET LIGHTING CONTROL REQUIREMENTS, WHICH MAY INCLUDE 0-10V DIMMING.
11. LIMIT CONDUIT ROUTING IN AREAS WITH OPEN CEILINGS TO LOADS IN THAT AREA. ROUTE CONDUIT IN ENCLOSED CEILINGS AND CONCEALED BULKHEADS WHERE POSSIBLE.
12. WHERE "PS" PHOTO SENSOR CONTROLS ARE INSTALLED, PROVIDE AN ADDITIONAL 10' OF CABLE SLACK TO RELOCATE PHOTO SENSOR AS NECESSARY IN FIELD DURING COMMISSIONING.
13. LIGHTING CONTROLS SHALL COMPLY WITH APPLICABLE ENERGY CODE. WHERE DAYLIGHT ZONES ARE APPLICABLE, THEY HAVE BEEN INDICATED ON FLOOR PLANS. OTHERWISE, CODE EXCEPTION IS TO BE APPLIED (ZONE WATTAGE NO MORE THAN 150 WATTS).
14. IN SERVICE SPACES (MECHANICAL, ELECTRICAL, MDF/IDF, ETC.), ADJUST FIXTURE LOCATIONS AS NECESSARY TO AVOID CONFLICTS WITH OTHER SYSTEMS/EQUIPMENT AND OPTIMIZE GENERAL ILLUMINATION.
15. ALL LINEAR LUMINAIRES SHALL BE CONTINUOUS AND NOT SEGMENTED. REFERENCE LIGHTING PLANS FOR FIXTURE LENGTHS. WHERE LIGHTING IS ALIGNED WITH ARCHITECTURAL ELEMENT (I.E. COVE LIGHTING), CONTRACTOR SHALL PROVIDE FIXTURES IN LENGTHS AS REQUIRED ACCORDING TO DIMENSIONS OF ARCHITECTURAL ELEMENT.

KEYNOTES LIGHTING

L01 CONNECT NEW LIGHTING TO EXISTING LIGHTING CIRCUIT RETAINED FROM DEMOLITION. CONTRACTOR SHALL VERIFY LOAD ON ANY INDIVIDUAL CIRCUIT DOES NOT EXCEED 16A.

L02 CONNECT EMERGENCY (HATCHED) LIGHTING TO EXISTING EMERGENCY CIRCUIT RETAINED FROM DEMOLITION. CONTRACTOR SHALL VERIFY LOAD ON ANY INDIVIDUAL CIRCUIT DOES NOT EXCEED 16A. PROVIDE UL924 DEVICES AS REQUIRED FOR CONTROL OF EMERGENCY FIXTURES.

L03 NEW EXIT SIGN. CONNECT TO NEAREST UNSWITCHED LEG OF EXISTING EMERGENCY CIRCUIT. LIGHTING

L04 PROVIDE DUAL CIRCUIT FEED FOR FIXTURE WITH 4' EMERGENCY SECTIONS EVERY 16'. CONNECT TO EMERGENCY AND NORMAL CIRCUITS RETAINED FROM DEMOLITION.

L05 DIGITAL CONTROL STATION FOR DMX DIMMING AND COLOR CHANGING OF TYPE 'D2' FIXTURE. STATION SHALL INCLUDE PRESETS AND FULL ADJUSTMENT CAPABILITY FOR COLOR AND DIMMING. PROVIDE ADDITIONAL DEVICES AND POWER PACKS AS REQUIRED IN CEILING TO INTERFACE WITH THE FIXTURES DMX DRIVE. FIXTURES SHALL STILL BE TIED IN TO LOCAL AREA ON/OFF AND OCCUPANCY CONTROLS.

1 E121 **LEVEL 2 - LIGHTING PLAN**
1/8" = 1'-0"

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Client/Project
University of North Texas - Denton

ESSC Renovation

Eagle Student Services Center 1147 Union Cir, Denton, TX 76201

Title
LEVEL 2 - LIGHTING PLAN

Project No. 2140001088
Scale As indicated
Revision
Drawing No. **E121**

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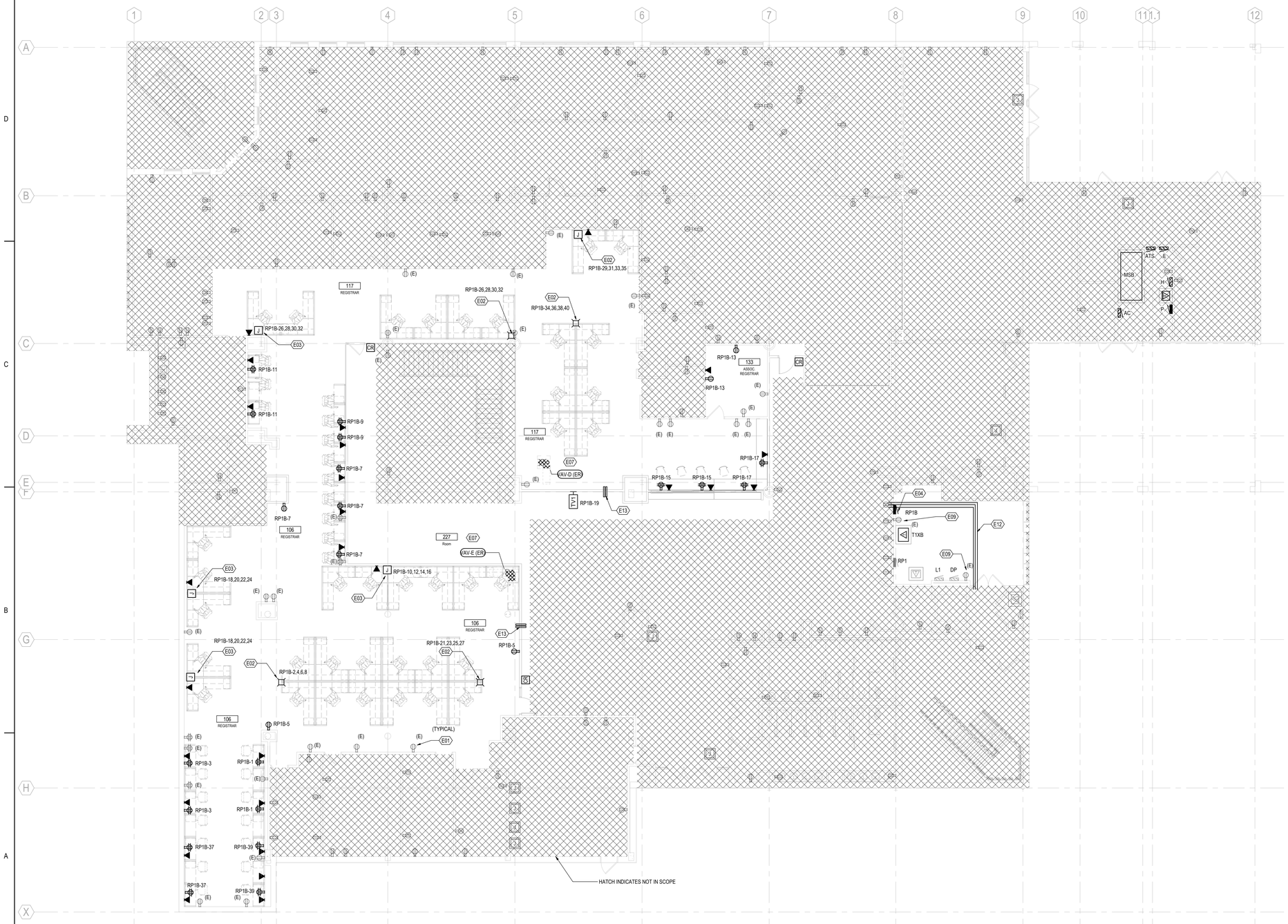
ORIGINAL SHEET - ARCH E1



1 E211 **LEVEL 1 - POWER PLAN**

1/8" = 1'-0"

GENERAL NOTES

1. REFER TO DRAWING E001 FOR ELECTRICAL LEGEND, ABBREVIATIONS AND GENERAL NOTES.
2. REFER TO DRAWING E401 FOR ELECTRICAL ONE LINE DIAGRAM.
3. EACH CIRCUIT SHALL HAVE A DEDICATED NEUTRAL CONNECTED BACK TO THE PANEL.
4. COORDINATE MOUNTING HEIGHT OF WALL MOUNTED EXTERIOR CAMERAS WITH SYSTEM INSTALLER PRIOR TO ROUGH-IN. EXTEND CONDUIT FROM CAMERA LOCATION TO NEAREST INTERIOR ACCESSIBLE CEILING SPACE.
5. COORDINATE ALL DEVICE MOUNTING LOCATIONS, HEIGHTS, AND SPACINGS WITH ARCHITECTURAL FLOOR PLANS AND ELEVATIONS. BIDDERS SHALL EXAMINE ARCHITECTURAL DRAWINGS TO INCLUDE ANY NECESSARY COSTS WITH THEIR BID.
6. IN GENERAL, DEVICES AT LOWER HEIGHTS SHALL BE STACKED DIRECTLY BELOW DEVICES AT HIGHER ELEVATIONS. PROVIDE CONDUIT OFFSET AS NECESSARY.
7. COORDINATE MOUNTING HEIGHT OF DEVICES ABOVE MILLWORK WITH ARCHITECTURAL PLANS PRIOR TO ROUGH-IN.
8. THESE DRAWINGS ARE DIAGRAMATIC AND INDICATE THE GENERAL EXTENT OF THE WORK. THE ELECTRICAL CONTRACTOR SHALL PROVIDE ALL PULL BOXES, JUNCTION BOXES AND INCIDENTAL MATERIALS AND LABOR FOR A COMPLETE AND FULLY FUNCTIONAL SYSTEM.
9. PROVIDE FIRESTOPPING FOR ALL FLOOR AND FIRE RATED WALL SLEEVES.
10. PROVIDE THROUGH WALL SLEEVES PER DIVISION 26 AND 27 SPECIFICATIONS.
11. ALL FIRE ALARM BOOSTER PANELS SHALL BE CONNECTED TO A NEW DEDICATED 20A/1P CIRCUIT BREAKER IN NEAREST 208Y/120V BRANCH PANELBOARD WITH (2)#12 AND (1)#12 GND-3/4" C. ELECTRICAL CONTRACTOR SHALL VERIFY EXACT LOCATION AND QUANTITIES WITH FIRE ALARM CONTRACTOR. CONTRACTOR SHALL UPSIZE WIRE AS NECESSARY FOR VOLTAGE DROP.
12. MC CABLE IS PERMITED FOR NEW DEVICES IN EXISTING WALLS. NEW DEVICES IN NEW WALLS SHALL UTILITY EMT CONDUIT.

KEYNOTES POWER

E01 DEVICES NOTED WITH (E) ARE EXISTING.

E02 PROVIDE POWER POLE FOR POWER AND DATA TO FURNITURE SYSTEM. POWER POLE TO BE SPECIFIED BY FURNITURE DESIGNER. VERIFY FURNITURE WIRING REQUIREMENTS WITH FURNITURE VENDOR PRIOR TO ROUGH-IN.

E03 WALL FURNITURE FEED FOR FURNITURE SYSTEM. VERIFY FURNITURE WIRING REQUIREMENTS WITH FURNITURE VENDOR PRIOR TO ROUGH-IN.

E04 PROPOSED LOCATION FOR NEW ELECTRICAL EQUIPMENT. CONTRACTOR SHALL VERIFY EXISTING CONDITIONS AND THAT ADEQUATE SPACE IS AVAILABLE TO MEET ALL CLEARANCE REQUIREMENTS. RELOCATE EQUIPMENT DISCONNECT OR CONTROL PANELS AS REQUIRED TO CREATE SPACE. PROVIDE 4" CONCRETE PAD FOR NEW TRANSFORMER.

E07 RELOCATED VAV. EXTEND EXISTING CONTROL CIRCUIT TO NEW LOCATION AND RECONNECT.

E09 REPLACE EXISTING DEVICE WITH GFCI DEVICE.

E12 PROVIDE (3) 4" CONDUIT THROUGH MECHANICAL ROOM INTO GENERAL BUILDING AREA FOR FUTURE CABLING. COORDINATE ROUTING WITH EXISTING CONDUIT AND EQUIPMENT IN SPACE. VERIFY ROUTING WITH OWNER PRIOR TO STARTING WORK.

E13 PROVIDE (2) 4" THRU WALL SLEEVES FOR FUTURE DATA CABLING. COORDINATE LOCATIONS WITH OWNER PRIOR TO ROUGH-IN. REFER TO SPECIFICATIONS FOR SLEEVE REQUIREMENTS.

FURNITURE POWER NOTE:

FURNITURE POWER IS BASED ON EVOLVE FURNITURE GROUP CUBICLE SYSTEM. LAYOUT AND CONNECTION LOCATIONS AND TYPE ARE PRELIMINARY AND WILL NEED TO BE COORDINATED BASED ON VENDOR DRAWINGS. WIRING IS BASED A 2+2 (4 CIRCUIT, 8 WIRE) SYSYTEM. DESIGN ASSUMES 3 RECEPTACLES PER CUBICLE. ANY DEVIATION TO FURNITURE VENDOR, WIRING SYSTEM, CUBICLE OR RECEPTACLE QUANTITY WILL REQUIRE REVIEW AND POTENTIAL REVISIONS TO THE POWER LAYOUTS AND REQUIREMENTS.

FOR EACH CUBICLE SYSTEM PROVIDE 4H, 2N, 1G WIRE. WIRE SIZE SHALL BE AS INDICATED ON PANEL SCHEDULE. BOND SYSTEM GROUND AND DEDICATED GROUND AT THE FURNITURE FEED JUNCTION BOX. PROVIDE HANDLE TIES FOR BREAKERS THAT SHARE A NEUTRAL CONDUCTOR.

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02/10/2023

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Client/Project Logo

Client/Project
University of North Texas - Denton

ESSC Renovation

Eagle Student Services Center 1147 Union Cir, Denton, TX 76201

Title
LEVEL 1 - POWER PLAN

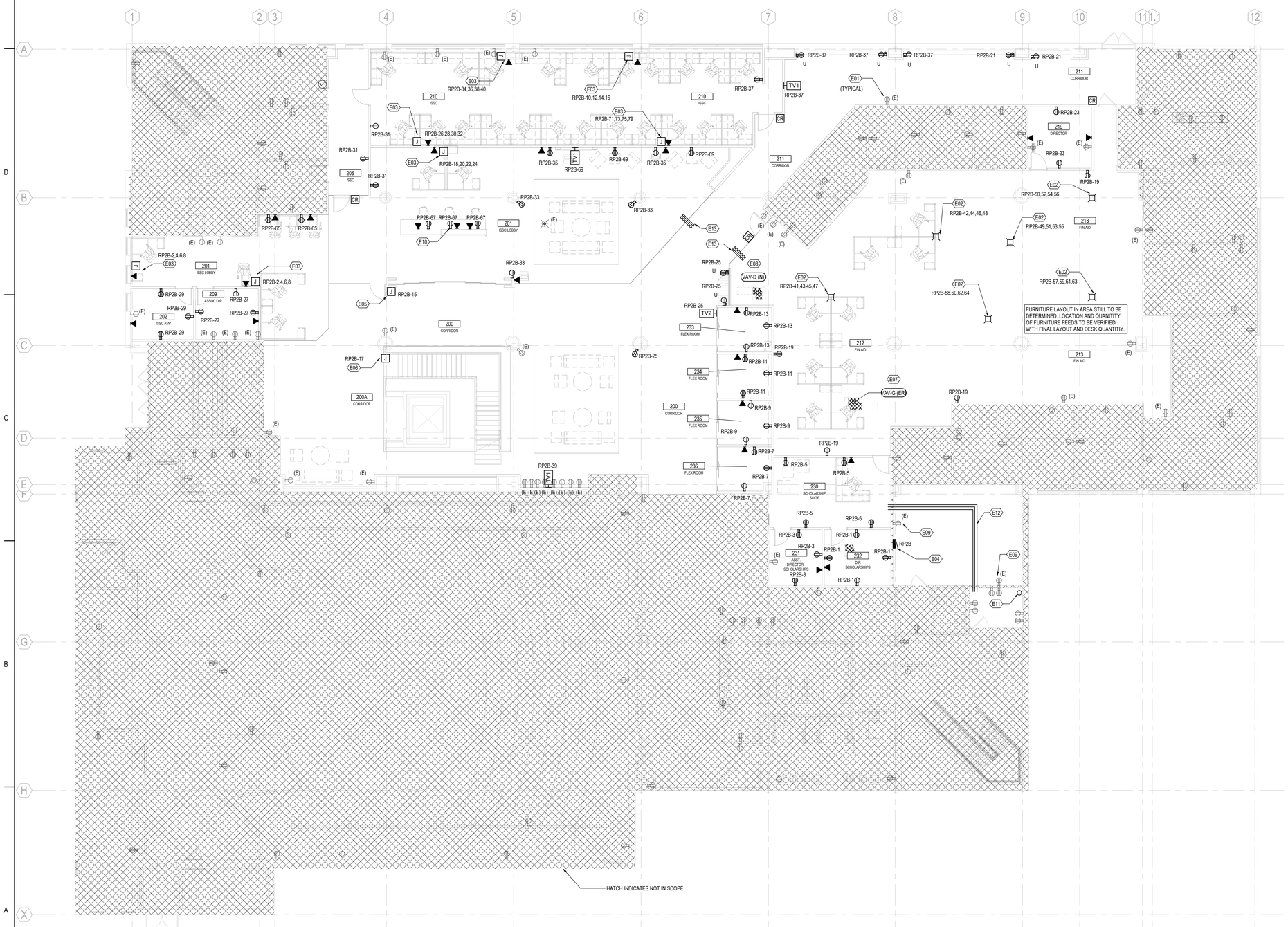
Project No. 2140001088

Scale As indicated

Revision

Drawing No. **E211**

ORIGINAL SHEET - ARCH E1



GENERAL NOTES

1. REFER TO DRAWING E001 FOR ELECTRICAL LEGEND, ABBREVIATIONS AND GENERAL NOTES.
2. REFER TO DRAWING E401 FOR ELECTRICAL ONE LINE DIAGRAM.
3. EACH CIRCUIT SHALL HAVE A DEDICATED NEUTRAL CONNECTED BACK TO THE PANEL.
4. COORDINATE MOUNTING HEIGHT OF WALL MOUNTED EXTERIOR CAMERAS WITH SYSTEM INSTALLER PRIOR TO ROUGH-IN. EXTEND CONDUIT FROM CAMERA LOCATION TO NEAREST INTERIOR ACCESSIBLE CEILING SPACE.
5. COORDINATE ALL DEVICE MOUNTING LOCATIONS, HEIGHTS, AND SPACINGS WITH ARCHITECTURAL FLOOR PLANS AND ELEVATIONS. BIDDERS SHALL EXAMINE ARCHITECTURAL DRAWINGS TO INCLUDE ANY NECESSARY COSTS WITH THEIR BID.
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7. COORDINATE MOUNTING HEIGHT OF DEVICES ABOVE MILLWORK WITH ARCHITECTURAL PLANS PRIOR TO ROUGH-IN.
8. THESE DRAWINGS ARE DIAGRAMATIC AND INDICATE THE GENERAL EXTENT OF THE WORK. THE ELECTRICAL CONTRACTOR SHALL PROVIDE ALL PULL BOXES, JUNCTION BOXES AND INCIDENTAL MATERIALS AND LABOR FOR A COMPLETE AND FULLY FUNCTIONAL SYSTEM.
9. PROVIDE FIRESTOPPING FOR ALL FLOOR AND FIRE RATED WALL SLEEVES.
10. PROVIDE THROUGH WALL SLEEVES PER DIVISION 26 AND 27 SPECIFICATIONS.
11. ALL FIRE ALARM BOOSTER PANELS SHALL BE CONNECTED TO A NEW DEDICATED 20A/1P CIRCUIT BREAKER IN NEAREST 208Y/120V BRANCH PANELBOARD WITH (2)#12 AND (1)#12 GND-3/4" C. ELECTRICAL CONTRACTOR SHALL VERIFY EXACT LOCATION AND QUANTITIES WITH FIRE ALARM CONTRACTOR. CONTRACTOR SHALL UPSIZE WIRE AS NECESSARY FOR VOLTAGE DROP.
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KEYNOTES POWER

E01	DEVICES NOTED WITH (E) ARE EXISTING.
E02	PROVIDE POWER POLE FOR POWER AND DATA TO FURNITURE SYSTEM. POWER POLE TO BE SPECIFIED BY FURNITURE DESIGNER. VERIFY FURNITURE WIRING REQUIREMENTS WITH FURNITURE VENDOR PRIOR TO ROUGH-IN.
E03	WALL FURNITURE FEED FOR FURNITURE SYSTEM. VERIFY FURNITURE WIRING REQUIREMENTS WITH FURNITURE VENDOR PRIOR TO ROUGH-IN.
E04	PROPOSED LOCATION FOR NEW ELECTRICAL EQUIPMENT. CONTRACTOR SHALL VERIFY EXISTING CONDITIONS AND THAT ADEQUATE SPACE IS AVAILABLE TO MEET ALL CLEARANCE REQUIREMENTS. RELOCATE EQUIPMENT DISCONNECT OR CONTROL PANELS AS REQUIRED TO CREATE SPACE. PROVIDE 4" CONCRETE PAD FOR NEW TRANSFORMER.
E05	PROVIDE 120V POWER TO BACKLIT SIGNAGE. VERIFY EXACT POWER REQUIREMENTS AND LOCATIONS PRIOR TO ROUGH. PROVIDE LINE SIDE TOGGLE DISCONNECT IF NO INTEGRAL DISCONNECT IS PROVIDED.
E06	PROVIDE 120V POWER FOR 3RD FLOOR FIRE CURTAIN HOLD OPEN. COORDINATE ALL ROUGH-IN LOCATIONS WITH DOOR PROVIDER. COORDINATE WITH FIRE ALARM CONTRACTOR AND PROVIDE ALL INTERCONNECTION TO FIRE ALARM SYSTEM AS REQUIRED.
E07	RELOCATED VAV. EXTEND EXISTING CONTROL CIRCUIT TO NEW LOCATION AND RECONNECT.
E08	NEW VAV. INTERCEPT AND EXTEND EXISTING VAV CONTROL CIRCUIT TO NEW VAV AND MAKE ALL CONNECTIONS REQUIRED.
E09	REPLACE EXISTING DEVICE WITH GFCI DEVICE.
E10	DEVICES MOUNTED IN CASEWORK. ROUTE CONDUIT FROM BELOW INTO CASEWORK FOR EXTENSION TO DEVICES. PROVIDE 1-1/4" PATHWAY INTO CASEWORK FOR DATA CABLING. VERIFY EXACT LOCATION WITH CASEWORK INSTALLER PRIOR TO ROUGH-IN.
E11	PROVIDE NEW 4" FLOOR CORE IN MDF ROOM TO FIRST FLOOR. COORDINATE LOCATION WITH EXISTING CORES AND EQUIPMENT. SUBMIT SHOP DRAWING INDICATING EXISTING CORES AND PROPOSED NEW CORE LOCATION FOR ARCHITECT/OWNER REVIEW PRIOR TO CORING.
E12	PROVIDE (3) 4" CONDUIT THROUGH MECHANICAL ROOM INTO GENERAL BUILDING AREA FOR FUTURE CABLING. COORDINATE ROUTING WITH EXISTING CONDUIT AND EQUIPMENT IN SPACE. VERIFY ROUTING WITH OWNER PRIOR TO STARTING WORK.
E13	PROVIDE (2) 4" THRU WALL SLEEVES FOR FUTURE DATA CABLING. COORDINATE LOCATIONS WITH OWNER PRIOR TO ROUGH-IN. REFER TO SPECIFICATIONS FOR SLEEVE REQUIREMENTS.

FURNITURE POWER NOTE:

FURNITURE POWER IS BASED ON EVOLVE FURNITURE GROUP CUBICLE SYSTEM. LAYOUT AND CONNECTION LOCATIONS AND TYPE ARE PRELIMINARY AND WILL NEED TO BE COORDINATED BASED ON VENDOR DRAWINGS. WIRING IS BASED A 2-2 (4 CIRCUIT, 8 WIRE) SYSYTEM. DESIGN ASSUMES 3 RECEPTACLES PER CUBICLE. ANY DEVIATION TO FURNITURE VENDOR, WIRING SYSTEM, CUBICLE OR RECEPTACLE QUANTITY WILL REQUIRE REVIEW AND POTENTIAL REVISIONS TO THE POWER LAYOUTS AND REQUIREMENTS.

FOR EACH CUBICLE SYSTEM PROVIDE 4H, 2N, 1G WIRE. WIRE SIZE SHALL BE AS INDICATED ON PANEL SCHEDULE. BOND SYSTEM GROUND AND DEDICATED GROUND AT THE FURNITURE FEED JUNCTION BOX. PROVIDE HANDLE TIES FOR BREAKERS THAT SHARE A NEUTRAL CONDUCTOR.

1 E221 **LEVEL 2 - POWER PLAN**
1/8" = 1'-0"

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Title
LEVEL 2 - POWER PLAN

Project No. 2140001088
Scale As indicated
Revision
Drawing No. **E221**

ORIGINAL SHEET - ARCH E1

3 PHASE MOTOR CIRCUIT SIZING SCHEDULE

SIZE (HP)	480V, 3 PHASE				208V, 3 PHASE			
	OVERCURRENT SWITCH/FUSE (AMPS)	OVERCURRENT CB (AMPS)	STARTER SIZE	DISC. SWITCH (AMPS)	OVERCURRENT SWITCH/FUSE (AMPS)	OVERCURRENT CB (AMPS)	STARTER SIZE	DISC. SWITCH (AMPS)
.5	30/3	15	1	30	30A/6A	15	1	30
.75	30/3	15	1	30	30A/6A	15	1	30
1	30/6	15	1	30	30/10	15	1	30
1.5	30/6	15	1	30	30/10	15	1	30
2	30/6	15	1	30	30/10	15	1	30
3	30/10	15	1	30	30/20	20	1	30
5	30/15	15	1	30	30/25	35	1	60
7.5	30/20	20	1	30	60/40	50	1	60
10	30/20	25	1	30	60/50	60	2	60
15	30/30	40	2	30	60/60	90	3	100
20	60/40	60	2	60	100/90	100	3	100
25	60/50	70	2	60	100/100	110	3	100
30	60/60	80	3	60	200/125	125	4	200
40	100/80	90	3	60	200/175	175	4	200
50	100/100	100	3	100	200/200	200	4	200
60	200/125	125	4	100	400/250	250	5	400
75	200/150	150	4	200	400/300	300	5	400
100	200/200	200	4	200	400/400	400	6	400
125	200/200	225	5	200	800/500	600	6	800
150	400/250	250	5	400	600/600	600	6	800
200	400/350	350	5	400	N/A	N/A	N/A	N/A

NOTES:

1. BASED ON MOTOR FULL LOAD AMPS AS LISTED IN THE N.E.C.
2. BASED ON MOTOR RUNNING OVERLOAD PROTECTION PROVIDED BY THERMAL OVERLOAD RELAYS.
3. WHERE THE STARTER IS LOCATED REMOTE FROM THE MOTOR, PROVIDE DISCONNECT LOCATED AT THE MOTOR, SIZE AS INDICATED.

