

# PROJECT MANUAL

NOVEMBER 13, 2024



# VLK | ARCHITECTS

OWNER:



7200 Spring Cypress Road  
Klein, Texas 77379

## KISD 2024 FRP

KLEIN I.S.D.  
HARRIS COUNTY, TEXAS

VLK Project No.

# 24-047.00



## OWNER

**Klein**  
**Independent School District**  
7200 Spring Cypress Road  
Klein, Texas 77379

## ARCHITECT

**VLK Architects, Inc.**  
Michelle Gallup  
20445 Texas 249, Suite 350  
Houston, Texas 77070  
Main Phone: 281.671.2300  
www.vlkarchitects.com



11/13/2024

## CIVIL ENGINEER

**Kimley-Horn**  
Firm Registration Number: F-928  
Rashard Harris, P.E.  
11700 Katy Freeway, #800  
Houston, Texas 77079  
Main Phone: 281.597.9300  
www.kimley-horn.com

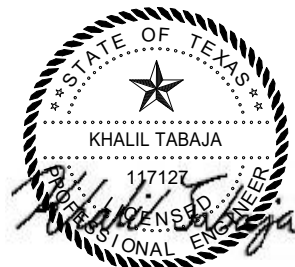


11/13/2024

## STRUCTURAL ENGINEER

**Matrix Structural Engineers**  
Firm Registration Number: F-2640  
Khalil Tabaja, P.E.  
5177 Richmond Ave., Suite 670  
Houston, Texas 77056  
Main Phone: 713.664.0130  
www.matrixstructural.com

Matrix Structural Engineers  
TBPE Firm Registration No. F-2640



11/13/2024

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NOVEMBER 13, 2024

**KISD 2024 FRP**

**KLEIN I.S.D.  
HARRIS COUNTY, TEXAS**

VLK Project No.  
**24-047.00**

M.E.P ENGINEER

**DBR Engineering Consultants, Inc.**

Firm Registration Number: F-2234

Adam Jones PE, LEED AP

9990 Richmond Avenue

South Building, Suite 300

Houston, TX 77042

Main Phone: 713.914.0888



**PROJECT  
MANUAL**

NOVEMBER 13, 2024

**KISD 2024 FRP**

**KLEIN I.S.D.**

**HARRIS COUNTY, TEXAS**

VLK Project No.

**24-047.00**



DOCUMENT 00 01 10

TABLE OF CONTENTS



11/13/2024

**DIVISION 00 - PROCUREMENT AND CONTRACTING REQUIREMENTS**

PROCUREMENT REQUIREMENTS

- Document 00 11 19 - Request for Competitive Sealed Proposals
- 00 21 16 - Instructions to Proposers
- 00 31 32 - Geotechnical Data
- 00 42 00 - Proposal Form
- 00 45 19 - Non-collusion Affidavit
- 00 45 20 - Felony Conviction Notification
- 00 45 25 - Certification of Criminal History Record Information Review by Contractor-Employer
- 00 45 46 - Conflict-of-interest Questionnaire

CONTRACTING REQUIREMENTS

- Document 00 61 13.13 - Performance Bond Form
- 00 61 13.16 - Payment Bond Form
- 00 65 00 - Release of Lien Documents
- 00 70 00 - General Conditions of the Contract for Construction, AIA Document A201-2017 (Modified)
- 00 73 00 - Master Supplementary Conditions
- 00 73 46 - Prevailing Wage Rates
- 00 73 50 - Weather Table

**DIVISION 01 - GENERAL REQUIREMENTS**

- Section 01 11 00 - Summary of Work
- 01 21 00 - Allowances
- 01 23 00 - Alternates
- 01 29 00 - Payment Procedures
- 01 31 00 - Project Management and Coordination
- 01 31 19 - Project Meetings
- 01 31 19.13 - Preconstruction Meetings
- 01 32 16 - Construction Progress Schedules
- 01 33 23 - Shop Drawings, Product Data, and Samples
- 01 35 00 - Alteration Project Procedures
- 01 41 00 - Regulatory Requirements
- 01 42 00 - References
- 01 42 16 - Definitions
- 01 45 00 - Quality Control
- 01 45 23 - Testing and Inspection Services
- 01 50 00 - Temporary Facilities and Controls
- 01 56 39 - Temporary Tree and Plant Protection
- 01 62 00 - Product Options
- 01 65 00 - Product Delivery Requirements
- 01 66 00 - Product Storage and Handling Requirements
- 01 73 29 - Cutting and Patching
- 01 74 13 - Cleaning
- 01 77 00 - Closeout Procedures
- 01 78 23 - Operation and Maintenance Data
- 01 78 30 - Warranties and Bonds
- 01 78 39 - Project Record Documents
- 01 78 40 - Spare Parts, Overages and Maintenance Materials

**DIVISION 02 - EXISTING CONDITIONS**

- Section 02 41 19 - Selective Demolition

**DIVISION 03 - CONCRETE**

Section 03 11 00 - Concrete Forming and Accessories  
03 20 00 - Concrete Reinforcing  
03 30 00 - Cast-in-place Concrete

**DIVISION 04 - MASONRY**

Section 04 20 00 - Masonry Units  
04 72 00 - Cast Stone Masonry

**DIVISION 05 - METALS and DIVISION 06 - WOOD, PLASTICS, AND COMPOSITES**

NONE IN THIS PROJECT

**DIVISION 07 - THERMAL AND MOISTURE PROTECTION**

Section 07 21 00 - Building Insulation  
07 27 26 - Fluid-Applied Membrane Air Barriers  
07 42 13 - Metal Wall Panels  
07 48 00 - Rainscreen Attachment System  
07 59 00 - Roofing Repair  
07 62 00 - Sheet Metal Flashing and Trim  
07 65 00 - Flexible Flashing  
07 92 00 - Joint Sealants

**DIVISION 08 - OPENINGS**

Section 08 41 13 - Aluminum Framed Entrances and Storefronts  
08 80 00 - Glazing

**DIVISION 09 - FINISHES**

Section 09 65 66 - Athletic Sheet Flooring  
09 67 23 - Resinous Flooring  
09 68 13 - Tile Carpeting  
09 91 00 - Painting

**DIVISION 10 - SPECIALTIES**

Section 10 14 00 - Identifying Devices  
10 73 26 - Prefabricated Walkway Covers

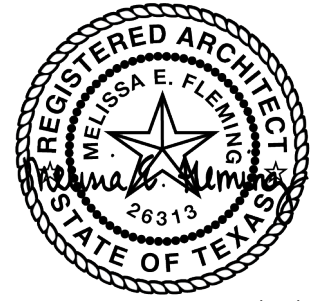
**DIVISION 11 - EQUIPMENT through DIVISION 22 - PLUMBING**

NONE IN THIS PROJECT

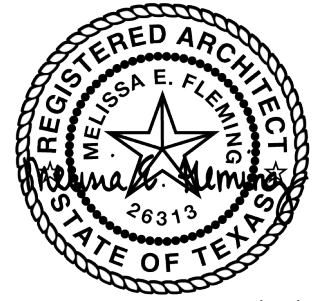
**DIVISION 23 - HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)**

Section 23 02 00 - Basic Materials and Methods for HVAC  
23 03 00 - Mechanical Demolition for Remodeling  
23 05 13 - Common Motor Requirements for HVAC Equipment  
23 05 48 - Vibration and Seismic Controls for HVAC Piping and Equipment  
23 05 93 - Testing, Adjusting, and Balancing  
23 07 13 - Duct Insulation  
23 07 16 - HVAC Equipment Insulation  
23 23 00 - Refrigerant Piping  
23 31 13 - Metal Ductwork  
23 33 00 - Ductwork Accessories  
23 41 00 - Air Filters  
23 62 13 - Air Cooled Condensing Units  
23 73 13 - Modular Indoor Central Station Air Handling Units

**DIVISIONS 24 and 25 - Not used.**



11/13/2024



11/13/2024

**DIVISION 26 - ELECTRICAL**

Section 26 02 00 - Basic Materials and Methods for Electrical  
26 05 19 - Wire, Cable and Related Materials  
26 05 26 - Grounding  
26 05 33 - Raceways  
26 51 19 - Lighting Fixtures - Light Emitting Diode (LED)

**DIVISION 27 - COMMUNICATIONS**

Section 27 02 00 - Basic Materials and Methods for Communications Systems

**DIVISION 28 - ELECTRONIC SAFETY AND SECURITY**

NONE IN THIS PROJECT

**DIVISIONS 29 and 30** - Not used.

**DIVISION 31 - EARTHWORK**

Section 31 10 00 - Site Clearing  
31 20 00 - Earth Moving  
31 32 13 - Soil Mixing Stabilization  
31 50 00 - Excavation Support and Protection  
31 63 29 - Drilled Concrete Piers

**DIVISION 32 - EXTERIOR IMPROVEMENTS**

Section 32 13 13 - Concrete Paving  
32 13 14 - Concrete Sidewalk  
32 13 73 - Concrete Paving Joint Sealants  
32 17 23 - Pavement Markings  
32 31 15 - Vinyl Clad Chain Link Fencing

**DIVISION 33 - UTILITIES**

Section 33 05 00 - Common Work Results for Utilities  
33 41 00 - Storm Utility Drainage Piping

**DIVISION 34 - TRANSPORTATION through 49**

NONE IN THIS PROJECT



**DOCUMENT 00 11 19**

**REQUEST FOR COMPETITIVE SEALED PROPOSALS**

Competitive Sealed Proposals for the work identified below in accordance with Proposal Documents and addenda as may be issued prior to date of proposal opening will be received by the Board of Trustees, Klein Independent School District, until proposal closing date and time, as identified below. Proposals from Offerors will then be opened in public and read aloud.

**OWNER:** Klein Independent School District  
7200 Spring Cypress Road  
Klein, TX 77379

**ARCHITECT:** VLK Architects, Inc.  
20445 SH 249, Suite 350  
Houston, TX 77070  
(281) 671-2300

**PROJECT:** 2024 Facility Renovation Project (FRP)  
Klein Independent School District  
Klein, Texas

**PRE-PROPOSAL** Wednesday, November 20, 2024; 10:00 a.m. at Klein ISD, Facility and School Services Office, 7520 FM 2920, Klein, TX 77379. Representatives of the Architect, Owner and Consulting Engineers will be present at this meeting. All Offerors are encouraged to attend. A walk through of two representative projects will be held after the Pre-Proposal meeting. Additional walk throughs may be scheduled with Klein ISD during Thanksgiving break, November 25-27.

**QUALIFICATION STATEMENT SUBMISSION:** Friday, November 22, 2024, 4:00 p.m.  
Deliver Contractor's Qualification Statement to Architect's office at address listed above or email to [mgallup@vlkarchitects.com](mailto:mgallup@vlkarchitects.com).

**PROPOSAL DATE AND TIME:** Tuesday, December 10, 2024, 2:00 p.m.

**LOCATION OF PROPOSAL OPENING:** Klein ISD Facility and School Services Office  
7520 FM 2920  
Klein, TX 77379

Proposal Documents will be available after November 13, 2024. Qualified Offerors (General Contractors) may obtain a free electronic copy of the Drawings and Project Manual or may obtain two hard copies upon deposit.

A link to the digital copies of the drawings and project manual may be obtained from Michelle Gallup, VLK Architects, Inc., 20445 SH 249, Suite 350, Houston, TX 77070, e-mail: [mgallup@vlkarchitects.com](mailto:mgallup@vlkarchitects.com). A link to the digital copy of the addenda will be e-mailed to the current list of plan holders.

In addition, proposal documents can be reviewed at the following locations:

iSqFt, a ConstructConnect™ company  
<https://www.isqft.com>

ConstructConnect  
<https://www.constructconnect.com/>

Dodge Data & Analytics  
[www.construction.com](http://www.construction.com)

All proposals must be in the hands of the Owner no later than the time specified above. Please seal all proposals in duplicate in an envelope with the following information on the face of the envelope.