3 PHASE DRY TYPE TRANSFORMER CIRCUIT SIZING SCHEDULE

SIZE (KVA)	PRIMARY VOLTAGE (480V)				SECONDARY VOLTAGE (208Y/120V)			
	COPPER (CU)				COPPER (CU)			
	OVERCURRENT FUSE/CB (AMPS)	CONDUCTOR SIZE	GROUND SIZE	CONDUIT SIZE	OVERCURRENT FUSE/CB (AMPS)	CONDUCTOR SIZE	GROUND SIZE	CONDUIT SIZE
9 KVA	20 A	#12	#12	3/4"	30 A	#10	#8	3/4"
15 KVA	30 A	#10	#10	3/4"	60 A	#4	#8	1 1/4"
30 KVA	60 A	#4	#10	1"	100 A	#1	#6	1 1/2"
45 KVA	90 A	#2	#8	1 1/4"	150 A	#1/0	#6	2"
75 KVA	150 A	#1/0	#6	1 1/2"	250A (225A)	#250 (#4/0)	#2	3" (2 1/2")
112.5 KVA	225 A	#4/0	#4	2"	400 A	2 SETS #3/0	#1/0	2 - 2"
150 KVA	300 A	#350	#4	2 1/2"	500 A	2 SETS #250	2 SETS #1/0	2 - 3"
225 KVA	450 A	2 SETS #4/0	2 SETS #2	2"	800 A	3 SETS OF #350	3 SETS #2/0	3 - 3"
300 KVA	600 A	2 SETS #350	2 SETS #1	2 - 2 1/2"	1000 A	3 SETS #500	3 SETS #3/0	3 - 3 1/2"
500 KVA	800 A	3 SETS #350	3 SETS #1/0	2 - 3"	2000 A	6 SETS #500	6 SETS #3/0	6 - 3 1/2"

NOTES:

1. TRANSFORMERS AND FEEDERS ARE BASED ON, 480V, 3ø, 3W PRIMARY AND 208Y/120V, 3ø , 4W SECONDARY.
2. CONDUCTORS ARE BASED ON 90°C., 600V, INSULATED COPPER WIRE APPLIED AT 75° FOR TERMINATION RATED 60°/75° OR 75°C.
3. THIS TABLE REFERENCES STANDARD TRANSFORMERS, K RATING MAY REQUIRE INCREASED NUETRALS.

COPPER FEEDER AND BRANCH CIRCUIT SCHEDULE

ID	NOMINAL CIRCUIT RATING	SETS	CONDUCTORS	GROUND	CONDUIT W/ N (4W)	CONDUIT W/O N (3W)
C01	20	1	#12	#12	3/4"	3/4"
C02	30	1	#10	#10	3/4"	3/4"
C03	40	1	#8	#10	3/4"	3/4"
C04	50	1	#6	#10	1"	3/4"
C05	60	1	#4	#10	1 1/4"	1"
C06	70	1	#4	#8	1 1/4"	1 1/4"
C07	80	1	#3	#8	1 1/4"	1 1/4"
C08	90	1	#2	#8	1 1/2"	1 1/4"
C09	100	1	#1	#8	1 1/2"	1 1/2"
C10	125	1	#1	#6	1 1/2"	1 1/2"
C11	150	1	#1/0	#6	2"	1 1/2"
C12	175	1	#2/0	#6	2"	2"
C13	200	1	#3/0	#6	2"	2"
C14	225	1	#4/0	#4	2 1/2"	2"
C15	250	1	250 kcmil	#4	3"	2 1/2"
C16	300	1	350 kcmil	#4	3"	2 1/2"
C17	350	1	500 kcmil	#3	3 1/2"	3"
C18	400	1	500 kcmil	#3	3 1/2"	3"
C19	450	2	#4/0	#2	2 1/2"	2"
C20	500	2	250 kcmil	#2	3"	2 1/2"
C21	600	2	350 kcmil	#1	3"	2 1/2"
C22	800	2	500 kcmil	#1/0	3 1/2"	3"
C23	900	3	350 kcmil	#2/0	3"	3"
C24	1000	3	500 kcmil	#2/0	3 1/2"	3"
C25	1200	4	350 kcmil	#3/0	3"	3"
C26	1600	5	500 kcmil	#4/0	3 1/2"	3"
C27	2000	6	500 kcmil	250 kcmil	3 1/2"	3"
C28	2500	7	500 kcmil	350 kcmil	3 1/2"	3 1/2"
C29	3000	8	500 kcmil	500 kcmil	4"	3 1/2"
C30	4000	11	500 kcmil	500 kcmil	4"	3 1/2"

SCHEDULE GENERAL NOTES:
1. COPPER CONDUCTORS ARE BASED ON TYPE THHN/THWN COPPER CONDUCTORS ONLY. CONDUITS BASED ON THHN/THWN CONDUCTORS ONLY. OTHER CONDUCTORS MAY REQUIRE LARGER CONDUITS.
2. BRANCH CIRCUITS ON PROJECT SHALL BE SIZED BASED ON THIS SCHEDULE AND CORRESPONDING NOMINAL CIRCUIT RATING. CIRCUITS SHALL BE UPSIZED FOR VOLTAGE DROP AS INDICATED ON E001 AND SPECIFICATIONS 260519. COORDINATE NEUTRAL REQUIREMENTS WITH EQUIPMENT CONNECTIONS.

SCHEMATICS

CABLE IDENTIFICATION, TABLE

C01 — CIRCUIT IDENTIFICATION, SEE FEEDER TABLE
A = ALUMINUM
C = COPPER
M = METAL CLAD

3|1|1
- QUANTITY OF GROUND CONDUCTORS, SIZE PER FEEDER TABLE
  0 = NOT REQUIRED
  1 = 1 GROUND CONDUCTOR
  2 = 1 GROUND CONDUCTOR AND 1 ISOLATED GROUND CONDUCTOR
- QUANTITY OF NEUTRAL CONDUCTORS, SIZE PER FEEDER TABLE
  0 = NOT REQUIRED
  1 = 1 NEUTRAL CONDUCTOR
  2 = 2 NEUTRAL CONDUCTORS
- QUANTITY OF PHASE CONDUCTORS, SIZE PER FEEDER TABLE

CABLE IDENTIFICATION, TEXT

4 #12+ 1 #12G, [SIZE]C
- CONDUIT SIZE
- QUANTITY AND SIZE OF GROUNDS
- QUANTITY AND SIZE OF CONDUCTORS

CABLE IDENTIFICATION, TEXT

4 SETS (3+1/C 600 kcmil +1 #3/0G, Cu, 15kV, 133%, TR-XLPE, [SIZE]C)
- CONDUIT SIZE
- CABLE TYPE
- INSULATION LEVEL
- INSULATION VOLTS
- MATERIAL
- QUANTITY AND SIZE OF GROUNDS
- QUANTITY AND SIZE OF CONDUCTORS
- QUANTITY OF SETS

#+1/C — SINGLE CONDUCTOR CABLE, # INDICATES QUANTITY OF CABLES

#/C — MULTI-CONDUCTOR CABLE, # INDICATES QUANTITY OF CONDUCTORS

SHORT CIRCUIT CURRENT RATING, # INDICATES RATING

BUS DUCT

BUS

FEEDER

PANEL, SINGLE TUB	PANEL, DOUBLE TUB, MAIN LUGS		PANEL, DOUBLE TUB, FEED THRU LUGS	
NAME	NAME	NAME	NAME	NAME
LOCATION	LOCATION		LOCATION	LOCATION
225 A MCB	225 A MCB		225 A MCB	225 A MCB
480 V	480 V		480 V	480 V
3 Ø, 4 W	3 Ø, 4 W		3 Ø, 4 W	3 Ø, 4 W
42 CCT	42 CCT		42 CCT	42 CCT

SCHEMATICS

GROUND

GROUND STUD

TRANSFER SWITCH

TRANSFORMER

TRANSFORMER CONFIGURATION, DELTA

TRANSFORMER CONFIGURATION, DELTA, CORNER GROUND

TRANSFORMER CONFIGURATION, DELTA, OPEN

TRANSFORMER CONFIGURATION, WYE

TRANSFORMER CONFIGURATION, WYE, SOLID GROUND

DMS — DIGITAL METERING SYSTEM

G — GENERATOR

K — KEY OPERATED SWITCH

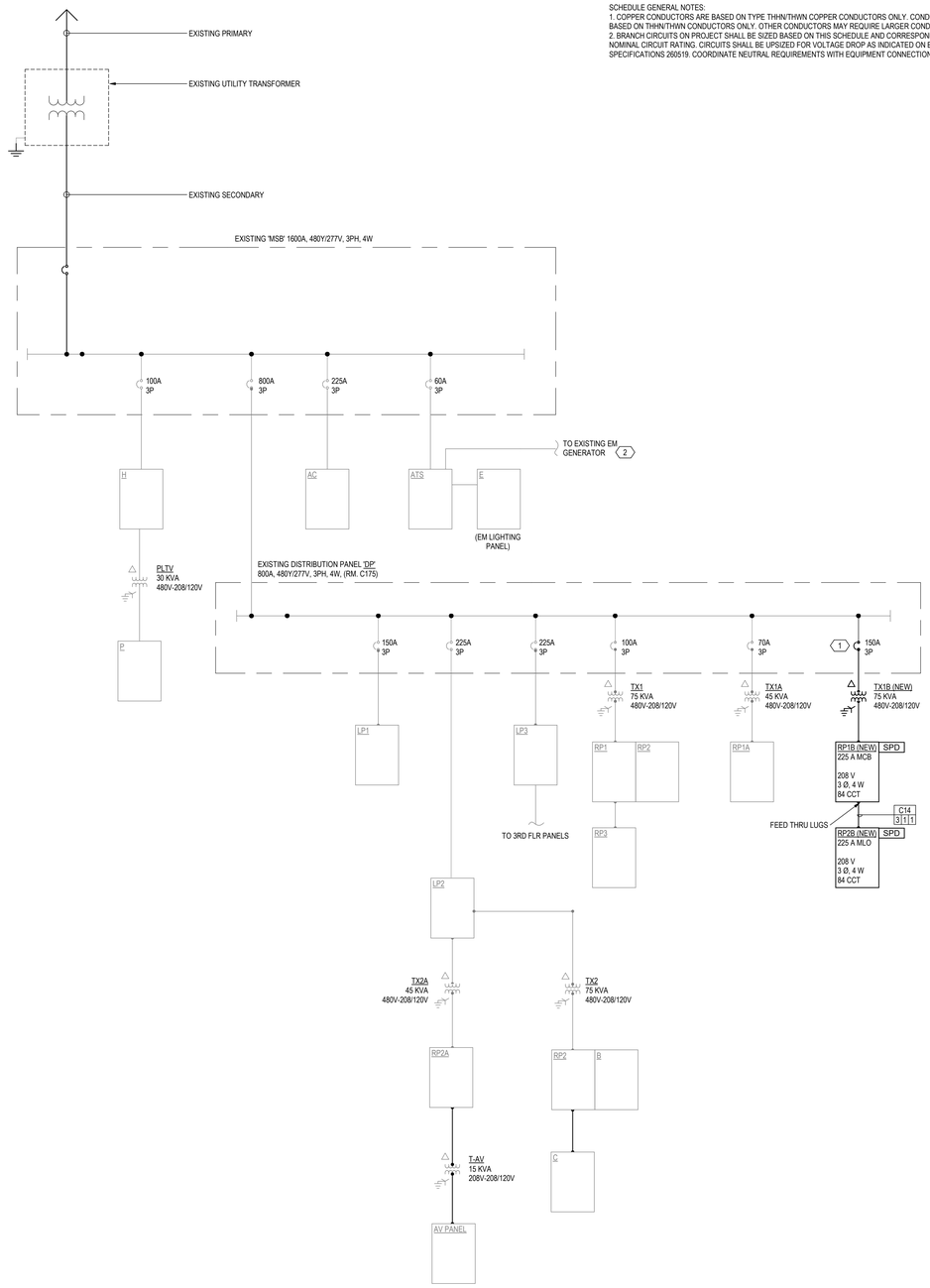
LSIG — RELAY, TRIP UNIT

M — INLINE SOCKET METER

METER — METER

SPACE — SPACE, FIXED BREAKER

SPD — SURGE PROTECTION DEVICE



4 / E401 **ONE-LINE DIAGRAM**
N.T.S.

GENERAL NOTES

1. REFER TO DRAWING E001 FOR ELECTRICAL LEGEND, ABBREVIATIONS AND GENERAL NOTES.
2. REFER TO E500 SERIES DRAWINGS FOR SUPPLEMENTAL DETAILS.
3. NO PORTION OF THE TOTAL CONTRACT WILL BE DECLARED SUBSTANTIALLY COMPLETE UNTIL THE AUTOMATIC TEMPERATURE CONTROL SYSTEM AND LIGHTING CONTROL SYSTEM HAVE BEEN DEMONSTRATED TO BE COMPLETE AND FUNCTIONING AS INTENDED.
4. PROVIDE WIRING SIZE AND TYPE FOR SPD PER SPD MANUFACTURER. PROVIDE OVERCURRENT PROTECTION FOR SPD THAT IS SIZED PER SPD MANUFACTURER REQUIREMENTS.
5. PROVIDE "PHASE-LOSS" RELAYS ON ALL NEW THREE PHASE MECHANICAL EQUIPMENT 1 HP AND LARGER TO PREVENT SINGLE PHASING. COORDINATE WITH MECHANICAL EQUIPMENT CONTRACTOR.
6. ALL BREAKERS USED TO FEED MECHANICAL EQUIPMENT SHALL BE "HACR" TYPE.
7. CONTRACTOR SHALL COMPLETE A SHORT CIRCUIT AND ARC FLASH STUDY FOR NEW DISTRIBUTION EQUIPMENT (PANELBOARDS, TRANSFORMERS, ETC). ANY UPSTREAM EQUIPMENT NECESSARY TO ACCURATELY CALCULATE VALUES AT NEW EQUIPMENT SHALL ALSO BE INCLUDED. CONTRACTOR SHALL SURVEY AND FIELD ESTIMATE EXISTING FEEDER LENGTHS AND SIZES AS REQUIRED TO COMPLETE THE STUDY.
8. ALL MECHANICAL EQUIPMENT SHALL BE PROVIDED WITH AN APPROPRIATE SHORT CIRCUIT CURRENT RATING (SCCR) AS REQUIRED FOR THE AVAILABLE SHORT CIRCUIT CURRENT AT THE PIECE OF EQUIPMENT AS REQUIRED BY NEC 440.10. PER DIVISION 26 SPECIFICATIONS, THE CONTRACTOR SHALL PERFORM A SHORT CIRCUIT STUDY AND PROVIDE A SUMMARY OF THE CALCULATIONS TO THE MECHANICAL CONTRACTOR. THIS INFORMATION SHOULD BE INCLUDED WITH THE MECHANICAL EQUIPMENT SUBMITTAL. SUBMITTALS WILL NOT BE ACCEPTED WITHOUT SCCR INFORMATION AND EQUIPMENT SHOULD NOT BE ORDERED PRIOR TO REVIEW OF SCCR DATA. IF THE AVAILABLE SCCR AT THE MECHANICAL EQUIPMENT EXCEEDS THE RATED SCCR OF THE EQUIPMENT THE CONTRACTOR SHALL PROVIDE A FUSED DISCONNECT AT THE EQUIPMENT AND HAVE THE STUDY RERUN TO VERIFY IF RATING IS SUFFICIENT.
9. ANY EQUIPMENT WITH A NON-FUSED DISCONNECT (TRANSFORMER, MECHNICAL EQUIPMENT, WATER HEATER, ETC.) SHALL HAVE A UL LISTED COMBINATION UPSTREAM BREAKER TO PROVIDE AN ADEQUATE SCCR RATING AT THE DISCONNECT BASED ON THE SHORT CIRCUIT STUDY. IF NO SUCH BREAKER CAN BE PROVIDED, DISCONNECT SHALL BE FUSED PER MANUFACTURER'S RECOMMENDATION TO ACHIEVE ADEQUATE SHORT CIRCUIT RATING.
10. ALL BREAKERS USED TO FEED MECHANICAL EQUIPMENT SHALL BE "HACR" TYPE.

KEYNOTES - ONE LINE DIAGRAM

1. PROVIDE NEW CASE MOLDED CIRCUIT BREAKER IN EXISTING SPACE IN PANEL. MATCH EXISTING MANUFACTURER AND KAIC RATING.
2. CONTRACTOR TO VERIFY TOTAL LOAD ON EMERGENCY SYSTEM AND CONFIRM SYSTEM CAPACITY IS SUFFICIENT FOR ANY ADDED EMERGENCY LIGHTING LOAD.

Stantec

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Notes

Revision	By	Appd	YYYY.MM.DD

Issued	By	Appd	YYYY.MM.DD
ISSUED FOR BIDDING AND CONSTRUCTION			2023.02.03

Permit/Seal

STATE OF TEXAS — STACY G. CARR — 94803 — LICENSED — PROFESSIONAL ENGINEER — 02/10/2023

Texas Firm Registration No. 13678
EXP. 2023.11.30

Client/Project Logo

Client/Project
University of North Texas - Denton

ESSC Renovation

Eagle Student Services Center 1147 Union Cir, Denton, TX 76201

Title
ELECTRICAL ONE LINE DIAGRAM

Project No. 2140001088
Scale 12" = 1'-0"
Revision
Drawing No. **E401**

ORIGINAL SHEET - ARCH E1

Stantec — Panel

Name: **RP1B** | Volts: 208Y/120V | Mains Type: MCB | Type:
Location: | Phases: 3 | Mains Rating: 225 A | AIC Rating: 10KAIC
Supply From: | Wires: 4 | MCB Rating: 225 A | Mounting: Surface
Serves: RP2B | Lugs: Single Lugs | Enclosure: Type 1

Notes:
FEED THRU LUGS TO PANEL RP2B.

CKT	Circuit Description	Trip	Poles	CB	Wire	C	A		B		C		C	Wire	CB	Poles	Trip	Circuit Description	CKT
1	RECEPTACLES REGISTRAR	20 A	1		#10	3/4"	720	810					1"	#10		1	20 A	FURNITURE FEED - REGISTRAR	2
3	RECEPTACLES REGISTRAR	20 A	1		#10	3/4"			720	810			*	*		1	20 A	FURNITURE FEED - REGISTRAR	4
5	RECEPTACLE REGISTRAR	20 A	1		#12	3/4"					360	810	*	*		1	20 A	FURNITURE FEED - REGISTRAR	6
7	RECEPTACLES REGISTRAR	20 A	1		#10	3/4"	1260	810					*	*		1	20 A	FURNITURE FEED - REGISTRAR	8
9	RECEPTACLES REGISTRAR	20 A	1		#12	3/4"			720	810			1"	#10		1	20 A	FURNITURE FEED - REGISTRAR	10
11	RECEPTACLES REGISTRAR	20 A	1		#10	3/4"					720	810	*	*		1	20 A	FURNITURE FEED - REGISTRAR	12
13	RECEPTACLES ASSOC REGISTRAR	20 A	1		#12	3/4"	360	810					*	*		1	20 A	FURNITURE FEED - REGISTRAR	14
15	RECEPTACLES REGISTRAR	20 A	1		#12	3/4"			720	810			*	*		1	20 A	FURNITURE FEED - REGISTRAR	16
17	RECEPTACLES REGISTRAR	20 A	1		#12	3/4"					720	675	1"	#10		1	20 A	FURNITURE FEED - REGISTRAR	18
19	TV - REGISTRAR	20 A	1		#12	3/4"	360	675					*	*		1	20 A	FURNITURE FEED - REGISTRAR	20
21	FURNITURE FEED - REGISTRAR	20 A	1		#10	1"			810	675			*	*		1	20 A	FURNITURE FEED - REGISTRAR	22
23	FURNITURE FEED - REGISTRAR	20 A	1		*	*					810	675	*	*		1	20 A	FURNITURE FEED - REGISTRAR	24
25	FURNITURE FEED - REGISTRAR	20 A	1		*	*	810	1080					1"	#10		1	20 A	FURNITURE FEED - REGISTRAR	26
27	FURNITURE FEED - REGISTRAR	20 A	1		*	*			810	1080			*	*		1	20 A	FURNITURE FEED - REGISTRAR	28
29	FURNITURE FEED - REGISTRAR	20 A	1		#10	1"					270	1080	*	*		1	20 A	FURNITURE FEED - REGISTRAR	30
31	FURNITURE FEED - REGISTRAR	20 A	1		*	*	270	1080					*	*		1	20 A	FURNITURE FEED - REGISTRAR	32
33	FURNITURE FEED - REGISTRAR	20 A	1		*	*			270	810			1"	#10		1	20 A	FURNITURE FEED - REGISTRAR	34
35	FURNITURE FEED - REGISTRAR	20 A	1		*	*					270	810	*	*		1	20 A	FURNITURE FEED - REGISTRAR	36
37	RECEPTACLE REGISTRAR	20 A	1		#10	3/4"	720	810					*	*		1	20 A	FURNITURE FEED - REGISTRAR	38
39	RECEPTACLE REGISTRAR	20 A	1		#10	3/4"			720	810			*	*		1	20 A	FURNITURE FEED - REGISTRAR	40
41	Spare	20 A	1	--	--	--					0	--	--	--	--	1	--	Space	42
43	Spare	20 A	1	--	--	--	0	--					--	--	--	1	--	Space	44
45	Spare	20 A	1	--	--	--			0	--			--	--	--	1	--	Space	46
47	Spare	20 A	1	--	--	--					0	--	--	--	--	1	--	Space	48
49	Spare	20 A	1	--	--	--	0	--					--	--	--	1	--	Space	50
51	Spare	20 A	1	--	--	--			0	--			--	--	--	1	--	Space	52
53	Spare	20 A	1	--	--	--					0	--	--	--	--	1	--	Space	54
55	Spare	20 A	1	--	--	--	0	--					--	--	--	1	--	Space	56
57	Spare	20 A	1	--	--	--			0	--			--	--	--	1	--	Space	58
59	Spare	20 A	1	--	--	--					0	--	--	--	--	1	--	Space	60
61	Spare	20 A	1	--	--	--	0	--					--	--	--	1	--	Space	62
63	Spare	20 A	1	--	--	--			0	--			--	--	--	1	--	Space	64
65	Spare	20 A	1	--	--	--					0	--	--	--	--	1	--	Space	66
67	Spare	20 A	1	--	--	--	0	--					--	--	--	1	--	Space	68
69	Spare	20 A	1	--	--	--			0	--			--	--	--	1	--	Space	70
71	Space	--	1	--	--	--					--	--	--	--	--	1	--	Space	72
73	Space	--	1	--	--	--	--	--					--	--	--	1	--	Space	74
75	Space	--	1	--	--	--			--	--			--	--	--	1	--	Space	76
77	Space	--	1	--	--	--					--	--	--	--	--	1	--	Space	78
79	Space	--	1	--	--	--	--	0					--	--	--	3	30 A	SPD	80
81	Space	--	1	--	--	--			--	0			--	--	--	--	--	--	82
83	Space	--	1	--	--	--					--	0	--	--	--	--	--	--	84
						Total Load:	**26.89 kVA**		**25.54 kVA**		**22.01 kVA**								
						Total Amps:	**229 A**		**217 A**		**183 A**								

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
Power	1000 VA	100.00%	1000 VA		
Receptacle	73444 VA	56.81%	41722 VA	**Total Conn. Load:**	**74444 VA**
				Total Est. Demand:	**42722 VA**
				Total Conn.:	**207 A**
				Total Est. Demand:	**119 A**

CB Legend (blank = circuit breaker):
G = GFCI S = Shunt Trip D = Switching Duty A = AFCI H = HID Rated C = HACR Rated † = Existing Circuit ‡ = Revised Circuit

Notes:
*CIRCUITS FOR FURNITURE FEEDS SHALL BE RUN TOGETHER. PROVIDE HANDLE TIES FOR BREAKERS THAT SHARE NEUTRAL. REFER TO FLOOR PLANS FOR ADDITIONAL INFORMATION ON FURNITURE WIRING.

Stantec — Panel

Name: **RP2B** | Volts: 208Y/120V | Mains Type: MLO | Type:
Location: | Phases: 3 | Mains Rating: 225 A | AIC Rating: 10KAIC
Supply From: RP1B | Wires: 4 | Max Rating: 225 A | Mounting: Surface
Serves: | Lugs: Single Lugs | Enclosure: Type 1

Notes:
FEED THRU PANEL FROM PANEL RP1B.