**Name of Offeror (General Contractor)  
Klein ISD 2024 Facility Renovation Program (FRP)  
Klein Independent School District**

The Owner reserves the right to reject any and all proposals and to waive any irregularities in the Competitive Sealed Proposal process. No proposal shall be withdrawn within 30 days after the proposal opening without the specific consent of the Owner.

**PROPOSAL BOND:** A Proposal Bond from a bonding company acceptable to the Owner or a certified check in an amount equal to 5 percent (5%) of the greatest amount of proposal must accompany each offeror's proposal.

**PAYMENT BOND AND PERFORMANCE BOND:** A Payment Bond and Performance Bond, each in an amount equal to 100 percent (100%) of the Contract Sum conditioned upon the faithful performance of the Contract will be required. Please note that all bonding companies presented must be acceptable to the Owner.

The prevailing rates of wages are the minimums that must be paid in conformance with all applicable laws of the State of Texas.

All Offerors submitting a proposal are encouraged to attend the proposal opening. Subcontractors and suppliers intending to submit proposals to Construction Offerors are required to prepare their proposals based on a complete set of proposal documents. If after reviewing the complete set of proposal documents, Subcontractors and supplier offerors desire to purchase individual drawings and specification sections for their proposal convenience, they may do so by ordering the specific drawings and specifications directly from the reproduction company. Each offeror purchasing a partial set of proposal documents is responsible for determining exactly which documents he requires and is responsible for all costs associated with printing and delivery. Subcontractors and suppliers exercising this option must agree to do so on the basis that 1) all documents shall be returned to the Architect, without refund, after submitting a proposal and 2) documents shall not be used on other projects. Successful Subcontractors and supplier offerors may retain their Proposal Documents until completion of the construction.

All Offerors submitting a proposal are encouraged to visit the sites.

END OF DOCUMENT

DOCUMENT 00 21 16

INSTRUCTIONS TO PROPOSERS

PART 1 - GENERAL

1.1 DOCUMENTS

- A. Reference DOCUMENT 00 11 19 - REQUEST FOR COMPETITIVE SEALED PROPOSALS for instructions on attaining Proposal Documents.

1.2 DEFINITIONS

- A. All definitions set forth in the General Conditions of the Contract for Construction, AIA Document A201, 2017 Edition and Section 01 42 16 - Definitions, are applicable to these Instructions to Proposers.
- B. Proposal documents include the Request for Proposals, Instructions to Proposers, the Proposal Forms and the proposed Contract Documents including Addenda issued prior to receipt of proposals.
- C. Addenda are written or graphic instruments issued prior to the execution of the Contract which modify or interpret the proposal documents, including Drawings and Specifications, by additions, deletions, clarifications or corrections. Addenda will become part of the Contract Documents when the Construction Contract is executed.
- D. "VLK Architects, Inc." will be hereafter referred to in this Project Manual as "Architect" and correspondence shall be addressed to: 20445 SH 249, Suite 350, Houston, TX 77070.

1.3 EXAMINATION OF DOCUMENTS AND SITE

- A. Each proposer, by making their Proposal, represents that they have read and understand the Proposal Documents.
- B. Each proposer, by making their Proposal, represents that they have visited the site, performed investigations and verifications as necessary and familiarized themselves with the local conditions under which the Work is to be performed and will be responsible for errors in their proposal resulting from their failure to do so.
- C. Each proposer by making their proposal represents that their proposal is based upon the materials, systems and equipment required by the Proposal Documents without exception.

1.4 QUESTIONS

- A. Proposers shall submit questions about the Proposal Documents to the Architect in writing not later than ten days prior to the date of receipt of the proposals. Replies will be issued to proposers as an addendum to the Proposal Documents and shall become a part of the Contract. The Architect and Owner will not be responsible for oral clarification.

1.5 SUBSTITUTIONS

- A. Each proposer represents by submitting their proposal that their proposal is based upon the materials and equipment described in the proposal documents.

1.6 PROPOSAL SECURITY

- A. A certified check; cashier's check; signed, dated and embossed proposal bond in an amount equal to 5% of the largest possible total proposal and made payable to the Owner must accompany each proposal. This shall be considered as the amount of liquidated damages which the Owner will sustain by failure or refusal of the proposer to execute and deliver the contract and the statutory performance and payment bonds should the Contract be awarded him.

- B. If the proposer defaults in executing and delivering the Contract and the statutory performance and payment bonds within ten days after written notification from the Architect of the award of Contract to him, then the check or proposal bond shall become the property of the Owner, not as a penalty, but as liquidated damages, as payment for damages due to excess costs, delay and other inconveniences.
- C. Proposals shall remain in effect for a period of 30 days after the time established for receipt thereof, and during this time the Owner may accept or reject the proposals as he so elects. If the proposal is not accepted within 30 days after the time set for submission of proposals, or if the successful proposer executes and delivers said contract and the performance and payment bonds, then the check or proposal bond will be returned.
- D. Proposal Bond shall be executed by a Surety Company that is:
  - 1. Approved by the school district, and duly authorized and admitted to do business in the State of Texas as determined by the State Board of Insurance.
  - 2. Listed by the United States Department of the Treasury in that issue of the "Federal Register" covering the date on which the bond was executed and the date that Surety Company has obtained reinsurance, if applicable, from a reinsurer that is authorized and admitted as a reinsurer in this state and is the holder of a certificate of authority from the United States secretary of the treasury.
- E. Facsimiles or copies of Proposal Bond will not be acceptable. Submit fully executed originals of required documents.

#### 1.7 STATUTORY PERFORMANCE BOND AND STATUTORY LABOR AND MATERIAL PAYMENT BOND

- A. A Statutory Performance Bond and a Statutory Labor and Material Payment Bond will be required of the successful proposer and shall be executed by a surety company acceptable to the Owner and authorized to do business in the State of Texas. Each bond shall be in an amount equal to one hundred percent (100%) of the contract price. The Performance Bond and the Labor and Material Payment Bond may be in one or separate instruments in accord with local law and are to be delivered to the Owner no later than the date of execution of the contract. Failure or neglecting to deliver said bonds, as specified, shall be considered as having abandoned the contract and the proposal security will be retained as liquidated damages.
- B. Bonds shall be executed by a Surety Company that is:
  - 1. Approved by the school district, and duly authorized and admitted to do business in the State of Texas as determined by the State Board of Insurance.
  - 2. Listed by the United States Department of the Treasury in that issue of the "Federal Register" covering the date on which the bond was executed and the date that Surety Company has obtained reinsurance, if applicable, from a reinsurer that is authorized and admitted as a reinsurer in this state and is the holder of a certificate of authority from the United States secretary of the treasury.

#### 1.8 SUBMITTAL

- A. Submit proposals in accordance with the Request for Proposals. Enclose proposal in an opaque, sealed envelope. Clearly mark on the outside of the proposal envelope:
  - 1. Project name
  - 2. Name of proposer
- B. Preparation of Proposals: Proposals shall be submitted on unaltered proposal forms furnished by the Architect. Fill in all blank spaces. If there are entries (blank spaces) on the proposal form which do not apply to a particular proposer, these entries shall be marked "N.A." (Not Applicable) by the proposer. No proposals will be considered that are amended or are qualified with conditional clauses, alterations, items not called for in the proposal, or irregularities of any kind which, in the Owner's opinion, may disqualify the proposer.
- C. Each proposer shall submit one original, one duplicate copy, and one digital copy saved on a USB Flash Drive of each of the following. All shall be submitted in a single sealed envelope. Electronic signatures are acceptable.:
  - 1. Proposal Form
  - 2. A completed and up-to-date AIA Form A305 Contractor's Qualification Statement
  - 3. HB 89/SB 252 Certification Form (Reference form attached to the end of this Section)
  - 4. Non-collusion Affidavit
  - 5. Felony Conviction Notice (Reference form attached to the end of this Section)
  - 6. Certification of Criminal History Record Information Review by Contractor-Employer
  - 7. Conflict-of-interest Questionnaire
  - 8. Any other information that responds to the Selection Criteria listed.



## 1.9 MODIFICATION AND WITHDRAWAL

- A. No proposal may be changed, amended or modified after submittal. Proposers may withdraw proposals prior to proposal opening.

## 1.10 DETERMINATION OF SUCCESSFUL RESPONDENT AND AWARD OF CONTRACT

- A. In determining the Selected Offeror, the Owner will evaluate the information derived from the Offeror's (Contractor's) Qualification Statement required herein, the information submitted on the Proposal Form, and other selection criteria including, but not limited to the following:
  - 1. The purchase price; forty percent (40%)
  - 2. Evaluated score of the following nine (9) criteria; sixty percent (60%)
    - a. Extent of the firm's experience in the construction of education facilities of comparable size and complexity in the greater Houston area construction market.
    - b. Whether the team personnel proposed has the appropriate experience and capabilities for this project.
    - c. Whether the firm has demonstrated the capability to meet project schedules and budgets.
    - d. How long the firm has been in business, and whether the firm's organizational structure, licensing and financial information indicates that the firm is capable of successfully completing the project.
    - e. The firm's responsiveness and completeness regarding the Request for Qualifications submittal.
    - f. The firm's safety and drug abuse programs and history of safety performance.
    - g. Whether the firm has previously worked for the District, and whether the work was satisfactory to the District.
    - h. Other relevant factors and extent of the firm's experience with educational facilities multi-campus renovation projects.
    - i. Proposers references from past projects
- B. The Selection Committee consisting of Klein ISD administrators, architects, consultants and other staff will make an initial evaluation of the proposals. The committee's recommendation will be considered by the Klein ISD Board of Trustees ("Board"). The District reserves the right to review the recommendation with others deemed appropriate by the District prior to review by the entire Board. The final decision-making authority on the proposals rests with the full Board. Decision-making authority has not been delegated to any person or entity other than the Board.
- C. The District will make such investigations as it deems necessary to determine the ability of the offeror to perform the Work, and the offeror shall furnish all such information and data for this purpose as may be requested. The District reserves the right to reject any proposal if the evidence submitted by, or investigation of, such offeror fails to satisfy the District that such offeror is properly qualified to carry out the obligations of the Contract and to complete the Work contemplated therein.
- D. The District reserves the right to reject any or all proposals and to waive any formalities or irregularities and to make the award of the contract in the best interest of the District.
- E. A decision regarding determination of the successful Offeror will be made by the District as soon as practical.

## 1.11 EXECUTION OF CONTRACT

- A. The Owner reserves the right to accept any proposal, to reject any and all proposals, or to negotiate contract terms with the various proposers, when such is deemed by the Owner to be in their best interest.
- B. Notwithstanding delays in the preparation and execution of the formal contract agreement, each proposer shall be prepared, upon written notice of proposal acceptance, to commence work on or before a date stipulated in an official written order of the Owner to proceed.
- C. The accepted proposer shall assist and cooperate with the Owner in preparing the formal contract agreement, and within 5 days following its presentation shall execute same and return it to the Owner.
- D. Form for the contract agreement will be AIA Document A101, Standard Form of Agreement Between Owner and Contractor, Stipulated Sum, 2007 Edition.

- E. Proposals shall be submitted on unaltered proposal forms furnished by the Architect. Fill in blank spaces. If there are entries (blank spaces) on the proposal form which do not apply to a particular proposer, these entries shall be marked "N.A." (Not Applicable) by that proposer. No proposals will be considered that are amended or are qualified with conditional clauses, alterations, items not called for in the proposal, or irregularities which, in the Owner's opinion, may disqualify the proposer.