CKT	Circuit Description	Trip	Poles	CB	Wire	C	A		B		C		C	Wire	CB	Poles	Trip	Circuit Description	CKT
1	RECEPTACLES DIR SCHOLAR	20 A	1		#12	3/4"	720	540					1"	#10		1	20 A	FURNITURE FEED - ISSC LOBBY	2
3	RECEPTACLES ASST DIR SCHOLAR	20 A	1		#12	3/4"			540	540			*	*		1	20 A	FURNITURE FEED - ISSC LOBBY	4
5	RECEPTACLES SCHOLARSHIP SUITE	20 A	1		#12	3/4"					720	540	*	*		1	20 A	FURNITURE FEED - ISSC LOBBY	6
7	RECEPTACLES FLEX 236	20 A	1		#12	3/4"	540	540					*	*		1	20 A	FURNITURE FEED - ISSC LOBBY	8
9	RECEPTACLES FLEX 235	20 A	1		#12	3/4"			540	810			1"	#10		1	20 A	FURNITURE FEED - ISSC	10
11	RECEPTACLES FLEX 234	20 A	1		#12	3/4"					540	810	*	*		1	20 A	FURNITURE FEED - ISSC	12
13	RECEPTACLES FLEX 233	20 A	1		#12	3/4"	540	810					*	*		1	20 A	FURNITURE FEED - ISSC	14
15	SIGNAGE CORRIDOR	20 A	1		#12	3/4"			500	810			*	*		1	20 A	FURNITURE FEED - ISSC	16
17	3RD FLR HOLD OPEN	20 A	1		#12	3/4"					500	270	1"	#10		1	20 A	FURNITURE FEED - ISSC LOBBY	18
19	RECEPTACLE	20 A	1		#12	3/4"	720	270					*	*		1	20 A	FURNITURE FEED - ISSC LOBBY	20
21	RECEPTACLES CORRIDOR	20 A	1		#12	3/4"			360	270			*	*		1	20 A	FURNITURE FEED - ISSC LOBBY	22
23	RECEPTACLES DIRECTOR	20 A	1		#12	3/4"					360	270	*	*		1	20 A	FURNITURE FEED - ISSC LOBBY	24
25	RECEPTACLES CORRIDOR	20 A	1		#12	3/4"	900	810					1"	#10		1	20 A	FURNITURE FEED - ISSC	26
27	RECEPTACLES ASSOC DIR	20 A	1		#12	3/4"			540	810			*	*		1	20 A	FURNITURE FEED - ISSC	28
29	RECEPTACLES ISSC AVP	20 A	1		#12	3/4"					540	810	*	*		1	20 A	FURNITURE FEED - ISSC	30
31	RECEPTACLES ISSC LOBBY AND...	20 A	1		#12	3/4"	540	810					*	*		1	20 A	FURNITURE FEED - ISSC	32
33	RECEPTACLES ISSC LOBBY	20 A	1		#12	3/4"			540	675			1"	#10		1	20 A	FURNITURE FEED - ISSC	34
35	RECEPTACLES ISSC LOBBY	20 A	1		#12	3/4"					360	675	*	*		1	20 A	FURNITURE FEED - ISSC	36
37	RECEPTACLES CORRIDOR	20 A	1		#10	3/4"	1080	675					*	*		1	20 A	FURNITURE FEED - ISSC	38
39	TV	20 A	1		#12	3/4"			360	675			*	*		1	20 A	FURNITURE FEED - ISSC	40
41	FURNITURE FEED - FIN AID	20 A	1		#10	1"					810	405	1"	#10		1	20 A	FURNITURE FEED - FIN AID	42
43	FURNITURE FEED - FIN AID	20 A	1		*	*	810	405					*	*		1	20 A	FURNITURE FEED - FIN AID	44
45	FURNITURE FEED - FIN AID	20 A	1		*	*			810	405			*	*		1	20 A	FURNITURE FEED - FIN AID	46
47	FURNITURE FEED - FIN AID	20 A	1		*	*					810	405	*	*		1	20 A	FURNITURE FEED - FIN AID	48
49	FURNITURE FEED - FIN AID	20 A	1		#10	1"	709	709					1"	#10		1	20 A	FURNITURE FEED - FIN AID	50
51	FURNITURE FEED - FIN AID	20 A	1		*	*			709	709			*	*		1	20 A	FURNITURE FEED - FIN AID	52
53	FURNITURE FEED - FIN AID	20 A	1		*	*					709	709	*	*		1	20 A	FURNITURE FEED - FIN AID	54
55	FURNITURE FEED - FIN AID	20 A	1		*	*	709	709					*	*		1	20 A	FURNITURE FEED - FIN AID	56
57	FURNITURE FEED - FIN AID	20 A	1		#10	1"			709	709			1"	#10		1	20 A	FURNITURE FEED - FIN AID	58
59	FURNITURE FEED - FIN AID	20 A	1		*	*					709	709	*	*		1	20 A	FURNITURE FEED - FIN AID	60
61	FURNITURE FEED - FIN AID	20 A	1		*	*	709	709					*	*		1	20 A	FURNITURE FEED - FIN AID	62
63	FURNITURE FEED - FIN AID	20 A	1		*	*			709	709			*	*		1	20 A	FURNITURE FEED - FIN AID	64
65	RECEPTACLE - ISSC LOBBY	20 A	1		#10	3/4"					720	0	--	--	--	1	20 A	Spare	66
67	RECEPTACLE ISSC CASEWORK	20 A	1		#12	3/4"	540	0					--	--	--	1	20 A	Spare	68
69	RECEPTACLES ISSC LOBBY	20 A	1		#10	3/4"			720	0			--	--	--	1	20 A	Spare	70
71	FURNITURE FEED - ISSC	20 A	1		#10	1"					810	0	--	--	--	1	20 A	Spare	72
73	FURNITURE FEED - ISSC	20 A	1		*	*	810	0					--	--	--	1	20 A	Spare	74
75	FURNITURE FEED - ISSC	20 A	1		*	*			810	0			--	--	--	1	20 A	Spare	76
77	FURNITURE FEED - ISSC	20 A	1		*	*					810	0	--	--	--	1	20 A	Spare	78
79	Spare	20 A	1	--	--	--	0	0					--	--	--	3	30 A	SPD	80
81	Spare	20 A	1	--	--	--			0	0			--	--	--	--	--	--	82
83	Spare	20 A	1	--	--	--					0	0	--	--	--	--	--	--	84
						Total Load:	**16.31 kVA**		**14.97 kVA**		**14.00 kVA**								
						Total Amps:	**137 A**		**126 A**		**117 A**								

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
Power	1000 VA	100.00%	1000 VA		
Receptacle	44284 VA	61.29%	27142 VA	**Total Conn. Load:**	**45284 VA**
				Total Est. Demand:	**28142 VA**
				Total Conn.:	**126 A**
				Total Est. Demand:	**78 A**

CB Legend (blank = circuit breaker):
G = GFCI S = Shunt Trip D = Switching Duty A = AFCI H = HID Rated C = HACR Rated † = Existing Circuit ‡ = Revised Circuit

Notes:
*CIRCUITS FOR FURNITURE FEEDS SHALL BE RUN TOGETHER. PROVIDE HANDLE TIES FOR BREAKERS THAT SHARE NEUTRAL. REFER TO FLOOR PLANS FOR ADDITIONAL INFORMATION ON FURNITURE WIRING.

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Revision	By	Appd	YYYY.MM.DD

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ISSUED FOR BIDDING AND CONSTRUCTION			2023.02.03

Permit/Seal

STATE OF TEXAS
STACY G. CARR
94803
LICENSED
PROFESSIONAL ENGINEER
02/10/2023

Texas Firm Registration No. 13678
EXP. 2023.11.30

Client/Project Logo

Client/Project
University of North Texas - Denton

ESSC Renovation

Eagle Student Services Center 1147 Union Cir, Denton, TX 76201

Title
PANEL SCHEDULES

Project No. 2140001088

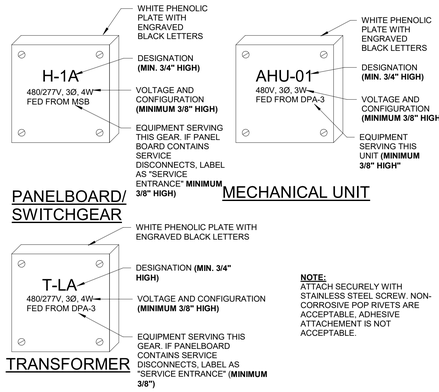
Scale

Revision

Drawing No.
E411

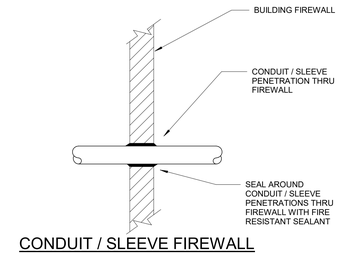
Pick location in Project Information
2/10/2023 12:06:11 PM

ORIGINAL SHEET - ARCH E1



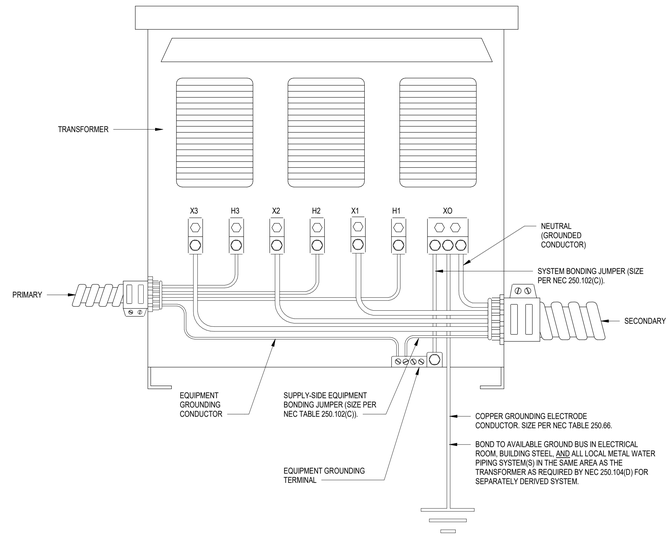
EQUIPMENT IDENTIFICATION

SCALE: NONE



CONDUIT / SLEEVE FIREWALL PENETRATION DETAIL

SCALE: NONE



TRANSFORMER SYSTEM BONDING DETAIL

SCALE: NONE

DANGER

Arc Flash & Shock Hazard
Appropriate PPE Required

Flash Hazard Category _____
Incident Energy (cal/cm ²) _____
_____ VAC Shock Hazard When:

Flash Protection Boundary _____
Limited Approach Boundary _____
Protection Approach Boundary _____
Prohibited Approach Boundary _____

FLASH PPE			SHOCK PPE
☐ Long sleeve shirt	☐ FR coverall	☐ Hearing protection	☐ Class _____
☐ Long pants	☐ Flash suit	☐ Safety glasses	☐ V-rating _____
☐ FR shirt	☐ Flash hood	☐ Safety goggles	☐
☐ FR pants	☐ Hard hat	☐ Leather gloves	☐
	☐ Face shield	☐ Leather shoes	☐

Equipment ID:

PROVIDE A 4"x6" RED LABEL ON THE OUTSIDE OF PANELS IN AREAS OPEN ONLY TO "QUALIFIED PERSONNEL" AND ON THE INSIDE PANEL DOOR OF PANELS IN "OCCUPANT AREAS". BRADY #99459 OR APPROVED EQUIVALENT.

WARNING

Arc Flash Hazard
Appropriate PPE Required

DO NOT OPERATE CONTROLS OR OPEN COVERS WITHOUT APPROPRIATE PERSONAL PROTECTION EQUIPMENT.

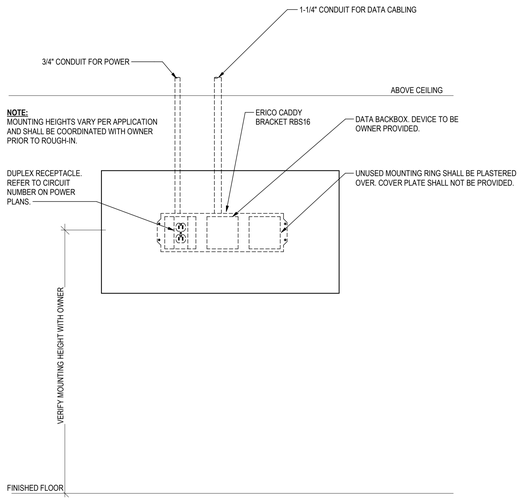
FAILURE TO COMPLY MAY RESULT IN INJURY OR DEATH!
Refer to NFPA 70E for minimum PPE requirements

PROVIDE A 3"x5" YELLOW LABEL ON THE OUTSIDE OF PANELS IN "OCCUPANT AREAS". BRADY #99454 OR APPROVED EQUIVALENT.

NOTE: LABELING SHALL COMPLY WITH 2021 NFPA 70E
NOTE: USE LATEST LABELS PER 2021 NFPA 70E

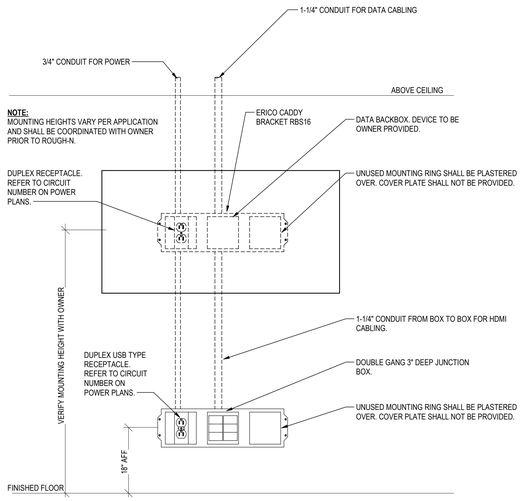
TYPICAL ARC FLASH WARNING LABELS

SCALE: NONE



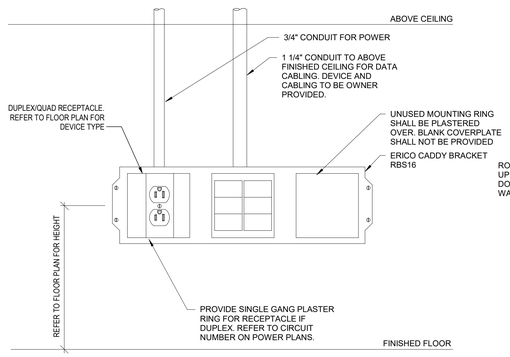
TV2 TV FLAT PANEL MONITOR ROUGH-IN DETAIL

SCALE: NONE



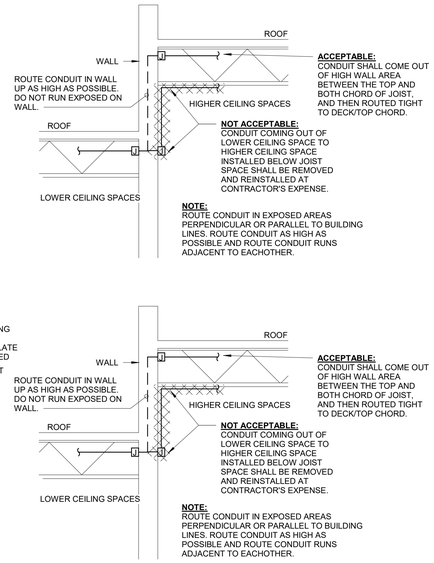
TV1 TV FLAT PANEL MONITOR ROUGH-IN DETAIL

SCALE: NONE



RECEPTACLE AND DATA OUTLET DETAIL

SCALE: NONE



EXPOSED CONDUIT ROUTING DETAIL

SCALE: NONE

Stantec

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6080 Tennyson Parkway Suite 200
Plano, TX 75024-6003
Tel: (214) 473-2400 • www.stantec.com

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Notes

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Eagle Student Services Center 1147 Union Cir, Denton, TX 76201

Title
ELECTRICAL DETAILS

Project No. 2140001088
Scale As indicated
Revision
Drawing No. **E501**

ORIGINAL SHEET - ARCH E1

>>Pc4 location in Project Information>
2/10/2023 12:06:13 PM

1 | 2 | 3 | 4 | 5 | 6

LUMINAIRE SCHEDULE												
TYPE	DESCRIPTION	MOUNTING	MANUFACTURER	CATALOG No.	ALTERNATE MANUFACTURERS	LAMP #	LAMP TYPE	LAMP LUMENS	LAMP COLOR	INPUT WATTS	INPUT VOLTS	COMMENTS/NOTES
A	RECESSED 2X4	RECESSED (GRID)	VERSA	VLFP9-BL-24-40L-QT-40K	APPROVED ALTERNATE	1	LED	5330	4000K	40	UNV	0-10V DIMMING
A2	RECESSED 2X2	RECESSED (GRID)	VERSA	VLFP9-BL-22-36L-QT-40K	APPROVED ALTERNATE	1	LED	4300	4000K	36	UNV	0-10V DIMMING
B-X	4" LINEAR LED - REFER TO FLOOR PLAN FOR FIXTURE LENGTH	RECESSED (GRID)	FINELITE	HP-4R-D-X-B-840-F-96LG-277-XX-FC1%-XX-FE-SW	APPROVED ALTERNATE	1	LED	479LM/FT	4000K	4.6W/FT	UNV	0-10V DIMMING. PROVIDE DUAL CIRCUIT FOR EMERGENCY CIRCUIT SECTIONS WHERE INDICATED ON FLOOR PLAN. VERIFY CEILING TYPE WITH ARCHITECUTRAL DRAWINGS.
B2-X	4" LINEAR LED - REFER TO FLOOR PLAN FOR FIXTURE LENGTH	RECESSED (HARD CEILING)	FINELITE	HP-4R-D-X-B-840-F-96LG-277-XX-FC1%-XX-FE-SW	APPROVED ALTERNATE	1	LED	479LM/FT	4000K	4.6W/FT	UNV	0-10V DIMMING. VERIFY CEILING TYPE WITH ARCHITECUTRAL DRAWINGS.
B3-X	4" LINEAR LED - REFER TO FLOOR PLAN FOR FIXTURE LENGTH	RECESSED (GYP)	FINELITE	HP-4R-D-X-B-840-F-96LG-277-XX-FC1%-XX-FE-SW	APPROVED ALTERNATE	1	LED	479LM/FT	4000K	4.6W/FT	UNV	0-10V DIMMING. VERIFY CEILING TYPE WITH ARCHITECUTRAL DRAWINGS.
C	4" - ROUND DOWNLIGHT	RECESSED	GOTHAM	EVO4-40/20-AR-LD-MD-MVOLT-GZ1	APPROVED ALTERNATE	1	LED	2000	4000K	22	UNV	0-10V DIMMING, MATTE DIFFUSE FINISH
D	DECORATIVE LED PENDANT	SUSPENDED	EUREKA	STELLA 4272D-9-LED-40-80-277-DV-XX-XX-BLKE-BLK-BLKE-WH	APPROVED ALTERNATE	1	LED	1750	4000K	22	UNV	0-10V DIMMING. PROVIDE STEM LENGTH AS REQUIRED FOR BOTTOM OF FIXTURE TO BE MOUNTED AT 7' AFF. FINAL FINISH SELECTION TO BE MADE DURING...
D2	DECORATIVE LED PENDANT - COLOR CHANGING WITH WOOD FINISH	SUSPENDED	BETA CALCO	RNGP2P02/LPF110/LPG055/CR80/CTA50/CTB50/UD1/V1/DA40/DB40/SS1/FA27/CF01/AP00/E0/CS1/C0	APPROVED ALTERNATE	1	LED	REF CAT NO.	N/A	102	UNV	DMX DIMMING AND COLOR CHANGING .BOTTOM OF FIXTURE TO BE MOUNTED AT 7' AFF. FINAL WOOD FINISH SELECTION TO BE MADE DURING SUBMITTAL PROCESS.
H	4" LINEAR LED - FIELD VERIFY LENGTH WITH EXISTING CEILING CAVITY.	WALL MOUNT	FINELITE	HP-4-WM-D-B-840-F-96LG-277-SC-FC-1%-MB-FE-SW	APPROVED ALTERNATE	1	LED	479LM/FT	4000K	4.6W/FT	UNV	0-10V DIMMING, CONTRACTOR SHALL FIELD VERIFY AVAILABLE DIMENSIONS OF RESTROOM WALL CAVITY AND PROVIDE SHOP DRAWINGS FOR REVIEW.
XA	EXIT SIGN - RED LETTERING	SURFACE - CEILING	LITHONIA	LE-S-*-R	APPROVED EQUIVALENT	1	LED	N/A	N/A	2	UNV	*REFER TO FLOOR PLANS FOR SIDES AND CHEVRONS.

LUMINAIRE SCHEDULE NOTES

1. FIXTURE FINISH TO BE SELECTED AND VERIFIED BY ARCHITECT.
2. PROVIDE FIXTURES WITH DIMMING DRIVERS WHERE SHOWN CIRCUITED TO DIMMING CONTROLS. DIMMING DRIVERS TO BE COMPATIBLE WITH OVERALL DIMMING CONTROL SYSTEM.
3. VERIFY MOUNTING AND PROVIDE REQUIRED CHEVERON(S) AS SHOWN ON ELECTRICAL PLANS.
4. CONTRACTOR TO VERIFY FIXTURE MOUNTING HEIGHT WITH ARCHITECT BEFORE INSTALLING.
5. PROVIDE FACTORY CONNECTED ROW-MOUNTED FIXTURE WHERE APPLICABLE.
6. CONTRACTOR TO VERIFY SPECIFIED FIXTURE MOUNTING IS COMPATIBLE WITH CEILING TYPE BEFORE ORDERING.
7. CONTRACTOR TO FIELD VERIFY OVERALL LENGTH BEFORE ORDERING.
8. IF DISCREPANCY EXISTS BETWEEN FIXTURE CATALOG NUMBER AND FIXTURE DESCRIPTION, FIXTURE DESCRIPTION SHALL TAKE PRECEDENCE.
9. FIXTURES SHALL BE 3500 DEGRESS KELVIN AND MINIMUM 80 CRI.

LIGHTING CONTROL NARRATIVE - IECC 2018

CONTROL REQUIREMENTS:

1. ALL LOW VOLTAGE WIRING SHALL BE PLENUM RATED IN ENTIRE PROJECT.
2. ALL LOW VOLTAGE WIRING TERMINATIONS SHALL BE MADE WITHIN A JUNCTION BOX. NO EXPOSED SPLICING PERMITTED.
3. ALL LIGHTING CONTROLS SHALL COMPLY WITH LOCAL CODES AS ADOPTED BY AHJ.
4. BASIS OF DESIGN IS ACUITY NLIGHT.

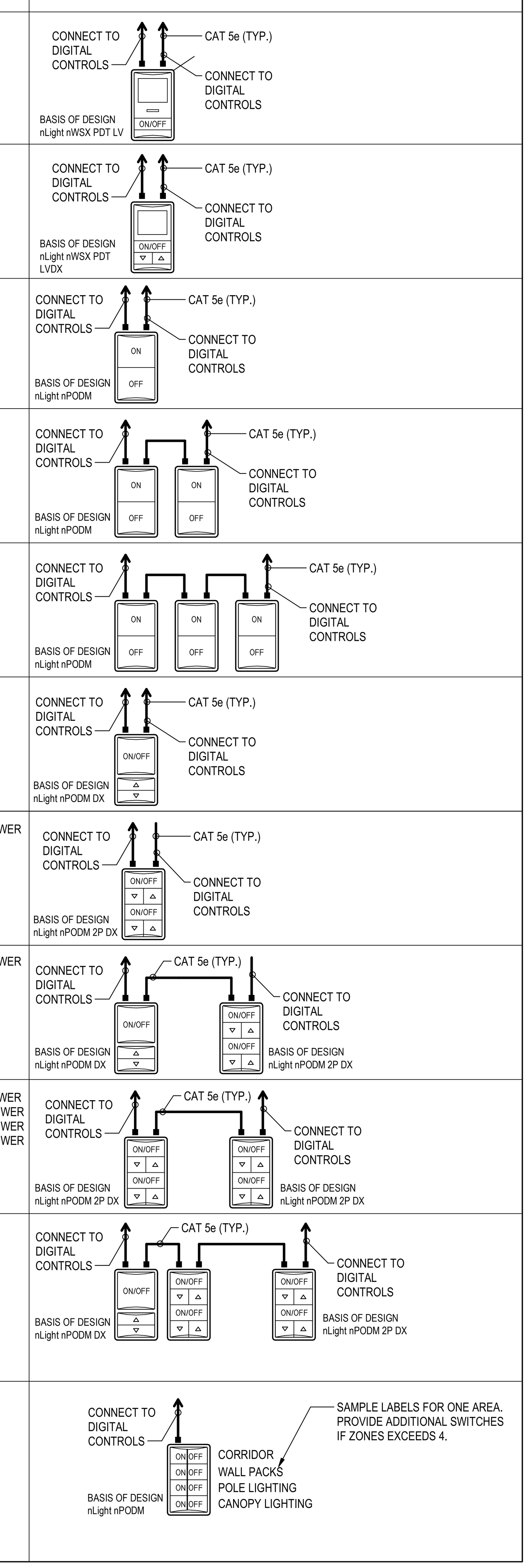
SEQUENCE OF OPERATION:

1. RAISE/LOWER = 0-10V DIMMING AND REQUIRES 0-10V WIRING.
2. OCCUPANCY SENSORS SHALL BE DUAL TECHNOLOGY TYPE SET TO 20 MINUTES AUTO OFF / MANUAL ON. EXCEPT IN CORRIDORS AND OTHER SPACES AS INDICATED BELOW, THEY SHALL BE SET TO AUTO OFF / AUTO ON.
3. LIGHTING CONTROLS WITHIN BUILDING SHALL BE STAND ALONE.
4. UPON ACTIVATION OF FIRE ALARM SYSTEM, ALL INTERIOR EGRESS LIGHTING SHALL TURN ON.
5. EMERGENCY LIGHTING SHALL REMAIN ON AS NIGHT LIGHTS FOR 24/7 OPERATION.
6. **INDIVIDUAL OFFICES:**
   - A. MANUAL: ON/OFF/RAISE/LOWER LIGHTING CONTROLS FOR EACH RESPECTIVE ZONE.
   - B. AUTOMATIC: OCCUPANCY SENSOR SET TO AUTO OFF/ MANUAL ON.
   - C. DAYLIGHT HARVESTING: AS INDICATED ON FLOOR PLANS FOR DAYLIGHT ZONES.
7. **OPEN OFFICE:**
   1. MANUAL: ON/OFF/RAISE/LOWER LIGHTING CONTROLS FOR EACH RESPECTIVE ZONE.
   2. AUTOMATIC: OCCUPANCY SENSOR SET TO AUTO OFF/ AUTO 50% ON.
   3. DAYLIGHT HARVESTING: AS INDICATED ON FLOOR PLANS FOR DAYLIGHT ZONES.
8. **CORRIDORS / VESTIBULES:**
   - A. MANUAL: ON/OFF/RAISE/LOWER LOW VOLTAGE CONTROL STATION LOCATED IN SPACE.
   - B. OCCUPANCY SENSOR SET TO AUTO ON/AUTO OFF.
   - C. DAYLIGHT HARVESTING: AS INDICATED ON FLOOR PLANS FOR DAYLIGHT ZONES.
9. **LARGE RESTROOMS / TOILET ROOMS:**
   - A. MANUAL: ON/OFF VIA KEY OPERATED LOW VOLTAGE MOMENTARY SWITCH.
   - B. AUTOMATIC: OCCUPANCY SENSORS WITH FULL COVERAGE TO AVOID LIGHTS SHUTTING OFF WHILE SPACES ARE OCCUPIED. SET TO AUTO ON / AUTO OFF.
   - C. DAYLIGHT HARVESTING: NONE.
10. **SMALL STORAGE:**
    - A. WALL MOUNTED OCCUPANCY SENSOR SWITCH SET TO AUTO OFF/ MANUAL ON.

LOW VOLTAGE CONTROL STATION SWITCH DESIGNATION*

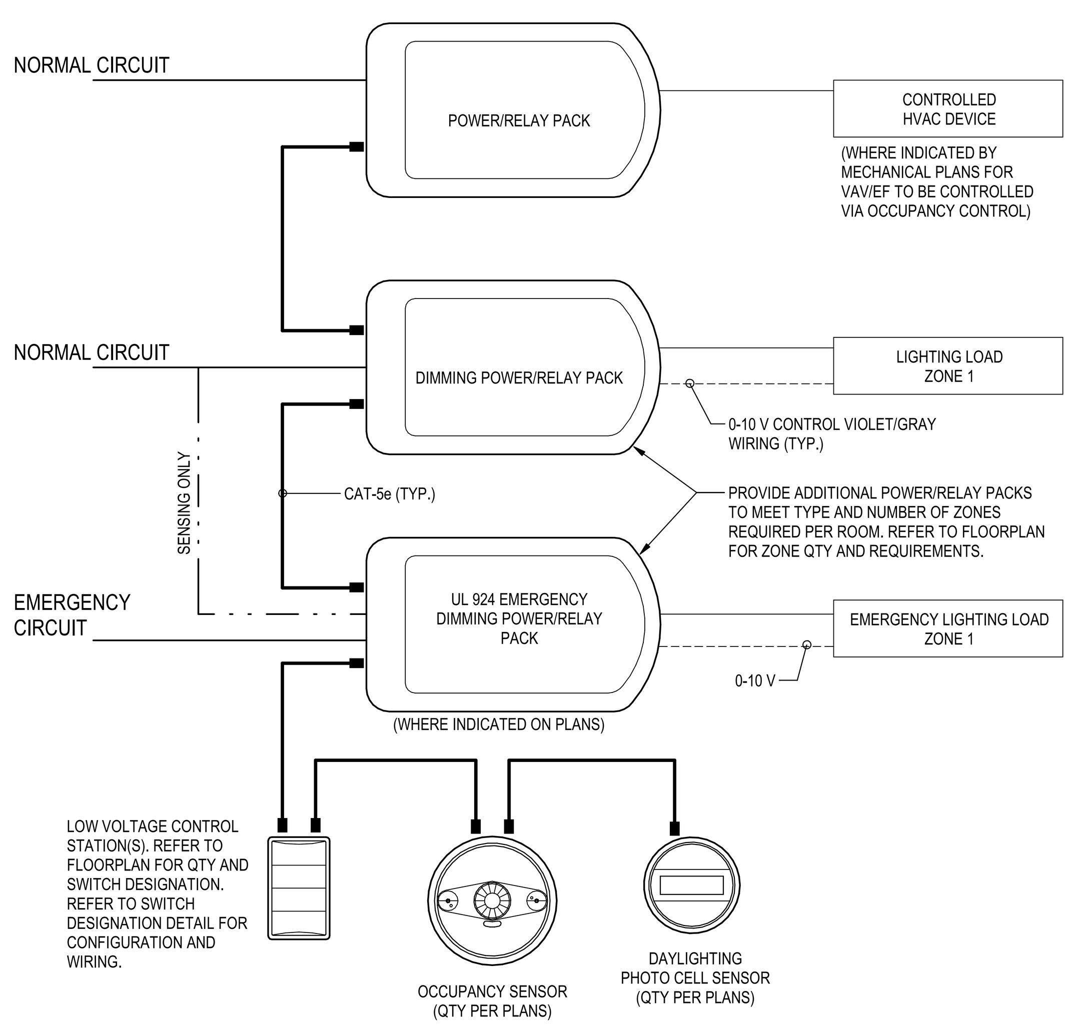
TYPE	FUNCTION**
$O	• WALL MOUNTED OCCUPANCY SENSOR • SINGLE ZONE: ON/OFF
$OD	• WALL MOUNTED OCCUPANCY SENSOR • SINGLE ZONE: ON/OFF/RAISE/LOWER
$L1	• SINGLE ZONE: ON/OFF
$L2	• ZONE 1 (Z1): ON/OFF • ZONE 2 (Z2): ON/OFF
$L3	• ZONE 1 (Z1): ON/OFF • ZONE 2 (Z2): ON/OFF • ZONE 3 (Z3): ON/OFF
$LD1	• SINGLE ZONE: ON/OFF/RAISE/LOWER
$LD2	• ZONE 1 (Z1): ON/OFF/RAISE/LOWER • ZONE 2 (Z2): ON/OFF/RAISE/LOWER
$LD3	• ZONE 1 (Z1): ON/OFF/RAISE/LOWER • ZONE 2 (Z2): ON/OFF/RAISE/LOWER • ZONE 3 (Z3): ON/OFF/RAISE/LOWER
$LD4	• ZONE 1 (Z1): ON/OFF/RAISE/LOWER • ZONE 2 (Z2): ON/OFF/RAISE/LOWER • ZONE 3 (Z3): ON/OFF/RAISE/LOWER • ZONE 4 (Z4): ON/OFF/RAISE/LOWER
$LD5	• ZONE 1 (Z1): ON/OFF/RAISE/LOWER • ZONE 2 (Z2): ON/OFF/RAISE/LOWER • ZONE 3 (Z3): ON/OFF/RAISE/LOWER • ZONE 4 (Z4): ON/OFF/RAISE/LOWER • ZONE 5 (Z5): ON/OFF/RAISE/LOWER
$LR	• ZONE 1 (Z1): ON/OFF • ZONE 2 (Z2): ON/OFF • ZONE 3 (Z3): ON/OFF • ZONE 4 (Z4): ON/OFF • OVERRIDE SWITCH FOR EXTERIOR ZONES AND CORRIDORS. LOCATE IN ELECTRICAL ROOM. PROVIDE LABEL ADJACENT SWITCH INDICATING CONTROL AREA.

WIRING DIAGRAM



NOTE:
*CONTRACTOR AND CONTROLS MANUFACTURER SHALL REFER TO SPECIFICATION 260943 FOR SEQUECE OF OPERATIONS. IT IS THE CONTRACTOR'S RESPONSIBILITY TO SHARE THIS SPECIFICATION WITH THE MANUFACTURER IN ORDER TO PROVIDE COMPREHENSIVE SHOP DRAWING SUBMITTAL FOR REVIEW.

**PROVIDE THE REQUIRED NUMBER OF BUTTONS TO ACHIEVE FUNCTIONALITY FOR EACH ZONE

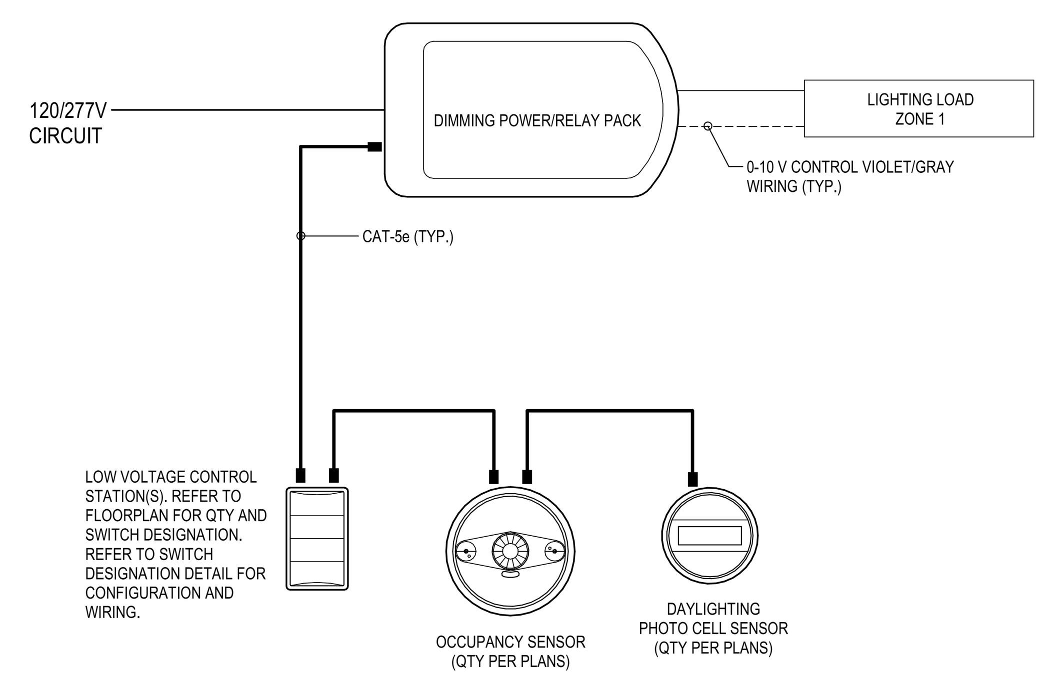


NOTES:

1. REFER TO SPECIFICATION 26 09 43 FOR ADDITIONAL REQUIREMENTS.
2. MOUNT PER MANUFACTURERS RECOMMENDATIONS.
3. ADJUST SENSITIVITY AND TIME DELAYS PER OWNER'S DIRECTION.
4. PROVIDE QTY OF OCCUPANCY SENSORS AS REQUIRED FOR OPTIMUM COVERAGE.
5. PROVIDE PHOTO CELL WHEN APPLICABLE AND SHOWN ON PLANS.
6. LOW VOLTAGE (0-10V) CABLING SHALL BE ROUTED IN CONDUIT AND WITH INSULATION RATED EQUAL TO LINE VOLTAGE AS REQUIRED BY NEC.
7. PROVIDE SPLITTERS AS REQUIRED.

DIGITAL CONTROLS WIRING DIAGRAM

SCALE: NONE



NOTES:

1. REFER TO SPECIFICAITON 26 09 43 FOR SEQUENCE OF OPERATION AND ADDITIONAL REQUIREMENTS.
2. MOUNT PER MANUFACTURERS RECOMMENDATIONS.
3. ADJUST SENSITIVITY AND TIME DELAYS PER OWNER'S DIRECTION.
4. PROVIDE QTY OF OCCUPANCY SENSORS AS REQUIRED FOR OPTIMUM COVERAGE. OCCUPANCY SENSORS SHALL BE DIGITAL TYPE. REFER TO SPECIFICATION 26 09 23 FOR ADDITIONAL INFORMATION.
5. PROVIDE CUSTOM LABELING OF CONTROL STATIONS.
6. PROVIDE PHOTO CELL WHEN APPLICABLE AND SHOWN ON PLANS.

SINGLE ZONE ROOM DIGITAL CONTROLS WIRING DIAGRAM

SCALE: NONE

Stantec

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6080 Tennyson Parkway Suite 200
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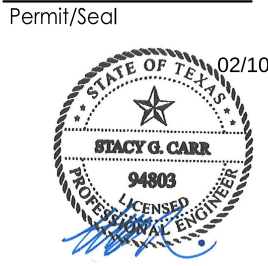

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Title
LIGHTING FIXTURE SCHEDULE AND DETAILS

Project No. 2140001088 | Scale As indicated

Revision | Drawing No. **E601**

<Pick location in Project Information>
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ORIGINAL SHEET - ARCH E1

PIPING COMPONENTS

SYMBOL

- ISOLATION VALVE (GENERIC)
- GATE VALVE
- GLOBE VALVE
- BUTTERFLY VALVE NPS 6 AND LESS
- BUTTERFLY VALVE NPS 8 AND MORE
- BALL VALVE
- PLUG VALVE
- NEEDLE VALVE
- CHECK VALVE (GENERIC)
- BALANCING VALVE
- FLOW LIMITING VALVE
- PRESSURE REDUCING VALVE
- 2-WAY CONTROL VALVE (GENERIC)
- 3-WAY CONTROL VALVE (GENERIC)
- SOLENOID 2-WAY CONTROL VALVE
- SOLENOID 3-WAY CONTROL VALVE
- FLOAT OPERATED VALVE ACTUATOR
- SAFETY OR RELIEF VALVE
- ANGLE VALVE
- BOILER STOP AND CHECK VALVE
- BFP — BACKFLOW PREVENTER (GENERIC)
- MULTI-PURPOSE VALVE (SHUTOFF, BALANCING AND CHECK)
- PUMP (GENERIC)
- Y STRAINER (GENERIC)
- STEAM TRAP (GENERIC)
- AUTOMATIC AIR VENT
- MANUAL AIR VENT
- VACUUM BREAKER
- SHOCK ABSORBER
- TEMPERATURE GAUGE
- PRESSURE GAUGE
- TEMPERATURE AND PRESSURE TAP
- SIGHT FLOW GLASS
- FLEXIBLE CONNECTOR
- EXPANSION JOINT
- GUIDE
- ANCHOR
- FLOW ARROW
- 1% — PIPING SLOPE
- PIPE CAP
- PIPE BREAK
- PIPE CROSS
- PIPING ELBOW UP
- PIPING ELBOW DOWN
- PIPING TEE UP
- PIPING TEE DOWN
- UNION CONNECTION
- FLANGED CONNECTION
- CONCENTRIC REDUCER
- ECCENTRIC REDUCER
- CO — STANDARD CLEAN-OUT IN LINE END OF RUN
- CO — STANDARD CLEAN-OUT THROUGH FLOOR END OF RUN
- CO — STANDARD CLEAN-OUT THROUGH FLOOR IN LINE

PIPING SYSTEMS (HVAC)

2 1/2"	PIPE SIZE
BBD	BOILER BLOWDOWN
BFW	BOILER FEED WATER
BR	BRINE RETURN
BS	BRINE SUPPLY
CHWR	CHILLED WATER RETURN
CHWR(G)	CHILLED WATER RETURN - GLYCOL
CHWR(P)	CHILLED WATER RETURN - PROCESS
CHWS	CHILLED WATER SUPPLY
CHWS(G)	CHILLED WATER SUPPLY - GLYCOL
CHWS(P)	CHILLED WATER SUPPLY - PROCESS
CWR	CONDENSER WATER RETURN
CWR(CT)	CONDENSER WATER RETURN (COOLING TOWER)
CWS	CONDENSER WATER SUPPLY
CWS(CT)	CONDENSER WATER SUPPLY (COOLING TOWER)
DTR	DUAL TEMPERATURE RETURN (HOT OR CHILLED)
DTS	DUAL TEMPERATURE SUPPLY (HOT OR CHILLED)
FOF	FUEL OIL FILL
FOR	FUEL OIL RETURN
FOS	FUEL OIL SUPPLY
FOV	FUEL OIL VENT
HPWR	HEAT PUMP WATER RETURN
HPWS	HEAT PUMP WATER SUPPLY
HRR	HEAT RECOVERY LOOP RETURN
HRS	HEAT RECOVERY LOOP SUPPLY
HWR	HEATING WATER RETURN
HWR(G)	HEATING WATER RETURN - GLYCOL
HWS	HEATING WATER SUPPLY
HWS(G)	HEATING WATER SUPPLY - GLYCOL
G	NATURAL GAS
GV	NATURAL GAS VENT
PG	PROPANE GAS
REF(HG)	REFRIGERANT HOT GAS
REF(L)	REFRIGERANT LIQUID
REF(S)	REFRIGERANT SUCTION
REF(V)	REFRIGERANT VENT
RV	RELIEF VENT
S(##)	STEAM (NOMINAL PRESSURE)
CS(##)	STEAM - CLEAN (NOMINAL PRESSURE)
C(##)	STEAM CONDENSATE (NOMINAL PRESSURE)
PC(##)	STEAM PUMPED CONDENSATE (NOMINAL PRESSURE)
SV	STEAM VENT
	PIPE INSULATION

VENTILATION (HVAC)

	AIR FLOW ARROW
18"x12" / 18"x12"	RECTANGULAR DUCT AND SIZE*
18"ø / 18"ø	ROUND DUCT AND SIZE*
18"x12"ø / 18"x12"ø	FLAT OVAL DUCT AND SIZE*
18"x12"	EXTERIOR DUCT TREATMENT*
18"x12" / 18"x12"	RECTANGULAR DUCT WITH ACOUSTIC LINING*
30"x12"	DUCT SECTION, SUPPLY AIR. SIZE* IS HORIZONTAL DIM. x VERTICAL DIM. APPLIES TO RECT., ROUND AND OVAL
	DUCT SECTION, OUTSIDE AIR. APPLIES TO RECT., ROUND AND OVAL
	DUCT SECTION, RETURN AIR. APPLIES TO RECT., ROUND AND OVAL
	DUCT SECTION, EXHAUST AIR. APPLIES TO RECT., ROUND AND OVAL
	FLEXIBLE DUCT
	ELBOW TURN, SUPPLY DOWN. APPLIES TO RECT., ROUND AND OVAL
	ELBOW TURN, OUTSIDE AIR DOWN. APPLIES TO RECT., ROUND AND OVAL
	ELBOW TURN, RETURN DOWN. APPLIES TO RECT., ROUND AND OVAL
	ELBOW TURN, EXHAUST DOWN. APPLIES TO RECT., ROUND AND OVAL
UP	CHANGE IN DUCT ELEVATION RISING IN DIRECTION INDICATED
DN	CHANGE IN DUCT ELEVATION DROPPING IN DIRECTION INDICATED
	END CAP
	ELBOW, RECTANGULAR, SMOOTH RADIUS WITH SPLITTER VANES (0.25 R/W DEFAULT)
	ELBOW, RECTANGULAR, SMOOTH RADIUS WITHOUT VANES (1.5 R/W DEFAULT)
	ELBOW, ROUND, SMOOTH RADIUS (1.5 R/W DEFAULT)
	MITERED ELBOW, RECTANGULAR, WITH TURNING VANES
	RECTANGULAR TO ROUND TRANSITION
AD	DUCT ACCESS DOOR (TOP, SIDE, BOTTOM)
FC	FLEXIBLE CONNECTION

* NOTE: ALL DUCT SIZES ARE INTERIOR, FREE DIMENSIONS (ALWAYS WIDTH X HEIGHT IN FLOOR PLAN AND SECTION)

EXPOSED DUCTWORK:
DOUBLE WALL SPIRAL OVAL DUCT WITH INTERSTITIAL LINER AND SOLID METAL LINER

EXPOSED DUCTWORK:
DOUBLE WALL SPIRAL ROUND DUCT WITH INTERSTITIAL LINER AND SOLID METAL LINER

VENTILATION (HVAC)

BDD	BACKDRAFT DAMPER
	MANUAL DAMPER
M	MOTORIZED DAMPER
	FIRE DAMPER
	SMOKE DAMPER
	SMOKE AND FIRE DAMPER
	DUCT SILENCER
X	CONTROL DEVICE (REFER TO CONTROLS LEGEND)
	AIR FLOW MEASURING STATION (REFER TO CONTROLS LEGEND)
QUANTITY / TYPE / SIZE (IN.) / VOLUME (CFM)	AIR OUTLET OR INLET TAG (REFER TO SCHEDULE)
	RECTANGULAR DIFFUSER, SUPPLY. OPTIONAL ARROWS SHOW THE FLOW DIRECTION.
	RECTANGULAR REGISTER OR GRILLE, RETURN
	RECTANGULAR REGISTER OR GRILLE, EXHAUST
	ROUND DIFFUSER, SUPPLY
	LINEAR DIFFUSER
	SIDEWALL REGISTER OR GRILLE, SUPPLY
	SIDEWALL GRILLE, RETURN OR EXHAUST
UC	UNDERCUT DOOR
	DOOR GRILLE OR LOUVER
	TRANSFER GRILLE OR LOUVER
	COIL (REFER TO CONTROLS LEGEND)
ID-#	EQUIPMENT TAG
QUANTITY / TYPE / LENGTH (FT) / CAPACITY (MBH)	RADIATION HEATING TAG (REFER TO SCHEDULE)

GENERAL SYMBOLS

- DEMOLITION
- EXISTING
- NEW WORK
- POINT OF CONNECTION OF NEW TO EXISTING SYSTEM
- POINT OF DISCONNECTION OF DEMOLITION FROM EXISTING
- CAP OFF EXISTING
- DETAIL CALLOUTS: DETAIL NUMBER; SHEET ON WHICH DETAIL IS SHOWN
- WALL SECTIONS: SECTION NUMBER; SHEET ON WHICH SECTION IS SHOWN
- FLOOR / 0'-0" — FLOOR OR ROOF LEVEL NAME; VERTICAL ELEVATION
- N — NORTH ARROW
- DRAWING REVISION
- MATCH LINE
- GRAPHIC SCALES - ENGINEERING
- 0000 — ROOM TAG
- M01 — KEY NOTE TAG
- SLOPE — SLOPE ARROW
- CIRCULAR BREAK SYMBOL
- CIRCLE BREAK SYMBOL
- CENTER LINE
- GRID BUBBLE AND LINE

GENERAL NOTES

1. THE INSTALLATION OF THE MECHANICAL SYSTEMS SHALL COMPLY WITH THE REQUIREMENTS OF THE 2018 INTERNATIONAL BUILDING CODE, THE 2018 INTERNATIONAL MECHANICAL CODE, THE 2018 INTERNATIONAL ENERGY CONSERVATION CODE, AND ALL LOCALLY ADOPTED AMENDMENTS TO THESE CODES.
2. THE PLANS AND SPECIFICATIONS SHALL GOVERN WHERE THEY EXCEED CODE REQUIREMENTS.
3. PRIOR TO SUBMITTING BID, VISIT THE JOB SITE AND BECOME FULLY ACQUAINTED WITH THE EXISTING CONDITIONS OF THE PROJECT. REVIEW THE GENERAL NOTES, SPECIFICATIONS, AND OTHER DRAWINGS FOR ADDITIONAL REQUIREMENTS WHICH MAY NOT BE SPECIFICALLY CALLED OUT IN THIS PORTION OF THE CONSTRUCTION DOCUMENTS. NOTIFY ENGINEER AND/OR OWNER OF CONFLICTS OR DISCREPANCIES PRIOR TO SUBMISSION OF BID.
4. REVIEW AND COMPLY WITH THE LATEST EDITION OF THE UNT UNIVERSITY DESIGN AND CONSTRUCTION STANDARDS.
5. EXISTING CONDITIONS WERE TAKEN FROM ORIGINAL DRAWINGS AND SITE VISITS AND MAY NOT REFLECT "AS-BUILT" CONDITIONS. FIELD VERIFY EXISTING CONDITIONS PRIOR TO SUBMITTING BIDS. COORDINATE NEW WORK AND DEMOLITION WITH OTHER DISCIPLINES AND EXISTING CONDITIONS PRIOR TO CONSTRUCTION.
6. IT IS THE CONTRACTORS RESPONSIBILITY TO COORDINATE STAGING OF EQUIPMENT AND MATERIALS WITH THE OWNER'S PROJECT MANAGER AND BUILDING ENGINEER TO MINIMIZE DISRUPTION OF DAILY ACTIVITIES WITHIN THE BUILDING.
7. IT IS EXPECTED THAT SHUTDOWNS OF EXISTING UTILITIES ARE REQUIRED DURING THE REMOVAL OF THE EXISTING MECHANICAL SYSTEM AND INSTALLATION OF THE NEW MECHANICAL SYSTEM. CONTRACTOR SHALL PLAN FOR SHUTDOWNS TO OCCUR DURING NON-BUSINESS HOURS. CONTRACTOR SHALL COORDINATE SHUTDOWN TIMES AND DURATION OF SHUTDOWNS IN ADVANCE WITH THE OWNER'S REPRESENTATIVE.
8. COORDINATE PARKING, TOOL STORAGE, AND EQUIPMENT STORAGE LOCATIONS WITH THE OWNER'S REPRESENTATIVE PRIOR TO THE START OF THE PROJECT.
9. INSPECT EXISTING EQUIPMENT TO REMAIN TO VERIFY THAT EQUIPMENT IS OPERATING PROPERLY. NOTIFY THE OWNER'S REPRESENTATIVE OF ALL DAMAGED AND/OR MALFUNCTIONING COMPONENTS.
10. COORDINATE THE REMOVAL OF THE EXISTING MECHANICAL SYSTEM AND THE INSTALLATION OF THE NEW MECHANICAL SYSTEM PRIOR TO THE START OF CONSTRUCTION TO ENSURE A NEAT AND ORDERLY INSTALLATION.
11. COVER AND PROTECT ALL SURFACES FROM DAMAGE DURING CONSTRUCTION. ANY DAMAGE TO EXISTING SURFACES CAUSED DURING CONSTRUCTION SHALL BE REPAIRED AT NO EXTRA COST TO THE OWNER.
12. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DRAIN DOWN AND REFILL OF THE HYDRONIC SYSTEMS AS REQUIRED TO PERFORM THE REMOVAL AND INSTALLATION OF THE NEW EQUIPMENT.
13. THE CONTRACTOR SHALL ENSURE THAT ALL OPEN ENDS OF DUCTWORK AND INLET AND/OR OUTLET OPENINGS AT MECHANICAL EQUIPMENT EITHER STORED ON SITE OR INSTALLED IN THE BUILDING IS THOROUGHLY SEALED TO PROTECT AGAINST DIRT AND MOISTURE UNTIL SUCH TIME THAT BUILDING IS DEEMED BY THE OWNER TO BE ADEQUATELY CLEAN TO ALLOW FOR START-UP OF MECHANICAL EQUIPMENT AND SYSTEMS. SHOULD OPEN ENDS OF DUCTWORK AND INLET AND/OR OUTLET OPENINGS AT MECHANICAL EQUIPMENT NOT BE SEALED AS SPECIFIED THROUGHOUT THE DURATION OF CONSTRUCTION UNTIL SYSTEM STARTUP OCCURS, THE CONTRACTOR WILL BE REQUIRED TO HAVE THE INTERIOR OF ALL SUCH DUCTWORK AND MECHANICAL EQUIPMENT PROFESSIONALLY CLEANED TO AS-NEW CONDITION AT NO ADDITIONAL COST TO THE OWNER.
14. A MINIMUM OF 30 INCHES CLEAR SHALL BE MAINTAINED ON THE SERVICE SIDE OF EACH VAV TERMINAL UNIT FOR ACCESS TO THE TERMINAL UNIT'S CONTROLS ENCLOSURE AND HYDRONIC HEATING COIL. COORDINATE PLACEMENT OF VAV TERMINAL UNITS WITH OTHER TRADES TO AVOID INTERFERENCES.
15. VAV BOXES AND VALVES SHALL BE LOCATED NO MORE THAN 18 INCHES ABOVE SUSPENDED CEILINGS FOR ACCESS.
16. REFER TO MECHANICAL SPECIFICATION FOR DUCTWORK AND PIPING INSULATION REQUIREMENTS AND DUCTWORK LINER REQUIREMENTS.
17. PROVIDE AIR TURNING VANES IN ALL 90 DEGREE RECTANGULAR DUCT ELBOWS.
18. ALL DUCTWORK SHALL BE CONCEALED IN WALLS AND/OR CEILING SPACE, UNLESS OTHERWISE NOTED.
19. SEAL ALL PENETRATIONS THROUGH WALLS PER DETAILS AND SPECIFICATIONS. FIREPROOF PENETRATIONS THROUGH FIRE RATED COMPONENTS IN ACCORDANCE WITH U.L. REQUIREMENTS.
20. COORDINATE THE EXACT LOCATION OF ALL CEILING DIFFUSERS, REGISTERS, AND GRILLES WITH ARCHITECTURAL REFLECTED CEILING PLANS AND ELECTRICAL LIGHTING PLANS. ADJUST THE LOCATION OF CEILING DIFFUSERS, REGISTERS, AND GRILLES AS REQUIRED TO ACCOMMODATE FINAL CEILING GRID AND LIGHT FIXTURE LOCATIONS.
21. COORDINATE THE EXACT MOUNTING SIZE AND FRAME TYPE OF DIFFUSERS, REGISTERS AND GRILLES WITH THE SUPPLIER TO MEET THE CEILING, WALL AND DUCT INSTALLATION REQUIREMENTS.
22. COORDINATE ALL TEMPERATURE SENSOR LOCATIONS WITH FURNITURE LAYOUT AND ARCHITECTURAL PLANS. LOCATE ALL TEMPERATURE SENSORS ADJACENT TO LIGHT SWITCH, OR AS SHOWN ON PLANS. COORDINATE LOCATION WITH ELECTRICAL PLANS.
23. PROVIDE FLEXIBLE CONNECTION AT INTAKE AND DISCHARGE OF ALL MOTOR DRIVEN EQUIPMENT.
24. PROVIDE A MANUAL BALANCING DAMPER IN EACH BRANCH DUCT TAKEOFF FROM MAIN SUPPLY, RETURN, AND EXHAUST DUCTS. IN INACCESSIBLE LOCATIONS PROVIDE YOUNG REGULATOR REMOTE ACTUATED DAMPER TO ASSIST IN DAMPER BALANCING.
25. PROVIDE A PREFABRICATED CONICAL RECTANGULAR/ROUND BRANCH DUCT TAKEOFF FITTING WITH MANUAL BALANCING DAMPER AND LOCKED QUADRANT FOR BRANCH DUCT CONNECTIONS AND TAKE-OFFS TO INDIVIDUAL DIFFUSERS, REGISTERS AND GRILLES.
26. ALL RUN-OUTS TO DIFFUSER/GRILLE SHALL BE THE SAME SIZE AS THE DIFFUSER/GRILLE NECK SIZE AND SHALL HAVE MANUAL VOLUME DAMPER UNLESS NOTED OTHERWISE.
27. ALL FLEXIBLE DUCTWORK SHALL HAVE A MAXIMUM LENGTH OF FIVE (5) FEET, SHALL HAVE A MAXIMUM RADIUS OF 90 DEGREES, AND SHALL BE INSTALLED AND SUPPORTED TO AVOID SHARP BENDS AND SAGGING.
28. REFER TO ARCHITECTURAL PLANS FOR RELATED CONSTRUCTION DETAILS AS APPLICABLE TO THE HVAC SYSTEM. VERIFY CHASES AND PENETRATIONS SHOWN ON ARCHITECTURAL PLANS THAT ARE INTENDED FOR DUCTWORK AND PIPING ARE SIZED APPROPRIATELY TO ACCOMMODATE THE DUCTWORK AND / OR PIPING.
29. ALL WALL-MOUNTED ITEMS (SUCH AS, BUT NOT LIMITED TO, THERMOSTATS, SENSORS, ANNUNCIATORS, AND DETECTORS) SHALL BE INSTALLED PLUMB, LEVEL, AND IN ALL THE LOCATIONS DESIGNATED IN THE DRAWINGS AND SPECIFICATIONS. ALL DEVICE COVERS AND TRIM SHALL FIT SNUGLY TO WALL SURFACES ON ALL SIDES. CONTRACTOR SHALL COORDINATE FINAL LOCATION OF SENSORS AND/OR THERMOSTATS WITH ARCHITECT.
30. CONTRACTOR SHALL COORDINATE, PROVIDE & INSTALL FIRE DAMPERS, COMBINATION FIRE SMOKE DAMPERS AND SMOKE DAMPERS AT ALL PENETRATIONS THROUGH FIRE OR SMOKE RATED ENVELOPE AS DEFINED BY ARCHITECT ON ARCHITECTURAL PLANS AND AS REQUIRED BY NATIONAL, STATE, AND/OR LOCAL GOVERNING CODES. DIVISION 26 CONTRACTOR SHALL FURNISH AND DIVISION 23 SHALL INSTALL DUCT SMOKE DETECTORS FOR EACH DUCT IN WHICH A FIRE-SMOKE OR SMOKE DAMPER IS REQUIRED. CONTRACTOR SHALL COORDINATE CONNECTION TO FIRE ALARM SYSTEM WITH FIRE ALARM SYSTEM PROVIDER. WIRING SHALL BE BY DIVISION 26.
31. PROVIDE WALL OR DUCT ACCESS PANELS OR DOORS FOR ACCESS TO FIRE, SMOKE OR FIRE/SMOKE DAMPERS. ACCESS PANELS OR DOOR SHALL BE MINIMUM SIZE OF 12" BY 12" AND SHALL BE INSTALLED WITHIN 12" OF DAMPER. PROVIDE A REMOVABLE DUCT SECTION WHERE DUCT SIZE IS TOO SMALL FOR A 12" BY 12" ACCESS DOOR.
32. NEW MECHANICAL EQUIPMENT, DUCTWORK AND PIPING ARE SHOWN AT APPROXIMATE LOCATIONS.
33. ALL DUCTWORK AND PIPING SHALL BE ROUTED AS HIGH AS POSSIBLE AND SHALL BE ROUTED PARALLEL TO BUILDING COLUMN LINES, UNLESS OTHERWISE NOTED. FIELD MEASURE FINAL LOCATIONS FOR DUCTWORK AND PIPING PRIOR TO FABRICATION AND MAKE ADJUSTMENTS AS REQUIRED TO FIT THE DUCTWORK AND PIPING WITHIN THE AVAILABLE SPACE. COORDINATE DUCTWORK AND PIPING ROUTING WITH OTHER TRADES TO AVOID INTERFERENCES. THE CONTRACTOR HAS THE OPTION OF MODIFYING ROUTING OF DUCTWORK AND PIPING TO AVOID OBSTRUCTIONS AND INTERFERENCES WITH OTHER TRADES AND TO PROVIDE FOR CLEARANCE AND/OR SLOPING REQUIREMENTS. CROSSING OF DUCTS MAY REQUIRE THAT OFFSETS BE PROVIDED. THE CONTRACTOR SHALL INCLUDE IN BID THE COST OF DUCTWORK AND PIPING OFFSETS WHERE REQUIRED AND SHALL SHOW COORDINATED ROUTING OF DUCTWORK AND PIPING ON SHOP DRAWINGS. ANY MODIFICATIONS REQUIRED TO RECONFIGURE THE ROUTING OF DUCTWORK AND PIPING AFTER INSTALLATION, RESULTING FROM A LACK OF COORDINATION, SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR AT NO EXTRA COST TO THE OWNER.
34. CONTRACTOR SHALL PROVIDE ALL NECESSARY DUCTWORK AND PIPING TRANSITIONS REQUIRED INCLUDING, BUT NOT LIMITED TO, TRANSITIONS TO AND FROM AIR HANDLING EQUIPMENT, DAMPER DEVICES AND DIFFERENT DUCT SIZES AND DUCT SHAPES.
35. ALL EXPOSED RECTANGULAR DUCTS SHALL BE INTERNALLY LINED AND SHALL BE PAINTED PER ARCHITECTURAL PLANS. THE ELEVATION AND LOCATION OF ALL EXPOSED RECTANGULAR DUCTS SHALL BE COORDINATED WITH ARCHITECT PRIOR TO INSTALLATION.
36. ALL EXPOSED ROUND DUCTS SHALL BE DOUBLE WALL SPIRAL AND SHALL BE PAINTED PER ARCHITECTURAL PLANS. THE ELEVATION AND LOCATION OF ALL EXPOSED ROUND DUCTS SHALL BE COORDINATED WITH ARCHITECT PRIOR TO INSTALLATION.
37. ALL EXPOSED OVAL DUCTS SHALL BE DOUBLE WALL SPIRAL AND SHALL BE PAINTED PER ARCHITECTURAL PLANS. THE ELEVATION AND LOCATION OF ALL EXPOSED OVAL DUCTS SHALL BE COORDINATED WITH ARCHITECT PRIOR TO INSTALLATION.
38. OVERHEAD HANGERS AND SUPPORTS FOR EQUIPMENT, DUCTWORK, AND PIPING SHALL BE FASTENED TO BUILDING JOISTS OR BEAMS. DO NOT ATTACH HANGERS AND SUPPORTS TO THE ABOVE FLOOR SLAB OR ROOF WITHOUT PRIOR CONSENT FROM THE STRUCTURAL ENGINEER.
39. PROVIDE A NEW SET OF AIR FILTERS IN ALL UNITS PRIOR TO TESTING, ADJUSTING AND BALANCING, AND BEFORE TURNING SYSTEMS OVER TO OWNER.
40. COORDINATE LOCATION OF EQUIPMENT SUPPORTS WITH LOCATION OF EQUIPMENT ACCESS PANELS AND ACCESS DOORS TO ENABLE SERVICE OF EQUIPMENT AND TO FACILITATE FILTER REPLACEMENT.
41. ALL MATERIAL INSTALLED ABOVE RETURN AIR PLENUM CEILINGS SHALL BE PLENUM RATED FOR FLAME AND SMOKE SPREAD AND APPROVED BY LOCAL AUTHORITY HAVING JURISDICTION.
42. DUCTWORK SHALL BE CONSTRUCTED IN ACCORDANCE WITH SMACNA "HVAC DUCT CONSTRUCTION STANDARDS," CURRENT EDITION, UNLESS OTHERWISE NOTED.
43. TESTING, ADJUSTING, AND BALANCING (TAB) AND COMMISSIONING OF THE MECHANICAL SYSTEMS SHALL BE PERFORMED IN COMPLIANCE WITH THE 2018 INTERNATIONAL ENERGY CONSERVATION CODE, SECTION C408. A SYSTEM TAB REPORT AND FINAL COMMISSIONING REPORT SHALL BE PROVIDED TO THE OWNER WITHIN 90 DAYS OF THE DATE OF RECEIPT OF THE CERTIFICATE OF OCCUPANCY.