#### 1.12 TIME OF COMPLETION AND LIQUIDATED DAMAGES

- A. The contract date will be established as the number of consecutive calendar days as set out on the proposal form from the "Notice-to-proceed" date issued by the Owner.
- B. Failure of the Contractor to complete the Work by the contract date will result in damages being sustained by the Owner. Such damages are, and will continue to be, impracticable and extremely difficult to determine. Due consideration will be given to delays falling within 8.3 of the General Conditions.
- C. The Contractor will pay the Owner the amount indicated on the Proposal Form and in the General Conditions for each calendar day of delay in finishing the Work in excess of time specified for completion, plus authorized time extensions. Execution of the Contract under these specifications shall constitute agreement by the Owner and Contractor that the amount indicated is the minimum value of the costs and actual damage caused by failure of the Contractor to Substantially Complete the Work within the allotted time, that such sum is Liquidated Damages and shall not be construed as a penalty, and that such sum may be deducted from payments due the Contractor if such delay occurs.

#### 1.13 SALES TAX EXEMPTION

- A. The Owner qualifies for exemption from State and Local Sales Taxes as set forth in the Supplementary Conditions.

#### 1.14 PAYMENTS TO SUBCONTRACTORS

- A. Under state law (Government Code §2251.022), a Contractor who receives payment from a public school district shall pay a subcontractor the appropriate share of the payment not later than the 10th day after the Contractor receives the payment. The Arlington ISD expects Contractors to abide by this statute.
- B. At each monthly pay application meeting, verification of compliance with this law must be submitted to the Owner concerning the previous payment made by the Owner to the Contractor. This provision shall become a part of the Contract. If a Contractor fails to abide by this law and contract provision, the Owner may exercise any and all remedies.

END OF DOCUMENT

DOCUMENT 00 31 32

GEOTECHNICAL DATA

PART 1 - GENERAL

1.1 LOG OF BORINGS/CONTRACTOR RESPONSIBILITY

- A. A copy of the locations and log of borings is bound herein.
- B. Subsurface soil data derived from test borings are given only for the convenience of the Contractor, and neither the Owner nor the Architect assumes responsibility for the accuracy of or for the Contractor's interpretation of the data.
- C. Contractor is responsible for any conclusions drawn from the boring data and is responsible for the work without extra compensation irrespective of whether or not the subsurface conditions encountered agree with the boring data.

1.2 REPORT

- A. The full geotechnical report prepared by the Owner's independent geotechnical and testing laboratory is available in the Architect's office for inspection by the Contractor.
- B. This geotechnical report is not a part of the Contract Documents.

END OF DOCUMENT

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DOCUMENT 00 42 00

PROPOSAL FORM

2024 FACILITIES RENOVATION PROJECT (FRP)  
KLEIN INDEPENDENT SCHOOL DISTRICT  
KLEIN, TEXAS

PROPOSAL OF: \_\_\_\_\_  
(Name) (Date)

TO: Mr. August Wunderlich, Chief of Operations  
Klein Independent School District  
7200 Spring Cypress Road  
Klein, TX 77379

Dear Sir/Madam:

Having examined the drawings, project manual, and related documents and having inspected the site of proposed Work, I (we) agree to furnish all labor, materials, and to perform all work described in the specifications and shown on the drawings for the sum of:

**BASE PROPOSAL:** For complete construction, including General, Mechanical, Plumbing, and Electrical Work, for the sum of:  
\_\_\_\_\_ DOLLARS

(\$\_\_\_\_\_).

**ALLOWANCES:** The above base proposal includes all allowances listed in SECTION 01 21 00 - ALLOWANCES.

**ALTERNATES:**

Alternate No.1: Installation of a marquee sign at Blackshear Elementary School as indicated on the drawings.  
\_\_\_\_\_ DOLLARS

(\$\_\_\_\_\_).

Alternate No.2: Installation of a marquee sign at Kohrville Elementary School as indicated on the drawings.  
\_\_\_\_\_ DOLLARS

(\$\_\_\_\_\_).

Alternate No.3: Installation of a marquee sign at Metzler Elementary School as indicated on the drawings.  
\_\_\_\_\_ DOLLARS

(\$\_\_\_\_\_).

The undersigned agrees, if this proposal is accepted, to commence work on or before a date to be established in the written "Notice-to-Proceed" of the Owner and to attain substantial completion of all Work on or before August 2, 2025, subject to extensions of time as described in Article 8.3 of the General Conditions.

The undersigned further agrees that, from the compensation otherwise to be paid, the Owner may retain the single sum of \$500.00 per campus per day for each calendar day after the substantial completion date that the Work remains incomplete, which sum is agreed upon as the proper measure of liquidated damages which the Owner will sustain per diem by the failure of the undersigned to complete the Work at the time stipulated in the contract. This sum is not to be construed in any sense a penalty.

The undersigned further agrees that, from the compensation otherwise to be paid, the Owner may retain the single sum of \$100.00 per campus per day for each calendar day after the final completion date that the Work remains incomplete, which sum is agreed upon as the proper measure of liquidated damages which the Owner will sustain per

diem by the failure of the undersigned to complete the Work at the time stipulated in the contract. This sum is not to be construed in any sense a penalty.

I (we) acknowledge receipt of the following addenda:

Addendum No. 1 Dated \_\_\_\_\_ Addendum No. 2 Dated \_\_\_\_\_

Addendum No. 3 Dated \_\_\_\_\_ Addendum No. 4 Dated \_\_\_\_\_

It is our intent to utilize the following major trade subcontractors for their respective portions of the Work:

Masonry	_____
Flooring – Athletic Sheet Flooring	_____
Flooring – Resinous Flooring	_____
Flooring – Tile Carpeting	_____
Prefabricated Walkway Covers	_____
HVAC	_____

Upon receipt of notice of acceptance of this proposal within 30 days after the opening of proposals, I (we) agree to execute formal contract forms, acceptable surety bonds, and required insurance certificates within five days of receipt of the Contract.

Should I (we) fail to execute and deliver the Contract, along with the satisfactory surety bonds and insurance certification within the time set forth, the proposal security, attached hereto without endorsement, in the sum of:

\_\_\_\_\_ DOLLARS(\$\_\_\_\_\_).

shall become the property of Klein Independent School District as liquidated damages for the delay caused and the additional work required.