MECHANICAL SHEET LIST

NO.	DRAWING NAME
M001	MECHANICAL LEGEND, SYMBOLS, AND ABBREVIATIONS
MD101	MECHANICAL DEMOLITION PLAN - FIRST FLOOR
MD102	MECHANICAL DEMOLITION PLAN - SECOND FLOOR
M101	MECHANICAL PLAN - FIRST FLOOR
M102	MECHANICAL PLAN - SECOND FLOOR
M103	MECHANICAL PLAN - THIRD FLOOR
M501	MECHANICAL SCHEDULES AND DETAILS
M502	MECHANICAL DETAILS

EQUIPMENT IDENTIFICATION

AB-#	AIR BLENDER
AC-#	AIR COMPRESSOR
ACU-#	AIR CONDITIONING UNIT
ADS-#	AIR AND DIRT SEPARATOR
AF-#	AIR FILTER
AHU-#	AIR HANDLING UNIT
AS-#	AIR SEPARATOR
ATU-#	AIR TERMINAL UNIT
B-#	BOILER
BCU-#	BLOWER COIL UNIT
CB-#	CHILLED BEAM
CC-#	COOLING COIL
CH-#	CHILLER
CONV-#	CONVECTOR
CRU-#	CONDENSATE RETURN UNIT
CT-#	COOLING TOWER
CUH-#	CABINET UNIT HEATER
CU-#	CONDENSING UNIT
DAC-#	DOOR AIR CURTAIN
DC-#	DUST COLLECTOR
DCT-#	DECONTAMINATION TANK
DF-#	DRINKING FOUNTAIN
DS-#	DUCT SILENCER
DU-#	DEHUMIDIFCATION UNIT
DWH-#	DOMESTIC WATER HEATER
E-#	EXHAUST GRILLE / REGISTER / DIFFUSER
EL-#	EXPANSION LOOP
ERC-#	ENERGY RECOVERY COIL
ERU-#`	ENERGY RECOVERY UNIT
EWC-#	ELECTRIC WATER COOLER
F-#	FAN
F(C)-#	FAN (CEILING)
F(E)-#	FAN (EXHAUST)
F(LE)-#	FAN (LABORATORY EXHAUST)
F(R)-#	FAN (RETURN)
F(S)-#	FAN (SUPPLY)
F(T)-#	FAN (TRANSFER)
FCU-#	FAN COIL UNIT
FD-#	FLOOR DRAIN
FFU-#	FAN FILTER UNIT
FP-#	FIRE PROTECTION PUMP
FPP-#	FIRE PROTECTION JOCKEY PUMP
FPTU-#	FAN POWERED TERMINAL UNIT
FTR-#	FINNED TUBE RADIATOR
FUR-#	FURNACE

EQUIPMENT IDENTIFICATION

GFS-#	GLYCOL FEED SYSTEM
GSG-#	GAS-FIRED STEAM GENERATOR
H-#	HUMIDIFIER
HC-#	HEATING COIL
HP-#	HEAT PUMP
HRU-#	HEAT RECOVERY UNIT
H(C)-#	HOOD (CANOPY)
H(HC)-#	HOOD (HEAT AND CONDENSATE)
H(I)-#	HOOD (INTAKE)
H(K)-#	HOOD (KITCHEN)
H(RH)-#	HOOD (RANGE)
H(R)-#	HOOD (RELIEF)
HX-#	HEAT EXCHANGER
LATU-#	LAB AIR TERMINAL UNIT
LAV-#	LAVATORY
MAC-#	MEDICAL AIR COMPRESSOR
MAU-#	MAKEUP AIR UNIT
MV-#	MIXING VALVE
MVP-#	MEDICAL VACUUM PUMP
P-#	PUMP
PDU-#	POOL DEHUMIDIFICATION UNIT
PRV-#	PRESSURE REDUCING VALVE
PTAC-#	PACKAGED TERMIANL AIR CONDITIONER
RD-#	ROOF DRAIN
R-#	RETURN AIR GRILLE/ REGISTER / DIFFUSER
RP-#	RADIANT PANEL
RTU-#	ROOFTOP UNIT
S-#	SUPPLY GRILLE / REGISTER / DIFFUSER
SH-#	SHOWER
SK-#	SINK
SPC-#	SOLAR PANEL COLLECTOR
SSF-#	SIDE STEAM FILTER
T-#	TRANSFER AIR GRILLE
T(B)-#	TANK (BUFFER TANK)
T(E)-#	TANK (EXPANSION TANK)
T(H)-#	TANK (HYDRO PNEUMATIC TANK)
T(S)-#	TANK (STORAGE TANK)
UH-#	UNIT HEATER
UR-#	URINAL
USG-#	UNFIRED STEAM GENERATOR
UV-#	UNIT VENTILATOR
VA-#	VALVE
WC-#	WATER CLOSET
WS-#	WATER SOFTENER
ZN-#	ZONE

NOTE: NOT ALL SYMBOLS, SYSTEMS, AND ABBREVIATIONS MAY BE USED ON THIS PROJECT

ABBREVIATIONS

A/C	AIR CONDITIONING
AAV	AUTOMATIC AIR VENT
ADA	AMERICANS WITH DISABILITIES ACT
ADJ	ADJUSTABLE
AFC	ABOVE FINISHED CEILING
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AP	ACCESS PANEL / DOOR
APD	AIR PRESSURE DROP
AV	ACID VENT
AVG	AVERAGE
AW	ACID WASTE
BAS	BUILDING AUTOMATION SYSTEM
BDD	BACKDRAFT DAMPER
BHP	BRAKE HORSEPOWER
BMS	BUILDING MANAGEMENT SYSTEM
BOD	BOTTOM OF DUCT
BOP	BOTTOM OF PIPE
BT	BATH TUB
BTU	BRITTISH THERMAL UNIT
BTUH	BRITTISH THERMAL UNIT PER HOUR
C	CELCIUS
C/W	COMPLETE WITH
CAV	CONSTANT AIR VOLUME
CFM	CUBIC FEET PER MINUTE
COND	CONDENSATE
CV	CONTROL VALVE
CW	CHILLED WATER
DB	DRY BULB TEMPERATURE
dB	DECIBEL(S)
DCW	DOMESTIC COLD WATER
DDC	DIRECT DIGITAL CONTROL
DEG	DEGREE
DHW	DOMESTIC HOT WATER
DHWR	DOMESTIC HOT WATER RETURN
DIA / Ø	DIAMETER
DIFF	DIFFERENTIAL
DIV	DIVISION
DN	DOWN
DWG	DRAWING
EA	EXHAUST AIR
EA (D)	EXHAUST AIR (DISHWASH)
EA (G)	EXHAUST AIR (GENERAL)
EA (K)	EXHAUST AIR (KITCHEN)
EA (LAB)	EXHAUST AIR (LAB)
EA (LD)	EXHAUST AIR (LAUNDRY/DRYER)
EA (W)	EXHAUST AIR (WASHROOM)
EAT	ENTERING AIR TEMPERATURE
EAV	EXHAUST AIR VALVE
ED	EXISTING TO BE DEMOLOISHED
EER	ENERGY EFFICIENCY RATIO
EEW	EYE WASH STATION
EG	ETHELYENE GLYCOL
ER	EXISTING RELOCATED (IN NEW CONSTRUCTION)
ERL	EXISTING TO BE RELOCATED (IN DEMOLITION)
ESP	EXTERNAL STATIC PRESSURE
EWT	ENTERING WATER TEMPERATURE
EXIST / (E)	EXISTING
F	FAHRENHEIT
FLA	FULL LOAD AMPERAGE
FPM	FEET PER MINUTE
FPS	FEET PER SECOND
FT	FOOT / FEET
GA	GAUGE
GAL	GALLON
GC	GENERAL CONTRACTOR
GPM	GALLONS PER MINUTE
HEPA	HIGH EFFICIENCY PARTICULATE AIR (FILTER)
HP	HORSEPOWER
HR	HOUR

ABBREVIATIONS

HVAC	HEATING / VENTILATION / AIR CONDITIONING
HW	HOT WATER
HWR	HOT WATER RETURN
HZ	HERTZ
IE	INVERT ELEVATION
IN	INCHES
IN WG	INCHES WATER GAUGE
IPLV	INTEGRATED PART LOAD VALUE
kW	KILOWATT
kWh	KILOWATT HOUR
LAT	LEAVING AIR TEMPEATURE
LBS	POUNDS
LF	LINEAR FEET
LWT	LEAVING WATER TEMPERATURE
M	METER
MAX	MAXIMUM
MBH	THOUSAND OF BTUH
MCA	MAXIMUM CIRCUIT AMPS
MFR	MANUFACTURER
MIN	MINIMUM
MOP	MAXIMUM OVERCURRENT PROTECTION
MSK	MOP SINK
N/A	NOT APPLICABLE
NC	NOISE CRITERIA
NC	NORMALLY CLOSED
NG	NATURAL GAS
NIC	NOT IN CONTRACT
NO	NORMALLY OPEN
NPS	NOMINAL PIPE SIZE
NTS	NOT TO SCALE
OA	OUTSIDE AIR
OFCI	OWNER FURNISHED, CONTRACTOR INSTALLED
OFE	OWNER FURNISHED EQUIPMENT
OFOI	OWNER FURNISHED / OWNER INSTALLED
PG	PROPYLENE GLYCOL
POE	POINT OF ENTRANCE
POS	POINT OF SERVICE
PPM	PARTS PER MILLION
PSI	POUNDS PER SQUARE INCH
PSIA	POUNDS PER SQUARE INCH, ABSOLUTE
PSIG	POUNDS PER SQUARE INCH, GAGE
PTS	PNEUMATIC TUBE STATION
PVC	POLYVINYL CHOLORIDE
RA	RETURN AIR
RELA	RELIEF AIR
REQD	REQUIRED
RH	RELATIVE HUMIDITY
RPM	ROTATIONS PER MINUTE
SA	SUPPLY AIR
SAN	SANITARY
SP	STATIC PRESSURE
SP	STAIR PRESSURIZATION AIR
SRV	SAFETY RELIEF VALVE
ST	STORM
ST(O)	STORM OVERFLOW
TA	TRANSFER AIR
TEMP	TEMPERATURE
TSP	TOTAL STATIC PRESSURE
TSTAT	THERMOSTAT
TYP	TYPICAL
UC	UNDER CUT (DOOR)
UG	UNDERGROUND
V	VENT
VAV	VARIABLE AIR VOLUME
VFD	VARIABLE FREQUENCY DRIVE
VIF	VERIFY IN FIELD
VTR	VENT - THRU ROOF
W/	WITH
W/O	WITHOUT
WB	WET BULB TEMPERATURE
WG	WATER GAUGE

GENERAL DEMOLITION NOTES

1. ANY INTERRUPTIONS OF EXISTING SERVICES OR EQUIPMENT SHALL BE PERFORMED AT A TIME APPROVED IN ADVANCE BY THE OWNER'S REPRESENTATIVE SO AS NOT TO INTERFERE WITH THE BUILDING OPERATION.
2. THESE DRAWINGS INDICATE THE GENERAL EXTENT OF WORK. THE EXTENT OF DEMOLITION SHALL BE REQUIRED BY THE NEW WORK AND REMOVAL OF MATERIALS/COMPONENTS NOT REQUIRED FOR THE NEW AND RENOVATED SYSTEMS.
3. ALL MECHANICAL SYSTEMS TO BE REMOVED SHALL BE REMOVED COMPLETE WITH ALL RELATED ITEMS INCLUDING HANGERS, SUPPORTS, ETC. CAP ALL OPEN PIPES AND DUCTS. PATCH AND SEAL ALL OPENINGS AS A RESULT OF DEMOLITION IN RATED WALLS TO MAINTAIN EXISTING WALL'S FIRE OR SMOKE RATING AND TO MATCH EXISTING ADJACENT SURFACES.
4. REMOVE HANGERS AND SUPPORTS WHERE PIPING AND/OR EQUIPMENT ARE REMOVED AND THE EXISTING HANGERS AND SUPPORTS ARE NOT USED FOR THE NEW INSTALLATION.
5. ALL ITEMS AND EQUIPMENT REMOVED SHALL REMAIN PROPERTY OF THE OWNER UNLESS POSSESSION RIGHTS ARE WAIVED. CONTRACTOR SHALL MEET WITH OWNER PRIOR TO START OF DEMOLITION TO DETERMINE WHICH ITEMS ARE TO BE SALVAGED. CONTRACTOR SHALL REMOVE REMAINING ITEMS FROM SITE.
6. FIELD VERIFY EXACT SIZE AND LOCATION OF ALL EXISTING SERVICES PRIOR TO START OF DEMOLITION.

VAV TAGS

VAV-# (E)	EXISTING TO REMAIN.
VAV-# (ER)	EXISTING TO BE RELOCATED. DISCONNECT AND REMOVE DURING DEMOLITION PHASE. INSPECT PER GENERAL NOTES. PROTECT AND STORE UNTIL RECONNECTION DURING NEW WORK PHASE. REUSE EXISTING CONTROLLERS.
VAV-# (N)	NEW VAV BOX AND CONTROLLERS.
VAV-# (D)	EXISTING TO BE DEMOLISHED.

GRD TAGS

(E)	EXISTING AIR TERMINAL TO REMAIN.
(ER)	EXISTING AIR TERMINAL TO BE RELOCATED. REMOVE, PROTECT, AND STORE UNTIL RECONNECTION DURING NEW WORK PHASE. PROVIDE NEW DUCTWORK TO CONNECT TO EXISTING SYSTEM AND MAKE FINAL CONNECTIONS.
(N)	NEW AIR TERMINAL. PROVIDE NEW DUCTWORK TO CONNECT TO EXISTING SYSTEM AND MAKE FINAL CONNECTIONS.
(D)	EXISTING AIR TERMINAL TO BE DEMOLISHED. REMOVE ALL DUCTWORK, ASSOCIATED HANGERS, AND SUPPORTS BACK TO DISCONNECT POINT SHOWN.

ADDITIONAL ALTERNATES

CONTRACTOR SHALL PROVIDE PRICING ON THE FOLLOWING ADDITIONAL ALTERNATES:

M1 - PROVIDE NEW VAV BOXES IN LIEU OF VAV BOXES THAT ARE INDICATED TO BE RELOCATED AND REUSED. REUSE EXISTING CONTROLLERS.

M2 - DEMOLISH ALL EXISTING VAV BOXES WITHIN SCOPE OF WORK AREA AND PROVIDE WITH NEW VAV BOXES AND VALVES. REUSE EXISTING CONTROLLERS.

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PROFESSIONAL ENGINEER
02.10.2023

Texas Firm Registration No. 13678
EXP. 2023.11.30

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Client/Project
University of North Texas - Denton

EAGLE STUDENT SERVICES CENTER

Eagle Student Services Center 1147 Union Cir, Denton, TX 76201

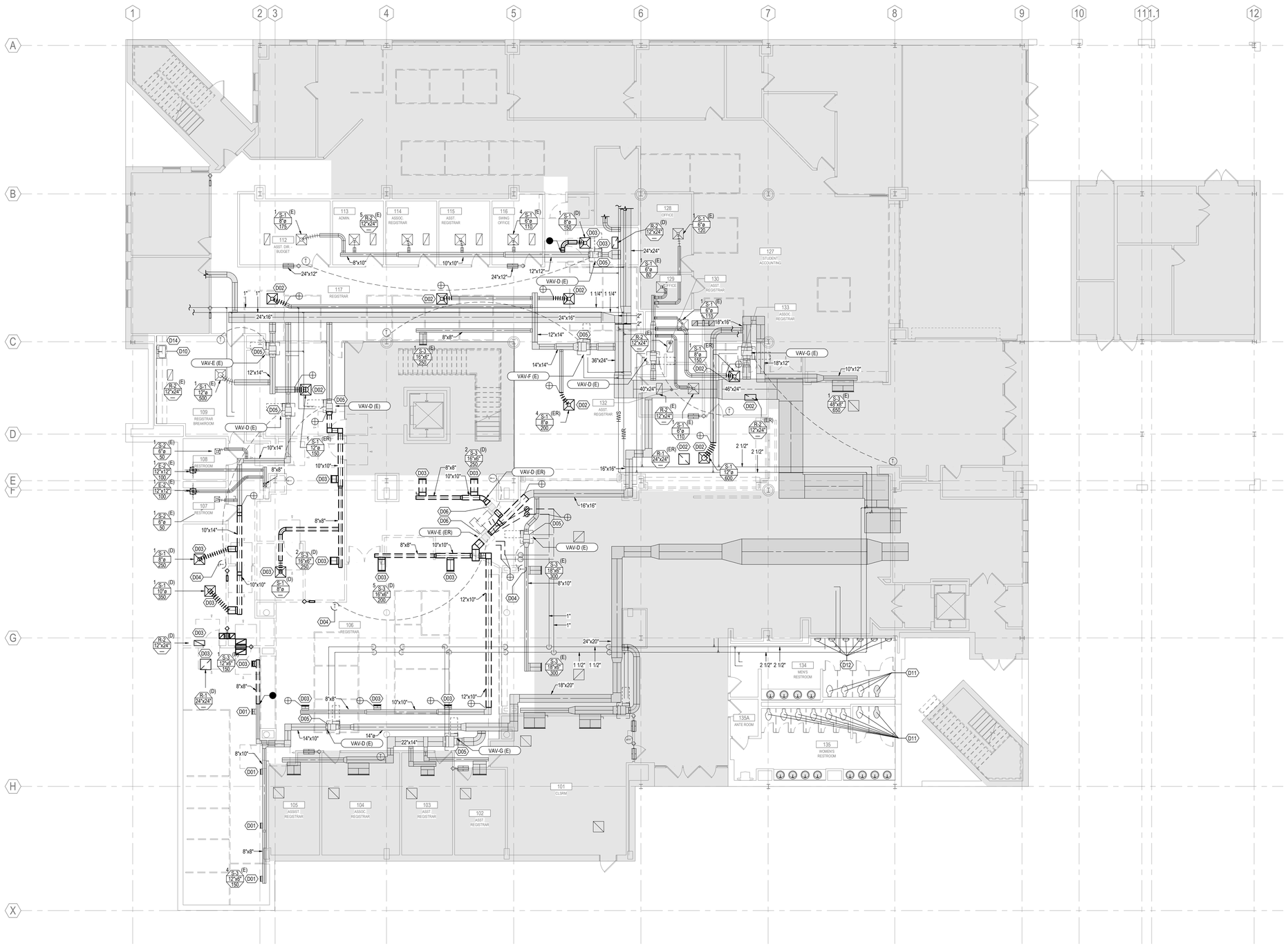
Title
MECHANICAL LEGEND, SYMBOLS, AND ABBREVIATIONS

Project No. 2140001088
Scale As indicated
Revision
Drawing No. **M001**

2/10/2023 9:39:27 AM
ORIGINAL SHEET - ARCH E1

DEMOLITION KEYNOTES

D01	EXISTING AIR TERMINAL TO REMAIN.
D02	EXISTING AIR TERMINAL TO BE RELOCATED IN NEW WORK PHASE. REMOVE AND PROTECT UNTIL INSTALLATION.
D03	EXISTING AIR TERMINAL TO BE REMOVED.
D04	RELOCATE THERMOSTAT. REFER TO NEW WORK PLANS.
D05	EXISTING VAV BOX TO REMAIN.
D06	EXISTING VAV BOX TO BE RELOCATED. REMOVE AND PROTECT VAV BOX AND CONTROLLER UNTIL INSTALLATION. DEMOLISH ASSOCIATED HANGERS, SUPPORTS, HYDRONIC PIPING, AND HYDRONIC SPECIALTIES BACK TO MAIN.
D10	DISCONNECT EXISTING SINK SERVICES. DEMOLISH EXISTING SINK. PREPARE FOR RECONNECTION DURING NEW WORK. COORDINATE DEMO EXTENTS WITH CASEWORK REPLACEMENT. REFER TO ARCH PLANS.
D11	DISCONNECT EXISTING WATER CLOSET SERVICES. STORE EXISTING WATER CLOSET FOR REUSE. PREPARE FOR RECONNECTION DURING NEW WORK. COORDINATE DEMO EXTENTS WITH WALL SURFACE REPLACEMENT. REFER TO ARCH PLANS
D12	DISCONNECT EXISTING URINAL SERVICES. STORE EXISTING URINALS FOR REUSE. PREPARE FOR RECONNECTION DURING NEW WORK. COORDINATE DEMO EXTENDS WITH WALL SURFACE REPLACEMENT. REFER TO ARCH PLANS.
D14	DISCONNECT EXISTING ICE MACHINE SERVICES. STORE EXISTING ICE MACHINE FOR REUSE. PREPARE FOR RECONNECTION DURING NEW WORK. COORDINATE DEMO EXTENTS WITH CASEWORK REPLACEMENT. REFER TO ARCH PLANS.