\_\_\_\_\_  
Respectfully submitted, (Signature)

\_\_\_\_\_  
By (Please Print or Type)

\_\_\_\_\_  
Title

\_\_\_\_\_  
Contractor

\_\_\_\_\_  
Business Address

\_\_\_\_\_  
Telephone Number

\_\_\_\_\_  
FAX Number

ATTEST:

Indicate whether - Individual  
Partnership  
Corporation

\_\_\_\_\_  
Secretary

DOCUMENT 00 45 19

NON-COLLUSION AFFIDAVIT

**2024 FACILITY RENOVATION PROJECT (FRP)**

**KLEIN INDEPENDENT SCHOOL DISTRICT**

By submission of this bid or proposal, the undersigned certifies that:

- A. The bid or proposal has been independently arrived at without collusion with any other bidder or with any other competitor;
- B. This bid or proposal has not been knowingly disclosed and will not be knowingly disclosed, to any other bidder or competitor or potential competitor, prior to the opening of the bids, or proposals for this project;
- C. No attempt has been or will be made to induce any other person, partnership or corporation to submit or not submit a bid or proposal;
- D. The undersigned certifies that he is fully informed regarding the accuracy of the statements contained in this certification, and that the penalties herein are applicable to the bidder as well as to any person signing in his behalf.

\_\_\_\_\_  
Authorized Agent (Print Name)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Company Name

\_\_\_\_\_  
Company Address

\_\_\_\_\_  
City State Zip

END OF DOCUMENT

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DOCUMENT 00 45 20

FELONY CONVICTION NOTIFICATION

State of Texas Legislative Senate Bill No. 1, Section 44.034, Notification of Criminal History, Subsection (a) states “a person or business entity that enters into a contract with a school district must give advance notice to the district if the person or owner or operator of the business entity has been convicted of a felony.” The notice must include a general description of the conduct resulting in the conviction of a felony.

Subsection (b) states “a school district may terminate a contract with a person or business entity if the district determines that the person or business entity failed to give notice as required by Subsection (a) or misrepresented the conduct resulting in the conviction. The district must compensate the person or business entity for services performed before the termination of the contract.”

**This notice is not required of a publicly-held corporation.**

**Please complete the information below.**

I, the undersigned agent for the firm named below, certify that the information concerning notification of felony convictions has been reviewed by me and the following information furnished is true to the best of my knowledge.

Offeror’s Name: \_\_\_\_\_

Name of Authorized Company Official (Please print or type):  
\_\_\_\_\_

A. My firm is a publicly-held corporation; therefore, this reporting requirement is not applicable.

Signature of Authorized Company Official: \_\_\_\_\_  
Date

B. My firm is not owned nor operated by anyone who has been convicted of felony.

Signature of Authorized Company Official: \_\_\_\_\_  
Date

C. My firm is owned or operated by the following individual(s) who has/have been convicted of a felony:

Name of Felon(s): \_\_\_\_\_  
\_\_\_\_\_

Details of Conviction(s): \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Signature of Authorized Company Official: \_\_\_\_\_  
Date

END OF SECTION

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DOCUMENTS 00 45 25

CERTIFICATION OF CRIMINAL HISTORY RECORD INFORMATION  
REVIEW BY CONTRACTOR-EMPLOYER

**Certifying Affidavit submitted to:**

**Name of School District:** Klein Independent School District  
**Mailing Address:** 7200 Spring Cypress Road  
Klein, TX 77379  
**Project:** 2024 Facility Renovation Project (FRP)

STATE OF TEXAS §  
COUNTY OF §

(1) The undersigned representative, on behalf of the contracting firm identified below, swears and affirms to Klein Independent School District (the "District") that such firm has obtained, reviewed and verified, from a law enforcement or criminal justice agency or a private entity that is consumer reporting agency governed by the Fair Credit Reporting Act (15 U.S.C. §§ 1681 et seq.) the criminal history record information of all employees hired **before January 1, 2008**, who (a) have or will have continuing duties related to the contracted services, and (b) have or will be on school campuses. Such employees are identified by name on Schedule A attached hereto. The undersigned further swears and affirms no employees who meet the requirements of (a) and (b) herein and/or identified on Schedule A have been convicted of any offense identified in Section 22.085 of the Texas Education Code.

(2) The undersigned representative, on behalf of the contracting firm identified below, swears and affirms to the District, that such firm has obtained, reviewed and verified, from the Texas Department of Public Safety criminal clearinghouse, the national criminal history record information of all employees hired **on or after January 1, 2008**, who (a) have or will have continuing duties related to the contracted services, and (b) be on school campuses. Such employees are identified by name on Schedule B attached hereto. The undersigned further swears and affirms no employees who meet the requirements of (a) and (b) herein and/or identified on Schedule B have been convicted of any offense identified in Section 22.085 of the Texas Education Code.

(3) The undersigned firm swears and covenants that no present or future employee will provide services to the Project that involve direct contact with students unless and until such employee's national criminal history record information has been reviewed and cleared as required by Paragraph (2) above, and an updated Certification has been submitted by the contracting firm to the District with an updated Schedule B identifying such employees. In the event of an emergency, an employee who has not been previously certified may only provide services that involve direct contact with students if such employee is escorted by a District representative.

(4) The undersigned firm swears and covenants that, upon receipt of information, directly or indirectly, that any employee of the contracting firm has been convicted of an offense identified in Section 22.085 of the Texas Education Code, the contracting firm will immediately remove such employee from the Project and notify the District.

(5) Furthermore, the name, driver's license number, date of birth, and any other information required by the DPS will be submitted to the District for any person on either Schedule A or Schedule B for the purposes of subscribing to and issuing a District badge.

\_\_\_\_\_, being duly sworn, affirms and certifies that he/she is the \_\_\_\_\_ (position) of \_\_\_\_\_ (contracting firm), and that all statements and acknowledgements contained herein are true and correct, and that he/she has the authority to bind such firm to the covenants set out above.

\_\_\_\_\_

SUBSCRIBED AND SWORN TO BEFORE ME this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_.