1 MD101 **MECHANICAL DEMOLITION PLAN - FIRST FLOOR**
1/8" = 1'-0"

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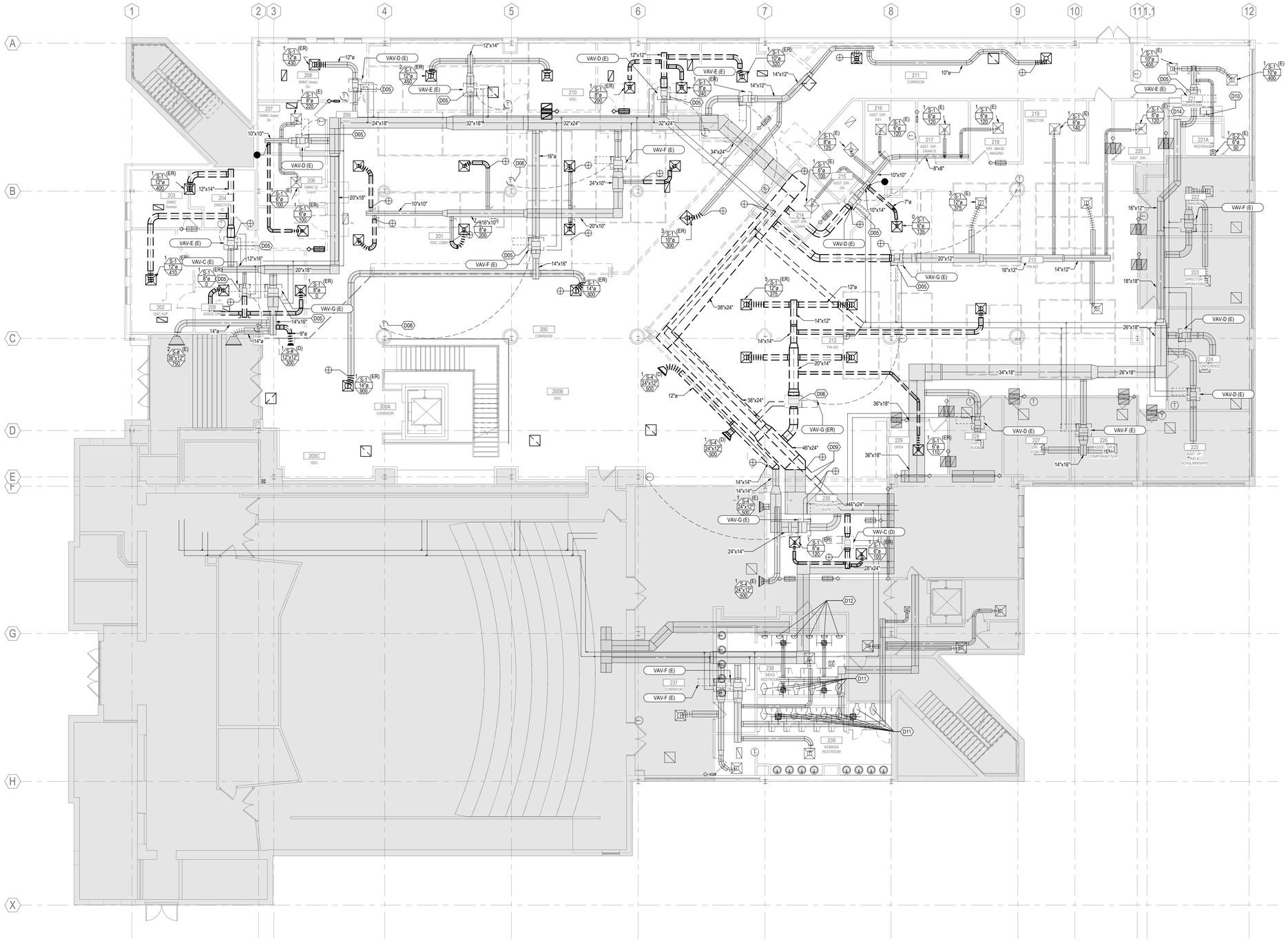
Title
MECHANICAL DEMOLITION PLAN - FIRST FLOOR

Project No. 2140001088
Scale 1/8" = 1'-0"
Revision
Drawing No. **MD101**

2/10/2023 9:31:44 AM
ORIGINAL SHEET - ARCH E1

DEMOLITION KEYNOTES

DXX	
D05	EXISTING VAV BOX TO REMAIN.
D06	EXISTING VAV BOX TO BE RELOCATED. REMOVE AND PROTECT VAV BOX AND CONTROLLER UNTIL INSTALLATION. DEMOLISH ASSOCIATED HANGERS, SUPPORTS, HYDRONIC PIPING, AND HYDRONIC SPECIALTIES BACK TO MAIN.
D08	REMOVE AND PROTECT THERMOSTAT TO ALLOW FOR INSTALLATION OF WALL SURFACE TREATMENT. PROTECT BACKBOX OPENING TO PREVENT IT BEING COVERED UP. REINSTALL DURING NEW WORK.
D09	DEMOLISH HYDRONIC PIPING TO EXTENTS SHOWN. PREPARE FOR RECONNECTION DURING NEW WORK.
D10	DISCONNECT EXISTING SINK SERVICES. DEMOLISH EXISTING SINK. PREPARE FOR RECONNECTION DURING NEW WORK. COORDINATE DEMO EXTENTS WITH CASEWORK REPLACEMENT. REFER TO ARCH PLANS.
D11	DISCONNECT EXISTING WATER CLOSET SERVICES. STORE EXISTING WATER CLOSET FOR REUSE. PREPARE FOR RECONNECTION DURING NEW WORK. COORDINATE DEMO EXTENTS WITH WALL SURFACE REPLACEMENT. REFER TO ARCH PLANS.
D12	DISCONNECT EXISTING URINAL SERVICES. STORE EXISTING URINALS FOR REUSE. PREPARE FOR RECONNECTION DURING NEW WORK. COORDINATE DEMO EXTENDS WITH WALL SURFACE REPLACEMENT. REFER TO ARCH PLANS.
D14	DISCONNECT EXISTING ICE MACHINE SERVICES. STORE EXISTING ICE MACHINE FOR REUSE. PREPARE FOR RECONNECTION DURING NEW WORK. COORDINATE DEMO EXTENTS WITH CASEWORK REPLACEMENT. REFER TO ARCH PLANS.



1 MD102 **MECHANICAL DEMOLITION PLAN - SECOND FLOOR**
1/8" = 1'-0"

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Title
MECHANICAL DEMOLITION PLAN - SECOND FLOOR

Project No.	Scale
2140001088	1/8" = 1'-0"
Revision	Drawing No.
	MD102

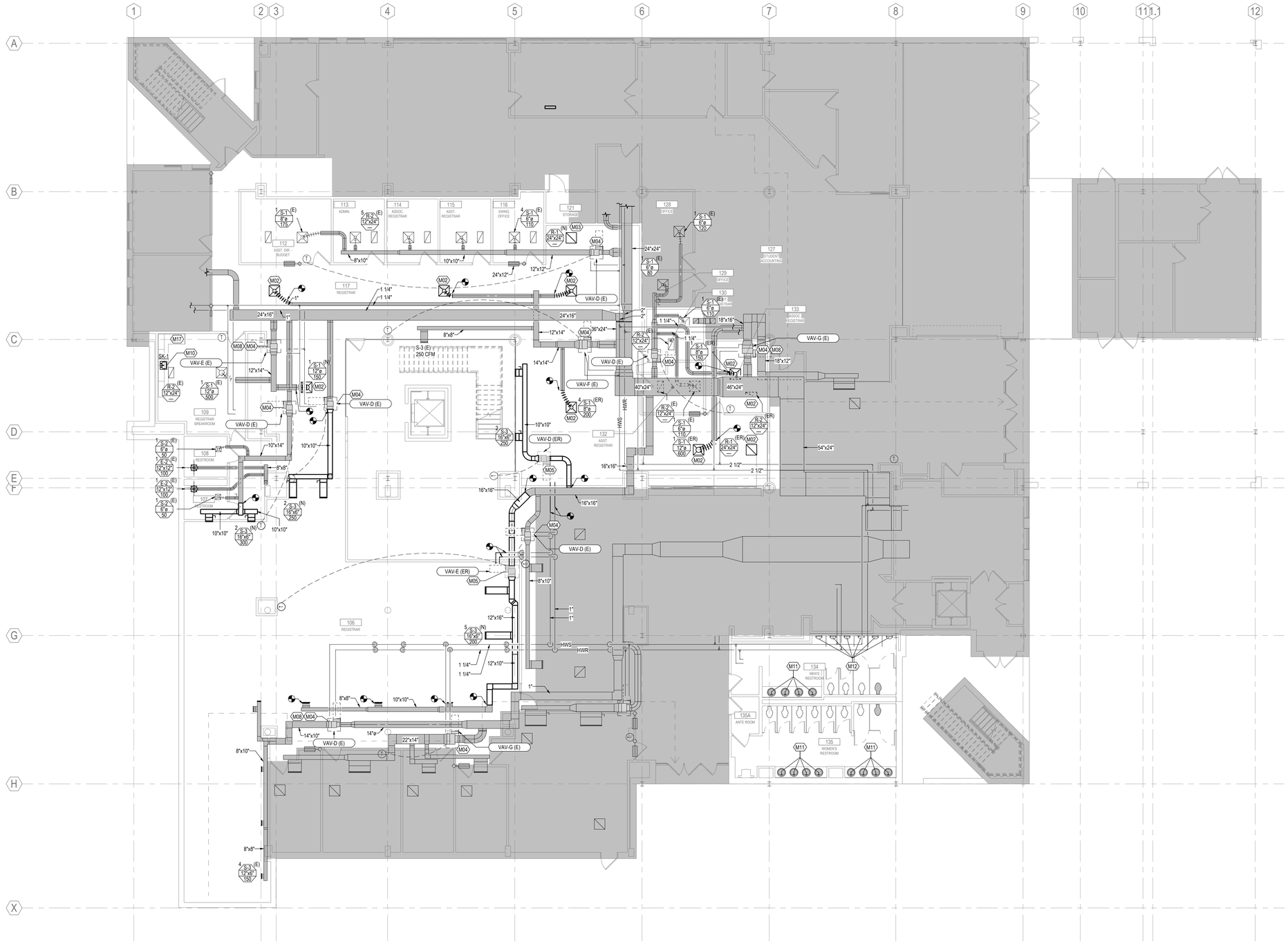
2/10/2023 12:03:5 AM

ORIGINAL SHEET - ARCH E1

REUSE EXISTING GRDS DEMOLISHED IF IN GOOD CONDITION. PROVIDE NEW GRDS AFTER EXISTING GRDS ARE EXHAUSTED. CONSOLIDATE EXISTING GRDS IN PRIVATE AREAS, PRIOIRITIZING ANY NEW GRDS IN PUBLIC LOBBY SPACES. NO EXISTING GRDS SHALL BE INSTALLED VISUALLY ADJACENT TO NEW GRDS.

MECHANICAL KEYNOTES

M02	EXISTING RELOCATED AIR TERMINAL. PROVIDE NEW DUCTWORK TO CONNECT TO EXISTING SYSTEM AND MAKE FINAL CONNECTIONS AS SHOWN.
M03	PROVIDE NEW AIR TERMINAL. PROVIDE NEW DUCTWORK TO CONNECT TO EXISTING SYSTEM AND MAKE FINAL CONNECTIONS AS SHOWN.
M04	EXISTING VAV BOX TO REMAIN.
M05	EXISTING RELOCATED VAV BOX WITH EXISTING CONTROLLER. PROVIDE NEW CONTROL WIRING, HANGERS, SUPPORTS, HYDRONIC PIPING, AND HYDRONIC SPECIALTIES EXTENDED AND CONNECTED TO EXISTING SYSTEM.
M08	CONTRACTOR TO VERIFY THERMOSTAT INSTALLATION SERVING THIS VAV BOX. PROVIDE NEW THERMOSTAT AND CONNECT TO VAV BOX IF NO EXISTING THERMOSTAT IS INSTALLED.
M10	PROVIDE NEW SINK IN NEW CASEWORK AND EXTEND AND RECONNECT TO SERVICES. COORDINATE WITH NEW CASEWORK. REFER TO ARCH PLANS.
M11	REINSTALL EXISTING WATER CLOSET AND EXTEND AND RECONNECT SERVICES. COORDINATE WITH NEW WALL SURFACE. REFER TO ARCH PLANS.
M12	REINSTALL EXISTING URINALS AND EXTEND AND RECONNECT SERVICES. COORDINATE WITH NEW WALL SURFACE. REFER TO ARCH PLANS.
M17	REINSTALL EXISTING ICE MACHINE AND EXTEND AND RECONNECT TO SERVICES. COORDINATE WITH NEW CASEWORK. REFER TO ARCH PLANS.



1 M101 **MECHANICAL PLAN - FIRST FLOOR**
1/8" = 1'-0"

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Title
MECHANICAL PLAN - FIRST FLOOR

Project No.	Scale
2140001088	1/8" = 1'-0"
Revision	Drawing No.
	M101

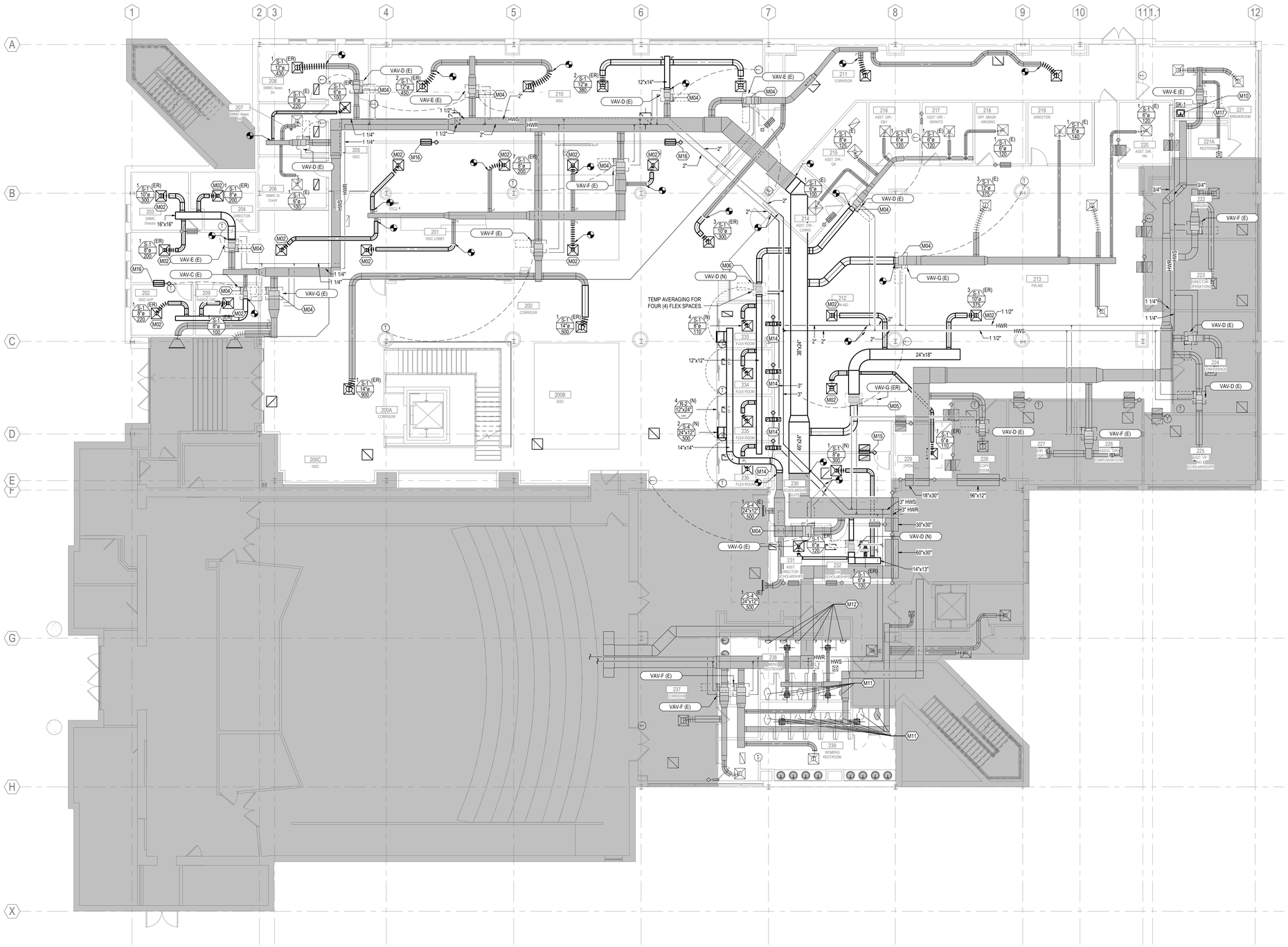
2/10/2023 9:31:10 AM

ORIGINAL SHEET - ARCH E1

REUSE EXISTING GRDS DEMOLISHED IF IN GOOD CONDITION. PROVIDE NEW GRDS AFTER EXISTING GRDS ARE EXHAUSTED. CONSOLIDATE EXISTING GRDS IN PRIVATE AREAS, PRIOIRITIZING ANY NEW GRDS IN PUBLIC LOBBY SPACES. NO EXISTING GRDS SHALL BE INSTALLED VISUALLY ADJACENT TO NEW GRDS.

MECHANICAL KEYNOTES

MXX	
M02	EXISTING RELOCATED AIR TERMINAL. PROVIDE NEW DUCTWORK TO CONNECT TO EXISTING SYSTEM AND MAKE FINAL CONNECTIONS AS SHOWN.
M04	EXISTING VAV BOX TO REMAIN.
M05	EXISTING RELOCATED VAV BOX WITH EXISTING CONTROLLER. PROVIDE NEW CONTROL WIRING, HANGERS, SUPPORTS, HYDRONIC PIPING, AND HYDRONIC SPECIALTIES EXTENDED AND CONNECTED TO EXISTING SYSTEM.
M06	PROVIDE NEW VAV BOX AND THERMOSTAT. MATCH SEQUENCE AND CAPABILITY WITH EXISTING CONDITIONS.
M10	PROVIDE NEW SINK IN NEW CASEWORK AND EXTEND AND RECONNECT TO SERVICES. COORDINATE WITH NEW CASEWORK. REFER TO ARCH PLANS.
M11	REINSTALL EXISTING WATER CLOSET AND EXTEND AND RECONNECT SERVICES. COORDINATE WITH NEW WALL SURFACE. REFER TO ARCH PLANS.
M12	REINSTALL EXISTING URINALS AND EXTEND AND RECONNECT SERVICES. COORDINATE WITH NEW WALL SURFACE. REFER TO ARCH PLANS.
M14	PROVIDE NEW 8"X8" LINED SOUND BOOT WITH FIRE DAMPER.
M15	PROVIDE NEW 24"X12" LINED SOUND BOOT WITH FIRE DAMPER.
M16	NEW 24"X12" RA OPENING WITH FIRE DAMPER.
M17	REINSTALL EXISTING ICE MACHINE AND EXTEND AND RECONNECT TO SERVICES. COORDINATE WITH NEW CASEWORK. REFER TO ARCH PLANS.



1 M102 **MECHANICAL PLAN - SECOND FLOOR**
1/8" = 1'-0"

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Title
MECHANICAL PLAN - SECOND FLOOR

Project No.	Scale
2140001088	1/8" = 1'-0"

Revision

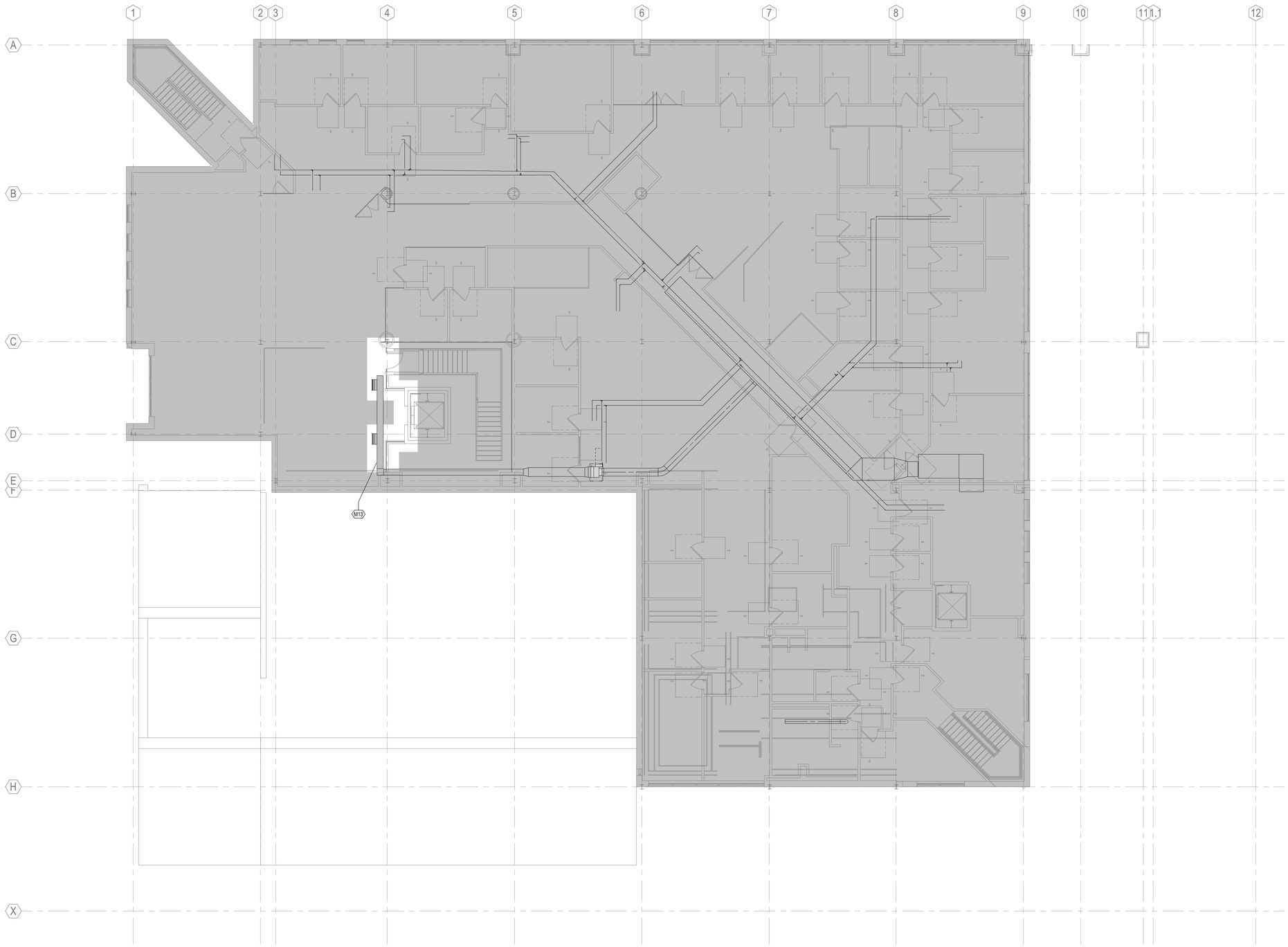
Drawing No.
M102

2/10/2023 3:33:25 AM

ORIGINAL SHEET - ARCH E1

MECHANICAL KEYNOTES

M13	MODIFY EXISTING DUCTWORK AS NEEDED TO ACCOMMODATE NEW STOREFRONT AND ASSOCIATED SUPPORTS.



1 M103 **MECHANICAL PLAN - THIRD FLOOR**
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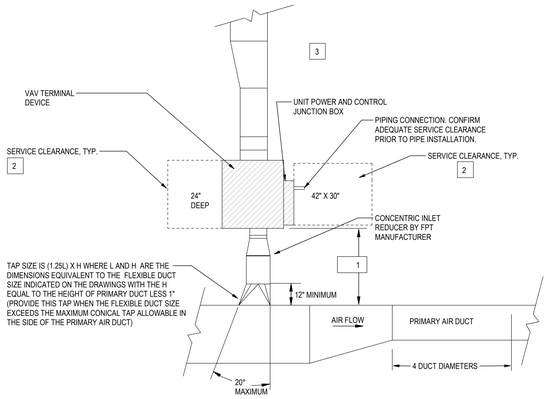
Title
MECHANICAL PLAN - THIRD FLOOR

Project No.	Scale
2140001088	1/8" = 1'-0"
Revision	Drawing No.
	M103

2/10/2023 9:51:34 AM

ORIGINAL SHEET - ARCH E1



PLAN VIEW

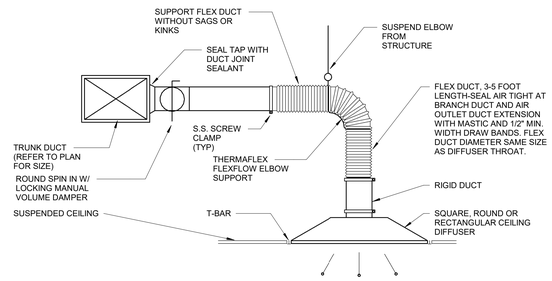
1 MAINTAIN MINIMUM STRAIGHT DISTANCE AS RECOMMENDED BY MANUFACTURER OR 4'-0", WHICHEVER IS GREATER.

2 SERVICE CLEARANCE TO BE 42" X 30", 24" DEEP, OR MANUFACTURER RECCOMENTDATION.

3 SUPPLY SENSOR TO BE MINIMUM 5' FROM TERMINAL UNIT.

VAV TERMINAL UNIT DETAIL

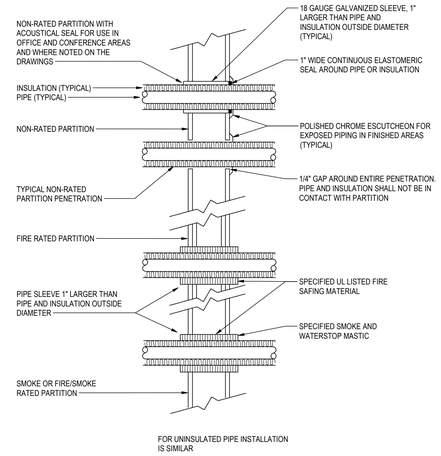
Scale : None

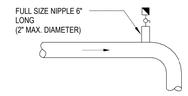


SPIN-IN AND CEILING DIFFUSER DETAIL

SCALE: NONE

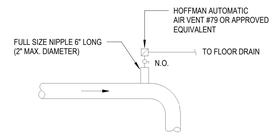
NOTE: ALL FIRE SAFING MATERIAL SHALL BE INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S U.L. LISTED INSTALLATION INSTRUCTIONS (TYPICAL).





MANUAL AIR VENT DETAIL

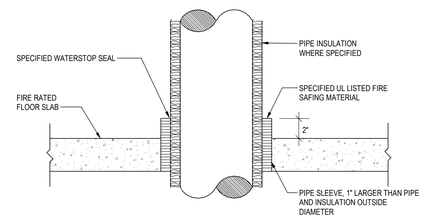
SCALE: NONE



NOTES:
1. IF A FLOOR DRAIN IS NOT AVAILABLE IN THE AREA OF THE VENT, PIPE THE DISCHARGE TO A PLASTIC BOTTLE. THE BOTTLE SHALL HAVE AN OPEN TOP TO ALLOW THE WATER TO EVAPORATE.

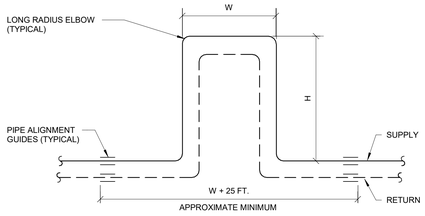
AUTOMATIC AIR VENT DETAIL

SCALE: NONE



PIPING PENETRATION DETAILS

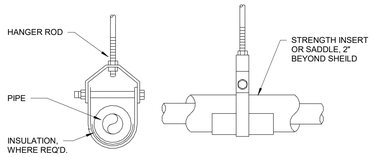
SCALE: NONE



PLAN

EXPANSION LOOP DETAIL

SCALE: NONE



NOTES:
1. ATTACH SUPPORTS FOR ALL PIPING SUSPENDED FROM THE STEEL STRUCTURE TO THE TOP CORD OF JOISTS OR BEAMS.

2. PROVIDE COPPER OR PLASTIC COATED HANGERS FOR NON- INSULATED COPPER PIPE.

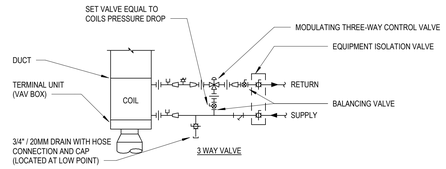
PIPE SUPPORT DETAIL

SCALE: NONE

AIR DEVICE SCHEDULE

MARK	TYPE	FACE SIZE	FINISH	DESCRIPTION	MANUF.	MODEL NUMBER	NOTES
S-1	SUPPLY	24"x24"	WHITE	LAY-IN CEILING SQUARE SUPPLY DIFFUSER	TITUS	TMS	1-5
S-2	SUPPLY	12"x12"	WHITE	LAY-IN CEILING SQUARE SUPPLY DIFFUSER	TITUS	TMS	1-5
S-3	SUPPLY	SEE PLANS	WHITE	SIDEWALL SUPPLY REGISTER	TITUS	300	1-2,7
S-4	SUPPLY	SEE PLANS	WHITE	SIDEWALL SUPPLY LINEAR BAR GRILLE	TITUS	CT	1-2,7
R-1	RETURN	24"x24"	WHITE	LAY-IN CEILING PERFORATED RETURN GRILLE	TITUS	PXP	1,2,6
R-2	RETURN	24"x12"	WHITE	LAY-IN CEILING PERFORATED RETURN GRILLE	TITUS	PXP	1,2,6
R-3	RETURN	SEE PLANS	WHITE	SIDEWALL RETURN REGISTER	TITUS	350	1-2,7
R-4	RETURN	SEE PLANS	WHITE	SIDEWALL RETURN LINEAR BAR GRILLE	TITUS	CT	1-2,7
E-1	EXHAUST	24"x24"	WHITE	LAY-IN CEILING PERFORATED EXHAUST GRILLE	TITUS	PXP	1-2,7
E-2	EXHAUST	12"x12"	WHITE	LAY-IN CEILING PERFORATED EXHAUST GRILLE	TITUS	PXP	1-2,7
E-3	EXHAUST	SEE PLANS	WHITE	SIDEWALL EXHAUST REGISTER	TITUS	350	1-2,7

NOTES:
1. CONTRACTOR SHALL COORDINATE EACH AIR DISTRIBUTION DEVICE LOCATION WITH ARCHITECTURAL REFLECTED CEILING PLANS.
2. AIR DEVICE TO BE PROVIDED WITH APPROPRIATE TRIM KIT FOR SPECIFIC CEILING TYPE WHERE DEVICE IS CALLED FOR INSTALLATION.
3. FLEXIBLE DUCT RUN-OUT TO AIR DEVICE SHALL BE THE SAME SIZE AS THE NECK OF THE AIR DEVICE, WHICH IS INDICATED ON FLOOR PLAN.
4. FLEXIBLE DUCT RUN-OUT TO AIR DEVICE SHALL BE LIMITED TO 5-FEET TOTAL LENGTH. PROVIDE RIGID ROUND EXTERNALLY INSULATED DUCT FOR RUN-OUTS IN EXCESS OF 5-FEET TOTAL LENGTH. SUPPORT FLEXIBLE DUCT WITH GALVANIZED STRAP HANGERS SPACED 3-FEET ON CENTER.
5. THE BACK OF ALL SUPPLY DIFFUSERS SHALL BE INSULATED WITH R-6 INSULATION.
6. PROVIDE WITH TITUS RCP ACOUSTICAL RETURN CANOPY.
7. PROVIDE REMOTE ACTUATED DAMPER CABLE MOUNTED IN DUCT AND ADJUSTABLE THROUGH FACE OF GRILLE.



NOTES:
1. INSULATE THE HEATING COIL TO PREVENT HEAT LOSS / CONDENSATION.
2. THE EQUIPMENT DRAIN IS SEPARATE FROM THE BLOW DOWN STRAINER DRAIN.
3. PIPE TAPS FROM THE MAIN SHALL BE OFF OF THE TOP OF THE MAIN EXCEPT WHERE NOTED OTHERWISE.
4. ISOLATION VALVES ARE SHOWN AS BALL VALVES, REFER TO THE CONTRACT DOCUMENTS FOR THE SPECIFIC VALVE TYPE BASED ON THE PIPE SIZE AND APPLICATION.
5. SHUT OFF VALVES AND ACCESSORIES SHALL BE THE SAME SIZE AS THE SYSTEM PIPING. TRANSITION TO THE COIL CONNECTION SIZE AT THE COIL.
6. ALL STRAINERS SHALL BE BLOW DOWN TYPE WITH AN ISOLATION VALVE AND CAP.

HOT WATER COIL PIPING DIAGRAM AT VAV TERMINAL UNIT WITH THREE-WAY CONTROL VALVE

SCALE: NONE

SINGLE DUCT AIR TERMINAL UNIT WITH HW COIL SCHEDULE

MARK	INLET SIZE (IN)	MAXIMUM AIRFLOW (CFM)	MINIMUM AIRFLOW (CFM)	MAX. PD IN WC	HEATING COIL			MANUF.	MODEL NUMBER	NOTES
					MIN. BTUH	GPM @ 170F EWT	CONN. SIZE			
A	5	100	0	0.1	2700	1	3/4"	TRANE	VCWE03	1,2,3,4,5,6,7,8,9,10
B	6	200	105	0.1	5400	1	3/4"	TRANE	VCWE06	1,2,3,4,5,6,7,8,9,10
C	8	400	205	0.15	10800	1	3/4"	TRANE	VCWE11	1,2,3,4,5,6,7,8,9,10
D	10	800	405	0.1	21600	3	3/4"	TRANE	VCWE17	1,2,3,4,5,6,7,8,9,10
E	12	1000	805	0.15	27000	3	3/4"	TRANE	VCWE24	1,2,3,4,5,6,7,8,9,10
F	14	1500	1005	0.15	40500	4	1"	TRANE	VCWE32	1,2,3,4,5,6,7,8,9,10
G	16	2000	1505	0.2	54000	6	1"	TRANE	VCWE32	1,2,3,4,5,6,7,8,9,10

NOTES:
1. PROVIDE DIRECT-DIGITAL PRESSURE INDEPENDENT VAV TERMINAL UNIT.
2. PROVIDE WITH MULTI-POINT CROSSFLOW INLET VELOCITY SENSOR WITH CENTER AVERAGING.
3. PROVIDE WITH 1/2-INCH THICK FIBERGLASS LINER. FOR HEATING COIL SECTION, PROVIDE INSULATION LINER. IF LINER IS NOT AN OPTION FOR THE HEATING SECTION, WRAP HEATING SECTION WITH EXTERNAL INSULATION WRAP MATCHING DUCTWORK INSULATION.
4. PROVIDE WITH NEMA 1 CONTROLS ENCLOSURE.
5. PROVIDE WITH CONTROL CIRCUIT TERMINAL BLOCK.
6. PROVIDE WITH CONTROL POWER TRANSFORMER WITH 120V INPUT. EXTEND FROM EXISTING ELECTRICAL FEEDER FROM VAV TERMINAL UNIT BELING REPLACED.
7. TERMINAL UNIT SHALL BE UL AND AHRI CERTIFIED.
8. VAV TERMINAL UNIT CONTROLLER SHALL BE PROVIDED BY BASE-BUILDING CONTROLS CONTRACTOR. CONTROLLER SHALL BE FIELD-MOUNTED BY BASE-BUILDING CONTROLS CONTRACTOR.
9. BASE-BUILDING CONTROLS CONTRACTOR SHALL PROVIDE DIGITAL, USER-ADJUSTABLE, WALL-MOUNTED TEMPERATURE/RELATIVE HUMIDITY SENSOR. TEMPERATURE/RELATIVE HUMIDITY SENSOR SHALL MATCH BASE-BUILDING STANDARD.
10. TERMINAL UNIT CONTROLS SHALL BE INTEGRATED SEAMLESSLY INTO EXISTING SCHNEIDER ELECTRIC BUILDING AUTOMATION SYSTEM BY BASE-BUILDING CONTROLS CONTRACTOR. OPERATION AND CAPABILITY SHALL MATCH THAT OF EXISTING TERMINAL UNITS.

PLUMBING FIXTURE SCHEDULE

MARK	FIXTURE	SAN/AW	V/AV	TRAP	ST	CW	HW	COMMENTS
SK-1	ADA SINK	1 1/2	1 1/2	1 1/2	-	1/2"	-	JUST SL-ADA-2019-A-GR (TWO FAUCET HOLES CENTER/RIGHT HAND, CENTER DRAIN PUNCH) W/ J-888-S FAUCET (SPOUT CENTER, HANDLE RIGHT), J-ADA-25 OFFSET BASKET STRAINER DRAIN, 1 1/2" TAILPIECE, P-TRAP WITH CO PLUG, QUARTER TURN ANGLE SUPPLIES AND STOP VALVES. T&S, CHICAGO, AND ELKAY ACCEPTABLE MANUFACTURERS.

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Notes

Revision	By	Appd	YYYY.MM.DD

ISSUE FOR CONSTRUCTION			2023.02.03
Issued	By	Appd	YYYY.MM.DD

Permit/Seal

STATE OF TEXAS
ZACHARY P. VAUGHN
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LICENSED
PROFESSIONAL ENGINEER
02.10.2023

Texas Firm Registration No. 13678
EXP. 2023.11.30

Client/Project Logo

Client/Project
University of North Texas - Denton

EAGLE STUDENT SERVICES CENTER

Eagle Student Services Center 1147 Union Cir, Denton, TX 76201

Title
MECHANICAL SCHEDULES AND DETAILS

Project No. 2140001088

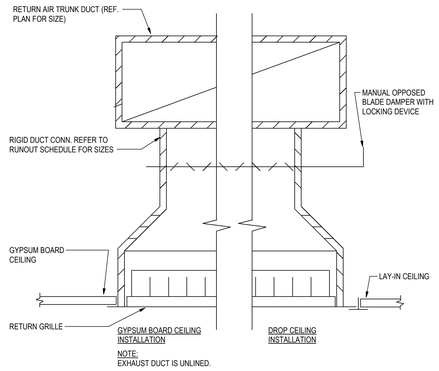
Scale As indicated

Revision

Drawing No. **M501**

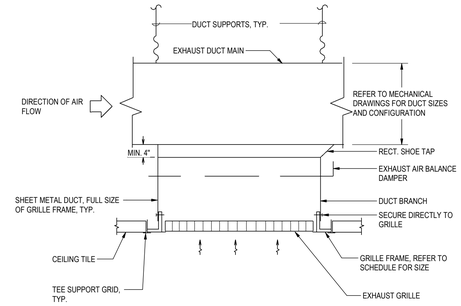
2/10/2023 3:39:32 AM

ORIGINAL SHEET - ARCH E1



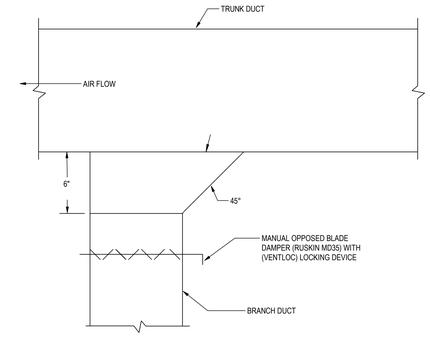
RETURN AIR GRILLE DETAIL

SCALE: NONE



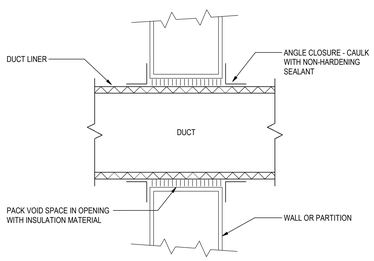
EXHAUST GRILLE CONNECTION DETAIL

SCALE: NONE



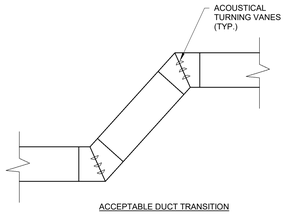
MINOR BRANCH TAKE OFF

SCALE: NONE

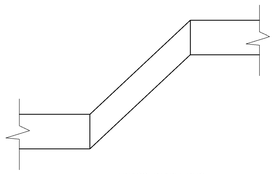


NON-FIRE RATED ASSEMBLY HORIZONTAL DUCT PENETRATION DETAIL

SCALE: NONE



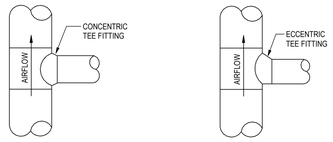
ACCEPTABLE DUCT TRANSITION



UNACCEPTABLE DUCT TRANSITION

DUCT TRANSITION DETAIL

NO SCALE

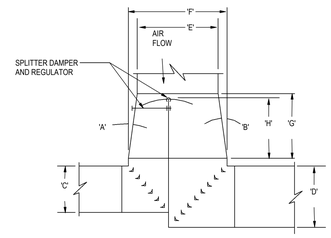


SUPPLY DUCT

RETURN OR EXHAUST DUCT

ROUND OR FLAT OVAL DUCT BRANCH TAKE-OFF DETAIL

SCALE: NONE

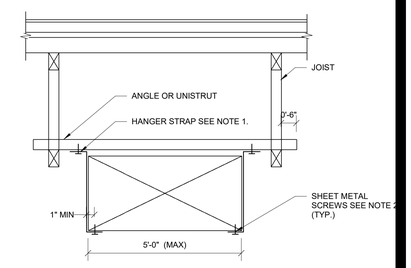


NOTE: DIMENSIONAL RELATIONSHIP
1. ANGLES 'A' & 'B' EACH TO BE 15° OR LESS.
2. SEE FLOOR PLAN FOR VALUES FOR 'C', 'D' & 'E'.
3. 'F'='C'+'D'.
4. 'H'=1.5 x 'C'
5. 'G'= 3" (MINIMUM)
6. HEIGHT OF FITTING EQUAL TO THAT OF HIGHEST OF THE THREE DUCTS.
7. CHANGE IN HEIGHTS OF DOWNSTREAM DUCTS TO OCCUR AFTER THE TURN.
8. SIMILAR FOR VERTICAL DUCT DROPS.

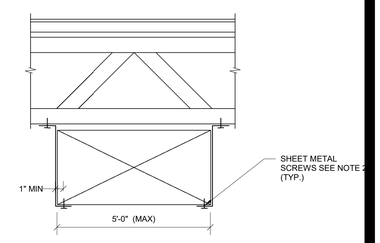
MAJOR SPLITTER TEE DETAIL

SCALE: NONE

PARALLEL TO STRUCTURE



PERPENDICULAR TO STRUCTURE

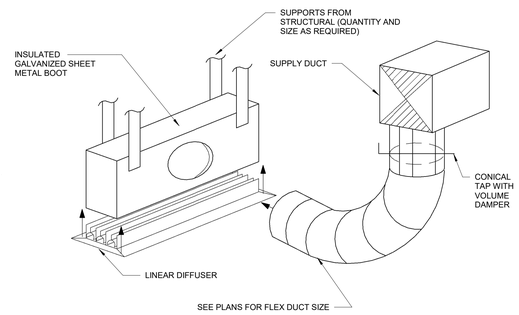


NOTES
1. USE THREADED ROD FOR ALL DUCTS LARGER THAN 60"ø WIDE

2. SHEET METAL SCREWS MAY BE OMITTED IT HANGER STRAP IS CONTINUOUS AND LOOPS UNDER ENTIRE DUCT

RECTANGULAR DUCT SUPPORT DETAIL

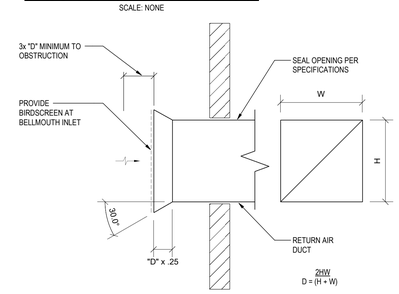
SCALE: NONE



NOTES:
1. ALL JOINTS AND CONNECTIONS TO BE PROVIDED WITH DUCT JOINT SEALANT.

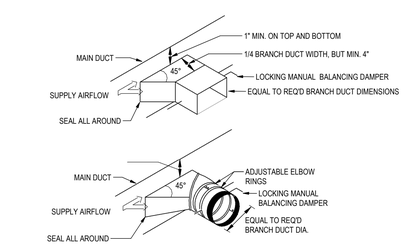
LINEAR DIFFUSER BOOT DETAIL

SCALE: NONE



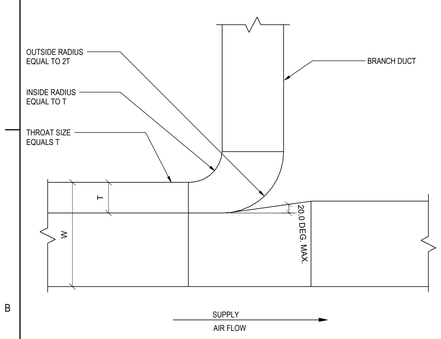
RETURN AIR BELLMOUTH DETAIL

SCALE: NONE



BRANCH TAKE-OFF DETAIL

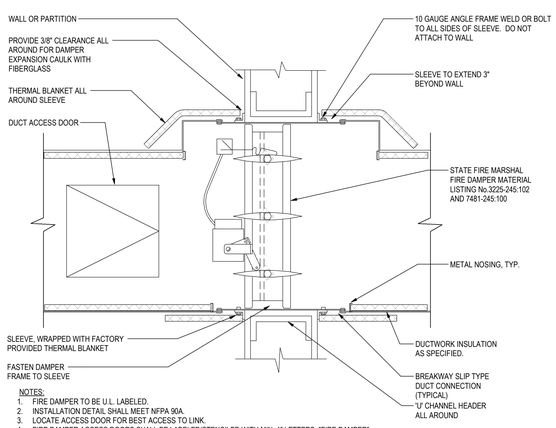
SCALE: NONE



NOTES:
1. FURNISH THIS TYPE CONNECTION FOR BRANCHES WITH MORE THAN 25% OF THE TOTAL AIR FLOW OR AS SHOWN ON DRAWINGS.
2. THIS TYPE OF CONNECTION MUST BE USED WHEN W > 36 IN.
3. SIZE THE LEADING END OF THE ELBOW (T) IN THE SAME RATIO TO THE MAIN DUCT SIZE AS THE RATIO OF THE RELATIVE AIR QUANTITIES HANDLED.

RECTANGULAR DUCT CONNECTION DETAIL

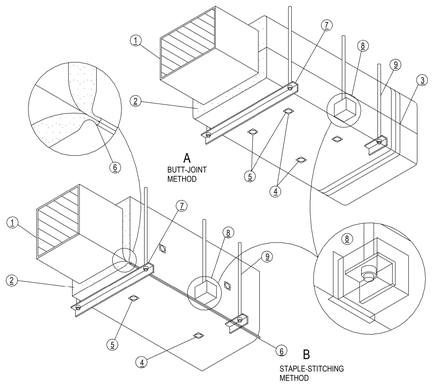
SCALE: NONE



NOTES:
1. FIRE DAMPER TO BE U.L. LABELED.
2. INSTALLATION DETAIL SHALL MEET NFPA 90A.
3. LOCATE ACCESS DOOR FOR BEST ACCESS TO LINK.
4. FIRE DAMPER ACCESS DOORS SHALL BE LABELED/STENCILED WITH MIN. 1" LETTERS: "FIRE DAMPER".
5. DAMPER SHALL BE CONSTRUCTED TESTED AND INSTALLED IN ACCORDANCE WITH U.L. STANDARD 555 & 555S.
6. FIRE DAMPER ASSEMBLIES, INCLUDING SLEEVES AND INSTALLATION PROCEDURES SHALL BE APPROVED BY THE BUILDING INSPECTOR PRIOR TO INSTALLATION.
7. DUCT SMOKE DETECTORS SHALL BE FURNISHED, INSTALLED, AND WIRED TO THE FIRE ALARM SYSTEM BY THE ELECTRICAL CONTRACTOR. THE CONTRACTOR SHALL PROVIDE DUCT SMOKE DETECTOR WIRING INTERLOCK TO MOTOR STARTER OR VFD'S. REFER TO ELECTRICAL DRAWINGS FOR DUCT SMOKE DETECTOR LOCATIONS.

FIRE / SMOKE DAMPER DETAIL

SCALE: NONE



NOTES:
1. BLANKET INSULATION WITH FACTORY-APPLIED VAPOR-RETARDER JACKET.
2. FACTORY LAP ALL SEALS (SEALED WITH ADHESIVE AND/OR STAPLES OR VAPOR-RETARDER TAPE).
3. MECHANICAL FASTENERS SUPPORTING INSULATION ON UNDERSIDE OF DUCTS OVER 24" WIDE (SPACED 3" MAXIMUM FROM THE BUTT JOINT).
4. VAPOR-RETARDER TAPE OVER TEARS AND PENETRATIONS OF THE VAPOR-RETARDER JACKET TO KEEP AIR TIGHT CONDITION.
5. ALTERNATE METHOD OF LAP SEAL - LONGITUDINAL JOINT LAPPED AND FOLDED, THEN STAPLED SECURELY IN PLACE.
6. HANGER ON EXTERIOR OF INSULATION. ENCAPSULATE EXPOSED END OF ANGLE. SEAL WITH ADHESIVE OR VAPOR-RETARDER TAPE.
7. HANGER EMBEDDED IN INSULATION. ENCAPSULATE EXPOSED END OF ANGLE. SEAL WITH ADHESIVE OR VAPOR-RETARDER TAPE.
8. COMPLETELY ENCAPSULATE HANGER ROD AND ANGLE. SEAL TOP PENETRATION. ENCAPSULATE AND SEAL

BLANKET FIBERGLASS INSULATION DETAIL

SCALE: NONE

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Notes

Revision	By	Appd	YYYY.MM.DD

ISSUE FOR CONSTRUCTION			2023.02.03
Issued	By	Appd	YYYY.MM.DD

Permit/Seal

STATE OF TEXAS
ZACHARY P. VAUGHN
141977
LICENSED
PROFESSIONAL ENGINEER
02.10.2023

Texas Firm Registration No. 13678
EXP. 2023.11.30

Client/Project Logo

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Client/Project
University of North Texas - Denton

EAGLE STUDENT SERVICES CENTER

Eagle Student Services Center 1147 Union Cir, Denton, TX 76201

Title
MECHANICAL DETAILS

Project No. 2140001088
Scale As indicated
Revision
Drawing No. **M502**

2/10/2023 9:39:57 AM

ORIGINAL SHEET - ARCH E1

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)

_____
(Signature)

_____
(Typed Name and Title)

_____
(Texas Vendor ID No.)

_____
(Address)

_____
(City, State, Zip)

_____
(Telephone)

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:

_____
(Signature)

_____
(Typed Name and Title)

(SEAL)

_____
(Principal)

_____
(Signature)

_____
(Typed Name and Title)

ATTEST:

_____
(Signature)

_____
(Typed Name and Title)

(SEAL)

_____
(Surety)

_____
(Signature)

_____
(Typed Name and Title)

Surety's Texas Local Recording Agent or Resident Agent:

_____
(Signature)

_____
(Typed Name)

_____
(License No.)

_____
(File No)

_____
(Address)

_____
(City, State, Zip)

_____
(Telephone)

Surety's Home Office Agent or Servicing Agent:

_____
(Name)

_____
(Title)

_____
(Address)

_____
(City, State, Zip)

_____
(Telephone)

Rev. 2/17

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
- ☐ 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 *continuous contract** in place for more than five (5) years *meets or exceeds* 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 do not have a *continuous contract** in place for more than five (5) years *does not meet or exceed* 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

***Continuous Contract**: 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.*

Rev. 2/17

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 **does not** have a **continuous contract*** in place for **more than five (5) years** 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. Is your company a State of Texas certified HUB? ☐ **- Yes** ☐ **- No**

c. Requisition #: _____ Bid Open Date: _____ (mm/dd/yyyy)

Enter your company's name here: _____ 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.)

☐ - *No*, I will 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).

Item #	Subcontracting Opportunity Description	HUBs		Non-HUBs
		Percentage of the contract expected to be subcontracted to HUBs with which you do not have a continuous contract* in place for more than five (5) years.	**Percentage of the contract expected to be subcontracted to HUBs with which you have a continuous contract* in place for more than five (5) years.**	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 **only** Texas certified HUBs to perform **all** 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 **do not** have a **continuous contract*** in place with for **more than five (5) years**, **meets or exceeds** 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.)

***Continuous Contract**: 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.*

Enter your company's name here: _____ 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).

Item #	Subcontracting Opportunity Description	HUBs		Non-HUBs
		Percentage of the contract expected to be subcontracted to HUBs with which you do not have a continuous contract* in place for more than five (5) years.	**Percentage of the contract expected to be subcontracted to HUBs with which you have a continuous contract* in place for more than five (5) years.**	**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		%	%	%
	Aggregate percentages of the contract expected to be subcontracted:	**%**	**%**	**%**

***Continuous Contract**: 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.*

Enter your company's name here: _____ 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 no later than ten (10) working days after the contract is awarded.
- 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 (mm/dd/yyyy)

Reminder:

- 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.

HSP Good Faith Effort - Method A (Attachment A)

Rev. 2/17

Enter your company's name here: _____ 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 each 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 https://www.comptroller.texas.gov/purchasing/docs/hub-forms/hub-sbcont-plan-gfe-achm-a.pdf

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.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		$	%
	☐ - 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 all 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 no later than ten (10) working days after the contract is awarded.

HSP Good Faith Effort - Method B (Attachment B)

Rev. 2/17

Enter your company's name here: _____ 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 **each** 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 https://www.comptroller.texas.gov/purchasing/docs/hub-forms/hub-sbcont-plan-gfe-achm-b.pdf..

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 specific 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 MUST comply with items a, b, c and d, thereby demonstrating your Good Faith Effort of having notified Texas certified HUBs and 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 https://www.comptroller.texas.gov/purchasing/docs/hub-forms/HUBSubcontractingOpportunityNotificationForm.pdf.

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 at least seven (7) working days 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 **three (3) 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
			☐ - Yes ☐ - No
			☐ - Yes ☐ - No

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 Accepted?
		☐ - Yes ☐ - No
		☐ - Yes ☐ - No

HSP Good Faith Effort - Method B (Attachment B) Cont.