Notary Public \_\_\_\_\_ State of \_\_\_\_\_

My Commission Expires: \_\_\_\_\_

DOCUMENT 00 45 46

CONFLICT OF INTEREST QUESTIONNAIRE  
for vendor or other person doing business with local governmental entity

The attached questionnaire is being filed in accordance with chapter 176 of the Local Government Code by a vendor who has a business relationship as defined by Section 176.001(1-a) with a local governmental entity and the vendor meets requirements under Section 176.006(a).

This questionnaire reflects changes made to the law by H.B. 23, 84<sup>th</sup> Leg., Regular Session, which became effective September 1, 2015. This form was adopted by the Texas Ethics Commission, November 30, 2015.

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# CONFLICT OF INTEREST QUESTIONNAIRE

For vendor doing business with local governmental entity

## FORM CIQ

This questionnaire reflects changes made to the law by H.B. 23, 84th Leg., Regular Session.

This questionnaire is being filed in accordance with Chapter 176, Local Government Code, by a vendor who has a business relationship as defined by Section 176.001(1-a) with a local governmental entity and the vendor meets requirements under Section 176.006(a).

By law this questionnaire must be filed with the records administrator of the local governmental entity not later than the 7th business day after the date the vendor becomes aware of facts that require the statement to be filed. See Section 176.006(a-1), Local Government Code.

A vendor commits an offense if the vendor knowingly violates Section 176.006, Local Government Code. An offense under this section is a misdemeanor.

### OFFICE USE ONLY

Date Received

**1** Name of vendor who has a business relationship with local governmental entity.

**2**  Check this box if you are filing an update to a previously filed questionnaire. (The law requires that you file an updated completed questionnaire with the appropriate filing authority not later than the 7th business day after the date on which you became aware that the originally filed questionnaire was incomplete or inaccurate.)

**3** Name of local government officer about whom the information is being disclosed.

\_\_\_\_\_  
Name of Officer

**4** Describe each employment or other business relationship with the local government officer, or a family member of the officer, as described by Section 176.003(a)(2)(A). Also describe any family relationship with the local government officer. Complete subparts A and B for each employment or business relationship described. Attach additional pages to this Form CIQ as necessary.

A. Is the local government officer or a family member of the officer receiving or likely to receive taxable income, other than investment income, from the vendor?

Yes       No

B. Is the vendor receiving or likely to receive taxable income, other than investment income, from or at the direction of the local government officer or a family member of the officer AND the taxable income is not received from the local governmental entity?

Yes       No

**5** Describe each employment or business relationship that the vendor named in Section 1 maintains with a corporation or other business entity with respect to which the local government officer serves as an officer or director, or holds an ownership interest of one percent or more.

**6**  Check this box if the vendor has given the local government officer or a family member of the officer one or more gifts as described in Section 176.003(a)(2)(B), excluding gifts described in Section 176.003(a-1).

**7**

\_\_\_\_\_  
Signature of vendor doing business with the governmental entity

\_\_\_\_\_  
Date

## **CONFLICT OF INTEREST QUESTIONNAIRE**

### **For vendor doing business with local governmental entity**

A complete copy of Chapter 176 of the Local Government Code may be found at <http://www.statutes.legis.state.tx.us/Docs/LG/htm/LG.176.htm>. For easy reference, below are some of the sections cited on this form.

**Local Government Code § 176.001(1-a):** "Business relationship" means a connection between two or more parties based on commercial activity of one of the parties. The term does not include a connection based on:

- (A) a transaction that is subject to rate or fee regulation by a federal, state, or local governmental entity or an agency of a federal, state, or local governmental entity;
- (B) a transaction conducted at a price and subject to terms available to the public; or
- (C) a purchase or lease of goods or services from a person that is chartered by a state or federal agency and that is subject to regular examination by, and reporting to, that agency.

**Local Government Code § 176.003(a)(2)(A) and (B):**

(a) A local government officer shall file a conflicts disclosure statement with respect to a vendor if:

\*\*\*

(2) the vendor:

(A) has an employment or other business relationship with the local government officer or a family member of the officer that results in the officer or family member receiving taxable income, other than investment income, that exceeds \$2,500 during the 12-month period preceding the date that the officer becomes aware that

- (i) a contract between the local governmental entity and vendor has been executed;
- or
- (ii) the local governmental entity is considering entering into a contract with the vendor;

(B) has given to the local government officer or a family member of the officer one or more gifts that have an aggregate value of more than \$100 in the 12-month period preceding the date the officer becomes aware that:

- (i) a contract between the local governmental entity and vendor has been executed; or
- (ii) the local governmental entity is considering entering into a contract with the vendor.

**Local Government Code § 176.006(a) and (a-1)**

(a) A vendor shall file a completed conflict of interest questionnaire if the vendor has a business relationship with a local governmental entity and:

- (1) has an employment or other business relationship with a local government officer of that local governmental entity, or a family member of the officer, described by Section 176.003(a)(2)(A);
- (2) has given a local government officer of that local governmental entity, or a family member of the officer, one or more gifts with the aggregate value specified by Section 176.003(a)(2)(B), excluding any gift described by Section 176.003(a-1); or
- (3) has a family relationship with a local government officer of that local governmental entity.

(a-1) The completed conflict of interest questionnaire must be filed with the appropriate records administrator not later than the seventh business day after the later of:

(1) the date that the vendor:

- (A) begins discussions or negotiations to enter into a contract with the local governmental entity; or
- (B) submits to the local governmental entity an application, response to a request for proposals or bids, correspondence, or another writing related to a potential contract with the local governmental entity; or

(2) the date the vendor becomes aware:

- (A) of an employment or other business relationship with a local government officer, or a family member of the officer, described by Subsection (a);
- (B) that the vendor has given one or more gifts described by Subsection (a); or
- (C) of a family relationship with a local government officer.