Rev. 2/17

Enter your company's name here: _____ 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 Emplioyer 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 **not** a Texas certified HUB, provide written justification for your selection process (attach additional page if necessary):

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 **all** 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 no later than ten (10) working days after the contract is awarded.

Rev. 2/17

HUB Subcontracting Opportunity Notification Form

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 agency, the respondent must provide notice of each of its subcontracting 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: _____ Phone #: _____

E-mail Address: _____ Fax #: _____

SECTION B: CONTRACTING STATE AGENCY AND REQUISITION INFORMATION

Agency Name: _____

Point-of-Contact: _____ Phone #: _____

Requisition #: _____ Bid Open Date: _____ (mm/dd/yyyy)

SECTION C: SUBCONTRACTING OPPORTUNITY RESPONSE DUE DATE, DESCRIPTION, REQUIREMENTS AND RELATED INFORMATION

1. Potential Subcontractor's Bid Response Due Date:

If you would like for our company to consider your company's bid for the subcontracting opportunity identified below in Item 2,

we must receive your bid response no later than _____ (Central Time) on _____ (Date (mm/dd/yyyy)).

In accordance with 34 TAC §20.285, each notice of subcontracting opportunity shall be provided to at least three (3) Texas certified HUBs, and allow the HUBs at least seven (7) working days to respond to the notice prior to submitting our bid response to the contracting agency. In addition, at least seven (7) working days prior to us submitting our bid response to the contracting agency, we must provide notice of each of our subcontracting 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).

(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.)

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

UNIFORM GENERAL CONDITIONS
FOR CONSTRUCTION AND DESIGN CONTRACTS
2022

TABLE OF CONTENTS

ARTICLE 1. DEFINITIONS 1

ARTICLE 2. WAGE RATES AND OTHER LAWS GOVERNING CONSTRUCTION 6

2.1 Environmental Regulations 6
2.2 Wage Rates 7
2.2.1 Notification to Workers 7
2.2.2 Penalty for Violation 8
2.2.3 Complaints of Violations. 8
2.3 Licensing of Trades 9
2.4 Royalties, Patents, and Copyrights 9
2.5 State Sales and Use Taxes 9
2.6 Antiquities 9
2.7 Franchise Tax Status 10

ARTICLE 3. GENERAL RESPONSIBILITIES OF OWNER 10

3.1 Preconstruction Conference 10
3.2 Owner's Construction Manager (OCM) 10
3.2.1 Point of Contact 10
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
3.3.3 Other Information 10
3.4 Availability of Lands 10
3.5 Limitation on Owner's Duties. 11
3.5.1 No Control 11
3.5.2 No Contravention of Design Professional 11

ARTICLE 4. GENERAL RESPONSIBILITIES OF DESIGN PROFESSIONAL 11

4.1 Role of Design Professional 11
4.2 Site Visits 11
4.3 Inspections 11
4.4 Clarifications and Interpretations 11
4.5 Limitations on Design Professional Authority 12

ARTICLE 5. GENERAL RESPONSIBILITIES OF CONTRACTOR 12

5.1 Contractor's General Responsibilities 12
5.2 Project Administration 12
5.2.1 Contractor's Management Personnel 13
5.2.2 Labor 13
5.2.3 Services, Materials, and Equipment 13
5.2.4 No Substitutions without Approval 13
5.3 Owner Equipment or Material 13
5.4 Non-Compliant Work 13
5.5 Subcontractors 13
5.5.1 Contract Documents 14

5.5.2 Scheduling 14
5.6 Continuing the Work 14
5.7 Cleaning 14
5.8 Acts and Omissions of Contractor, its Subcontractors, and Employees 14
5.9 Ancillary Areas 14
5.10 Off-Site Storage 15
5.11 Separate Contracts 15
5.11.1 Continuation of Contract 15
5.11.2 Cooperation 16
5.11.3 Reimbursement 16

ARTICLE 6. HISTORICALLY UNDERUTILIZED BUSINESS (HUB) SUBCONTRACTING PLAN 16

6.1 General Description 16
6.1.1 Good Faith Effort 16
6.2 Compliance with Approved HUB Subcontracting Plan 16
6.3 Failure to Demonstrate Good-Faith Effort 17

ARTICLE 7. BONDS 17

7.1 Construction Bonds 17
7.2 Bond Requirements 17
7.2.1 Performance Bonds 17
7.2.2 Payment Bonds 18
7.2.3 When Bonds Are Due 18
7.2.4 Power of Attorney 18
7.3 Bond Indemnification 18
7.3.1 Furnishing Bond Information 18
7.3.2 Claims on Payment Bonds 18
7.4 Payment of Claims when Payment Bond is Not Required 18
7.5 Sureties 18
7.6 Bond Costs 19

ARTICLE 8. INDEMNITY AND INSURANCE 19

8.1 Indemnification of Owner 19
8.1.1 No Third-Party Beneficiaries 19
8.1.2 Notice 19
8.2 Insurance Requirements 20
8.2.1 Period of Coverage 20
8.2.2 Certificates 20
8.2.3 Failure to Provide Certificates 20
8.2.4 Contractor's Liability 20
8.2.5 Insurance Limits 20
8.2.6 Insurers 20
8.3 Insurance Coverage Required 20
8.3.1 Workers' Compensation Insurance 20
8.3.2 Commercial General Liability Insurance 21
8.3.3 Asbestos Abatement Liability Insurance 21
8.3.4 Comprehensive Automobile Liability Insurance 22
8.3.5 All-Risk Builder's Risk Insurance 22
8.3.6 "Umbrella" Liability Insurance 22
8.4 Policy Requirements. Policies must include the following clauses, as applicable 23

8.5 Subcontractor Insurance Coverage 23

ARTICLE 9 CONSTRUCTION DOCUMENTS, COORDINATION DOCUMENTS, AND RECORD DOCUMENTS 24

9.1 Drawings and Specifications 24
9.1.1 Copies Furnished 24
9.1.2 Ownership of Drawings and Specifications. 24
9.2 Interrelation of Documents 24
9.3 Resolution of Conflicts in Documents 24
9.4 Contractor's Duty to Review Contract Documents 25
9.5 Discrepancies and Omissions in Drawings and Specifications 25
9.5.1 Design-Build Firm 25
9.5.2 Construction Manager-at-Risk Examination and Reporting 25
9.5.3 Other Limitations 25
9.6 No Warranty or Representation by Owner 25
9.7 Requirements for Record Documents. 25
9.7.1 Contractor shall: 25
9.7.2 Design Professional shall: 26

ARTICLE 10. CONSTRUCTION SAFETY 27

10.1 General 27
10.1.1 Site Visits 27
10.2 Notices 27
10.2.1 Utilities and Adjacent Properties 27
10.2.2 Safety Data Sheets 27
10.3 Emergencies 27
10.3.1 On Call Response 27
10.3.2 Notice 28
10.3.3 Owner Remedy 28
10.4 Injuries 28
10.4.1 Documentation 28
10.4.2 Incident Report 28
10.5 Environmental Safety 28
10.5.1 Subcontractors 28
10.5.2 Owner 28
10.6 Trenching Plan 29
10.6.1 OSHA Regulations 29
10.6.2 Texas State Law 29
10.6.3 Contractor Responsibility 29
10.7 Crane Safety 30
10.8 Unmanned Aircraft System (UAS) Usage 30
10.9 Fire Protection Procedures 30
10.10 Smoke and Tobacco Free Campus 30

ARTICLE 11. QUALITY CONTROL 31

11.1 Materials & Workmanship 31
11.2 Testing 31
11.2.1 Owner 31
11.2.2 Contractor 31
11.2.3 Standards 31
11.2.4 Non-Compliance (Test Results) 31

11.2.5 Notice of Testing 32
11.2.6 Test Samples 32
11.2.7 Covering Up Work 32
11.3 Submittals 32
11.3.1 Contractor's Submittals 32
11.3.2 Review of Submittals 33
11.3.3 Correction and Resubmission 33
11.3.4 Limits on Shop Drawing Review 34
11.3.5 No Substitutions without Approval 34
11.3.6 Unauthorized Substitutions at Contractor's Risk 35
11.4 Field Mock-up 35
11.4.1 Minimum 35
11.4.2 No Incorporation Unless Approved 35
11.4.3 Schedule 35
11.5 Inspection During Construction 35
11.5.1 Corrected Work 35
11.5.2 Owner's Self Help 35
11.5.3 Notice 36

ARTICLE 12. CONSTRUCTION SCHEDULES 36

12.1 Contract Time 36
12.2 Notice to Proceed 36
12.3 Work Progress Schedule 36
12.3.1 Work Progress Schedule Updates 36
12.3.2 Use of Work Progress Schedules 37
12.4 Ownership of Float 38
12.5 Completion of Work 38
12.5.1 Owner's Self Help 38
12.5.2 Requirement to Regain Schedule 38
12.5.3 Recovery Schedule 38
12.5.4 Owner's Notice Not Acceleration 38
12.6 Modification of the Contract Time 38
12.6.1 Extension Request 39
12.6.2 Weather Days 39
12.6.3 Excusable Delay 39
12.7 No Damages for Weather Days 40
12.8 Costs for Excusable Delay 40
12.9 No Damages for Other Delay 40
12.10 Concurrent Delay 40
12.11 Time Extension Requests for Changes to the Work or Excusable Delay 40
12.11.1 Content of Request 41
12.11.2 No Release 41
12.11.3 Longest Path Analysis 41
12.11.4 Owner Response 41
12.12 Failure to Complete Work in the Contract Time 41
12.13 Liquidated Damages 42
12.13.1 Reasonable Estimate 42
12.13.2 Offset 42
12.13.3 No Waiver 42

ARTICLE 13. PAYMENTS 42
13.1 Job Order Contracts 42
13.2 Schedule of Values 43
13.2.1 Requirements 43
13.3 Progress Payments 43
13.3.1 Preliminary Pay Worksheet 43
13.3.2 Contractor's Application for Payment 44
13.3.3 Certification by Design Professional 45
13.4 Owner's Duty to Pay 45
13.4.1 Stored Materials 45
13.4.2 Retainage 45
13.4.3 Price Reduction to Cover Loss 45
13.4.4 Title 46
13.4.6 No Release 46
13.4.7 Documentation 46
13.5 Time for Payment by Contractor 47
ARTICLE 14. CHANGES 47
14.1 Change Orders 47
14.1.1 Owner Ordered Changes 47
14.1.2 Corrections 47
14.2 Lump Sum Change Order Request 48
14.2.1 Self-Performed Labor 48
14.2.2 Overhead and Profit 48
14.2.3 Labor Burden 48
14.2.4 Material 49
14.2.5 Equipment 49
14.2.6 Maximum Markup Percentage Allowable on Self-Performed Work 49
14.2.7 Maximum Markup Percentages Allowable on Work Performed by Subcontractors 49
14.2.8 GMP Limitation 50
14.2.9 No Markup on Bonds and Liability Insurance Costs 50
14.2.10 Direct and Indirect Costs Covered by Markup Percentages 50
14.2.11 Deduct Change Orders and Net Deduct Changes 50
14.2.12 Contingency 50
14.3 Unit Price Change Order Requests 50
14.3 Cost Plus Change Order Requests 51
14.4 Job Order Unit Prices 51
14.5 Claims for Additional Costs. 51
14.5.0 Claim with no Requested Change 51
14.5.1 Miscellaneous Claims 51
14.5.2 Failure to Notify 51
14.6 Minor Changes 52
14.7 Concealed Site Conditions 52
14.8 Extension of Time 52
14.9 Administration of Change Order Requests 52
14.9.1 Procedures. 52
14.9.2 Routine Changes 52
14.9.3 Documentation 53
14.9.4 Emergencies 53
14.9.5 Coordination with Schedule of Values 53

14.10 Construction Change Directive (CCD) ... 53
14.11 Audit of Changes ... 53

ARTICLE 15. PROJECT COMPLETION AND ACCEPTANCE ... 53

15.1 Closing Inspections ... 53
15.1.1 Purpose of Inspection ... 53
15.1.2 Annotation ... 54
15.1.3 Substantial Completion Inspection ... 54
15.1.4 Final Inspection ... 55
15.1.5 Additional Inspections. ... 55
15.1.6 Phased Completion ... 56
15.2 Owner's Right of Occupancy ... 56
15.3 Acceptance and Payment. ... 56
15.3.1 Request for Final Payment ... 56
15.3.2 Final Payment Documentation ... 56
15.3.3 Design Professional Approval ... 56
15.3.4 Offsets and Deductions ... 57
15.3.5 Final Payment Due ... 57
15.3.6 Effect of Final Payment ... 57
15.3.7 Waiver of Claims ... 57
15.3.8 Effect on Warranty ... 57

ARTICLE 16. WARRANTY AND GUARANTEE ... 57

16.1 Contractor's General Warranty and Guarantee ... 57
16.1.1 Warranty Period ... 58
16.1.2 Limits on Warranty ... 58
16.1.3 Events Not Affecting Warranty ... 58
16.2 Separate Warranties ... 59
16.2.1 Assumption ... 59
16.2.2 Assignment ... 59
16.3 Correction of Defect ... 59
16.4 Certification of No Asbestos Containing Materials or Work ... 59
16.5 Compliance with Acts ... 59

ARTICLE 17. SUSPENSION AND TERMINATION ... 60

17.1 Suspension of Work for Cause ... 60
17.1.1 Cease Work ... 60
17.1.2 Investigation ... 60
17.1.3 Outcome ... 60
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 ... 60
17.3.2 No Waiver ... 61
17.3.3 Notice ... 61
17.3.4 Cure ... 61
17.3.5 Failure to Cure ... 61
17.3.6 Conversion to Termination for Convenience ... 62
17.4 Termination for Convenience of Owner ... 62
17.4.1 Notice ... 62
17.4.2 Contractor Action ... 62

17.4.3 Contractor Remedy 63
17.5 Termination by Contractor 63
17.6 Settlement on Termination 63
ARTICLE 18. DISPUTE RESOLUTION 63
18.1 Contracts Less Than $250,000 63
18.2 Contracts $250,000 or Greater 63
18.2.1 Mediation 63
18.3 Owner Retained Rights 65
18.4 No Waiver 65
18.5 No Attorney's Fees 65
18.6 Interest 65
ARTICLE 19. MISCELLANEOUS 65
19.1 Right to Audit 65
19.2 Records and Inspection 65
19.2.1 Deliverables 66
19.2.2 Plans and Specifications 66
19.2.3 Ethics Expectations 66
19.2.4 Change Order Pricing 66
19.2.5 Invoice Accuracy 66
19.2.6 Claims. 66
19.3 Audit of Subcontractors 66
19.4 Overpricing or Overcharges. 66
19.5 Documentation Requirements 66
19.6 Supplementary or Special Conditions 67
19.6.1 Supplementary Conditions 67
19.6.2 Special Conditions 68
19.7 Federally Funded Projects 68
19.8 Internet-based Project Management Systems 68
19.8.1 Accessibility and Administration. 68
19.8.2 Training 68
19.9 Computation of Time 68
19.10 Survival of Obligations 68
19.11 No Waiver of Performance 68
19.12 Governing Law and Venue 68
19.13 Captions and Catch Lines 69
19.14 Independent Contractor Status 69
19.15 No Third-Party Beneficiaries 69
19.16 Child Support Obligor 69
19.17 Buy America Requirements for Iron and Steel Used in Construction 69
19.18 No Assignment 69
19.19 Severability 69
19.20 Parties Bound 69
19.21 Public Information 69
19.22 Business Ethics Expectations 70
19.22.1 Contractor 70
19.22.2 Reasonable Actions 70
19.22.3 Gifts and Other Considerations 70

19.22.4 Subcontractor 70
19.22.5 Other Jobs 70
19.22.6 Owner Notification 70
19.22.7 Subcontractors Contracts 70
19.22.8 Interviews and Audits 70
19.23 Entire Agreement 71

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 Environmental Regulations. 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 Wage Rates. 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 Notification to Workers. 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 Penalty for Violation. 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 Complaints of Violations.

2.2.3.1 Owner's Determination of Good Cause. 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 No Extension of Time. 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 Cooperation with Owner's Investigation. 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 Notification to Owner. 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 Licensing of Trades. 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 Royalties, Patents, and Copyrights. 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 State Sales and Use Taxes. 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 Antiquities. 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 Franchise Tax Status. 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 Preconstruction Conference. 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 Owner's Construction Manager (OCM). 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 Point of Contact. 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 Directives. All directives on behalf of Owner will be conveyed to Contractor and Design Professional by OCM in writing.

3.3 Owner Supplied Materials and Information.

3.3.1 Surveys. 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 Drawings and Specifications. 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 Other Information. Owner will provide information, equipment, or services under Owner's control to Contractor with reasonable promptness.

3.4 Availability of Lands. 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 Limitation on Owner's Duties.

3.5.1 No Control. 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 No Contravention of Design Professional. 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 Role of Design Professional. 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 Site Visits. 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 Inspections. 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 Clarifications and Interpretations. 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 Limitations on Design Professional Authority. 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 Contractor's General Responsibilities. 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 Site Visit. 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 Project Administration. 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 Contractor's Management Personnel. 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 Labor. 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 Services, Materials, and Equipment. 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 No Substitutions without Approval. 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 Owner Equipment or Material. 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 Non-Compliant Work. 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 Subcontractors. 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 Contract Documents. 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 Scheduling. 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 terms and conditions of the Contract, including, without limitation, any provisions 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 Continuing the Work. 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 Cleaning. 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 Acts and Omissions of Contractor, its Subcontractors, and Employees. 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 Ancillary Areas. 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 Off-Site Storage. 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 Separate Contracts. 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 Continuation of Contract. 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 Cooperation. 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 Reimbursement. 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.
HISTORICALLY UNDERUTILIZED BUSINESS (HUB) SUBCONTRACTING PLAN

6.1 General Description. 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 Good Faith Effort.

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 Compliance with Approved HUB Subcontracting Plan. 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 Failure to Demonstrate Good-Faith Effort. 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.
BONDS

7.1 Construction Bonds. 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 Bond Requirements. 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 Performance Bonds. 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 Payment Bonds. 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 When Bonds Are Due. Payment and performance bonds are due before Contractor commences any Work.

7.2.4 Power of Attorney. 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 Bond Indemnification. 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 Furnishing Bond Information. 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 Claims on Payment Bonds. 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 Payment of Claims when Payment Bond is Not Required. 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 Sureties. 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), https://fiscal.treasury.gov/surety-bonds/list-certified-companies.html, 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 Bond Costs. 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 **No Third-Party Beneficiaries. 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 **Notice. 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 Insurance Requirements. 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 Period of Coverage. 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 Certificates. 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 Failure to Provide Certificates. 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 Contractor's Liability. 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 Insurance Limits. 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 Insurers. 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 Workers' Compensation Insurance. 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 Commercial General Liability Insurance. 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 Asbestos Abatement Liability Insurance. 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 Comprehensive Automobile Liability Insurance. 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 All-Risk Builder's Risk Insurance. 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 "Umbrella" Liability Insurance. 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 Policy Requirements. Policies must include the following clauses, as applicable:

- This insurance shall not be suspended, voided, canceled, materially changed, or non-renewed 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 Subcontractor Insurance Coverage**. WITHOUT LIMITING ANY OF THE OTHER 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 Copies Furnished. 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 Ownership of Drawings and Specifications. 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 Interrelation of Documents. 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 Resolution of Conflicts in Documents. 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 Contractor's Duty to Review Contract Documents. 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 Discrepancies and Omissions in Drawings and Specifications. 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 Design-Build Firm. 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 Construction Manager-at-Risk Examination and Reporting. 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 Other Limitations. 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 No Warranty or Representation by Owner. 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 Requirements for Record Documents.

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 General. 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 Site Visits. 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 Notices. Contractor shall provide notices as follows:

10.2.1 Utilities and Adjacent Properties. 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 Safety Data Sheets. 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 Emergencies. 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 On Call Response. 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 To OCM and Design Professional: Give OCM and Design Professional prompt notice of all such events.

10.3.2.2 Changes or Variations to Work: 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 Owner Remedy. 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 Injuries. 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 Documentation. 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 Incident Report. 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 Environmental Safety. 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 Subcontractors. Contractor shall bind all Subcontractors to the same duty.

10.5.2 Owner. 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 Trenching Plan. 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 OSHA Regulations: 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 Texas State Law: 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 Contractor Responsibility: 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 Unmanned Aircraft System (UAS) Usage. 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 Fire Protection Procedures. 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 Smoke and Tobacco Free Campus. 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 Materials & Workmanship. 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 Testing.

11.2.1 Owner. 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 Contractor. 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 Standards. 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 Non-Compliance (Test Results). 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 Notice of Testing. 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 Test Samples. 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 Covering Up Work. 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 Submittals.

11.3.1 Contractor's Submittals. 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 re-submittal 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 withhold a reasonable sum of money that would otherwise be due 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 Review of Submittals. 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 Correction and Resubmission. 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 Limits on Shop Drawing Review. 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 No Substitutions without Approval. 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 Unauthorized Substitutions at Contractor's Risk. 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 Field Mock-up. Mock-ups shall be constructed prior to commencement of a specified scope of work to confirm acceptable workmanship.

11.4.1 Minimum. 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 No Incorporation Unless Approved. 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 Schedule. 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 Inspection During Construction. 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 Corrected Work. Should corrections of the Work be required for approval, Contractor shall not cover up corrected Work until Owner indicates approval.

11.5.2 Owner's Self Help. 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 Notice. 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 Contract Time. **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 Notice to Proceed. 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 Work Progress Schedule. 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 Work Progress Schedule Updates.

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 Use of Work Progress Schedules. 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 Ownership of Float. 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 Completion of Work. 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 Owner's Self Help. 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 Requirement to Regain Schedule. 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 Recovery Schedule. 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 Owner's Notice Not Acceleration. 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 Modification of the Contract Time. Delays and extensions of Contract Time are valid only if properly noticed and documented by Change Order.

12.6.1 Extension Request. 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 Weather Days. "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 Excusable Delay. 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 No Damages for Weather Days. 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 Costs for Excusable Delay. 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 regardless of the extent or frequency of Owner's exercise of such rights or remedies.

12.10 Concurrent Delay. 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 Time Extension Requests for Changes to the Work or Excusable Delay. 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 Content of Request. 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 No Release. 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 Owner Response. 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 Failure to Complete Work in the Contract Time. **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 Liquidated Damages. 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	To	Per Day
	< $ 1,000,000	$ 250
$ 1,000,000	< $ 25,000,000	$ 1,000
$ 25,000,000	< $ 50,000,000	$ 2,500
$ 50,000,000	< $ 75,000,000	$ 5,000
$ 75,000,000	< $ 100,000,000	$ 7,500
> $ 100,000,000		$ 10,000

12.13.1 Reasonable Estimate. 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 Offset. 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 No Waiver. 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.
PAYMENTS

13.1 Job Order Contracts. 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 Schedule of Values (utilized in Construction-Manager-at-Risk and General Construction Agreement). 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 Requirements.

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 Progress Payments. 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 Preliminary Pay Worksheet. 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 Contractor's Application for Payment. 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 Certification by Design Professional. 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 Owner's Duty to Pay. 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 Stored Materials. 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 Retainage. 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 Price Reduction to Cover Loss. 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 Title.

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 Contracts with No Payment Bond. 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 No Release. 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 Time for Payment by Contractor: 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 Change Orders. 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 Owner Ordered Changes. 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 Corrections. 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 Lump Sum Change Order Request. 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 Self-Performed Labor. 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 Overhead and Profit. 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 Labor Burden. 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 Non-Reimbursable Labor Burden. 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 Material. 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 Equipment. 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 Maximum Markup Percentage Allowable on Self-Performed Work. 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 Maximum Markup Percentages Allowable on Work Performed by Subcontractors. 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 GMP Limitation. 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 No Markup on Bonds and Liability Insurance Costs. 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 Deduct Change Orders and Net Deduct Changes. 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 Contingency. 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 Unit Price Change Order Requests. 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 Job Order Unit Prices. 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 Claims for Additional Costs.

14.5.1 Claim with no Requested Change. 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 Miscellaneous Claims. 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 Failure to Notify. 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 Minor Changes. 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 Concealed Site Conditions. 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 before they are disturbed. Upon such notice, or upon its own observation 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 Extension of Time. 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 Administration of Change Order Requests. 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 Routine Changes. 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 Documentation. 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 Emergencies. 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 Coordination with Schedule of Values. 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 Construction Change Directive (CCD). 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 Audit of Changes. 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 Closing Inspections.

15.1.1 Purpose of Inspection. 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 Annotation. 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 Substantial Completion Inspection. 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 Final Inspection. 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 Phased Completion. 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 completed receives a Substantial Completion certificate. Final Completion of the Work as a whole is the date on which the last element or part of the Work completed receives a Final Completion certificate.

15.2 Owner's Right of Occupancy. 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 Request for Final Payment. 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 Final Payment Documentation. 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 may not subsequently submit a claim on behalf of Subcontractor or vendor unless Contractor's affidavit notes that claim as an exception.

15.3.3 Design Professional Approval. 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 Offsets and Deductions. 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 Final Payment Due. 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 Effect of Final Payment. 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 Waiver of Claims. 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 Effect on Warranty. 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 Contractor's General Warranty and Guarantee. 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 Warranty Period. 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 Limits on Warranty. 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 Events Not Affecting Warranty. 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 Separate Warranties. 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 Assumption. 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 Assignment. 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 Correction of Defects. 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 Certification of No Asbestos Containing Materials or Work. 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 Compliance with Acts. 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 Suspension of Work for Cause. 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 Cease Work. 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 Investigation. 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 Outcome. 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 Time. 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 Suspension of Work for Owner's Convenience. 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 Termination by Owner for Cause.

17.3.1 Cause. 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 No Waiver. 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 Notice. 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 Cure. 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 Failure to Cure. 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 Conversion to Termination for Convenience. 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 Termination for Convenience of Owner. 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 Notice. 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 Contractor Action. 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 Contractor Remedy. 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 Termination by Contractor. 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 Settlement on Termination. 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 Contracts Less Than $250,000. 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 Contracts $250,000 or Greater. 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 Mediation. 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 Owner Retained Rights. 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 No Waiver. 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 No Attorney's Fees. 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 Interest. 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 Records and Inspection. 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 Change Order Pricing: Compliance with contract provisions regarding the pricing of Change Orders

19.2.5 Invoice Accuracy: Accuracy of Contractor representations regarding the pricing of invoices

19.2.6 Claims: Accuracy of Contractor representations related to claims submitted by the Contractor or any of his payees.

19.3 Audit of Subcontractor: 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 Overpricing or Overcharges: 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 Documentation Requirements: 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	.pdf
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.)	.pdf and Excel
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.)	.pdf

19.6 Supplementary or Special Conditions. 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 Supplementary Conditions. 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 Special Conditions. 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 Federally Funded Projects. 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 Internet-based Project Management Systems. 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 Training. When used, Owner shall provide training to the Project team members.

19.9 Computation of Time. 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 Survival of Obligations. 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 No Waiver of Performance. 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 Governing Law and Venue. 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 Captions and Catch Lines. 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 Independent Contractor Status. 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 No Third-Party Beneficiaries. 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 Child Support Obligor. 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 Buy America Requirements for Iron and Steel Used in Construction. 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 No Assignment. 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 Severability. 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 Parties Bound. 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 Public Information. 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 Contractor: 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 Reasonable Action: 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 Gifts and Other Considerations: 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 Subcontractors: 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 Other Jobs: 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 Owner Notification: 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 Subcontractor Contracts: 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 Interviews and Audits: 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 Entire Agreement. 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.