DOCUMENT 00 61 13.13

**PERFORMANCE BOND FORM**  
(Penalty of this bond must be 100% of contract amount)

**Bond No.:** \_\_\_\_\_

KNOW ALL MEN BY THESE PRESENTS, that: \_\_\_\_\_  
(hereinafter called the Principal), as principal, and  
a corporation organized and existing under the laws of the State of \_\_\_\_\_ authorized and admitted to  
do business in the State of Texas and licensed by the State of Texas to execute bonds as Surety (hereinafter called the Surety), as  
Surety, are held and firmly bound unto

\_\_\_\_\_

(hereinafter called the Obligee) in the amount of \_\_\_\_\_

\_\_\_\_\_

Dollars(\$ \_\_\_\_\_) for the payment whereof, the said Principal and Surety bind themselves, and their heirs,  
administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has entered into a certain written contract with the Obligee, dated this \_\_\_\_\_ day of  
\_\_\_\_\_, \_\_\_\_\_.

**2024 FACILITY RENOVATION PROJECT  
KLEIN I.S.D.  
KLEIN, TEXAS**

which contract is hereby referred to and made a part hereof as fully and the same extent as if copied at length herein.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that if the said Principal shall faithfully perform  
the work in accordance with the plans, specifications and contract documents, then this obligation shall be void; otherwise to  
remain in full force and effect.

PROVIDED, HOWEVER, that this bond is executed pursuant to the provisions of Chapter 22.53 of the Texas Government Code  
and all liabilities on this bond shall be determined in accordance with the provisions of said Chapter to the same extent as if it  
were copied at length herein.

IN WITNESS WHEREOF, the said Principal and Surety have signed and sealed this Instrument this \_\_\_\_\_ day of  
\_\_\_\_\_, \_\_\_\_\_.

\_\_\_\_\_  
Principal (Seal)

Surety Address By: \_\_\_\_\_

\_\_\_\_\_  
Surety (Seal)

Surety Telephone Number By: \_\_\_\_\_  
Attorney-in-Fact

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**DOCUMENT 00 61 13.16**

**PAYMENT BOND FORM**

**Bond No.:** \_\_\_\_\_

(Penalty of this bond must be 100% of contract amount)

KNOW ALL MEN BY THESE PRESENTS, that: \_\_\_\_\_  
(hereinafter called the Principal), as principal,  
a corporation organized and existing under the laws of the State of \_\_\_\_\_ authorized and admitted to  
do business in the State of Texas and licensed by the State of Texas to execute bonds as Surety (hereinafter called the Surety), as  
Surety, are held and firmly bound unto

\_\_\_\_\_

(hereinafter called the Obligee) in the amount of \_\_\_\_\_

\_\_\_\_\_ Dollars(\$ \_\_\_\_\_) for the payment whereof, the said Principal and Surety bind themselves, and their heirs,  
administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has entered into a certain written contract with the Obligee, dated this \_\_\_\_\_ day of  
\_\_\_\_\_, \_\_\_\_\_.

**2024 FACILITY RENOVATION PROJECT (FRP)  
KLEIN I.S.D.  
KLEIN, TEXAS**

which contract is hereby referred to and made a part hereof as fully and the same extent as if copied at length herein.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that if the said Principal shall pay all claimants  
supplying labor and material to him or a Subcontractor in the prosecution of the work provided for in said contract, then this  
obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, HOWEVER, that this bond is executed pursuant to the provisions of Chapter 22.53 of the Texas Government Code  
and all liabilities on this bond to all such claimants shall be determined in accordance with the provisions of said Chapter to the  
same extent as if it were copied at length herein.

IN WITNESS WHEREOF, the said Principal and Surety have signed and sealed this Instrument this \_\_\_\_\_ day of  
\_\_\_\_\_, \_\_\_\_\_.

Witness: \_\_\_\_\_ (Seal)  
Principal

\_\_\_\_\_ By: \_\_\_\_\_

Witness: \_\_\_\_\_ (Seal)  
Surety

\_\_\_\_\_ By: \_\_\_\_\_  
Attorney-in-Fact

\_\_\_\_\_ Surety Address

\_\_\_\_\_ Surety Telephone Number

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DOCUMENT 00 65 00  
RELEASE OF LIEN DOCUMENTS

**APPENDIX INDEX:**

1. **CONDITIONAL WAIVER FOR PROGRESS PAYMENTS**
2. **UNCONDITIONAL WAIVER FOR PROGRESS PAYMENTS**
3. **CONDITIONAL WAIVER FOR FINAL PAYMENT**
4. **UNCONDITIONAL WAIVER FOR FINAL PAYMENT**

[Note: the attached forms are duplicated *verbatim* (without editing) from HB 1456.]

**FORM 1: CONDITIONAL WAIVER FOR PROGRESS PAYMENTS**

\* \* \* \* \*

**CONDITIONAL WAIVER AND RELEASE ON PROGRESS PAYMENT**

Project:

Job No.:

On receipt by the signer of this document of a check from \_\_\_\_\_

(maker of check) in the sum of \$ \_\_\_\_\_  
payable to \_\_\_\_\_

(payee or payees of check) and when the check has been properly endorsed and has been paid by the bank on which it is drawn, this document becomes effective to release any mechanic's lien right, any right arising from a payment bond that complies with a state or federal statute, any common law payment bond right, any claim for payment, and any rights under any similar ordinance, rule, or statute related to claim or payment rights for persons in the signer's position that the signer has on the property of \_\_\_\_\_

(owner) located at (location) to the following extent: \_\_\_\_\_

\_\_\_\_\_ (job description).

This release covers a progress payment for all labor, services, equipment, or materials furnished to the property or to \_\_\_\_\_  
(person with whom signer contracted) as indicated in the attached statement(s) or progress payment request(s), except for unpaid retention, pending modifications and changes, or other items furnished.

Before any recipient of this document relies on this document, the recipient should verify evidence of payment to the signer.

The signer warrants that the signer has already paid or will use the funds received from this progress payment to promptly pay in full all of the signer's laborers, subcontractors, materialmen, and suppliers for all work, materials, equipment, or services provided for or to the above referenced project in regard to the attached statement(s) or progress payment request(s).

Date: \_\_\_\_\_

\_\_\_\_\_ (Company name)

By \_\_\_\_\_ (Signature)

\_\_\_\_\_ (Title)

**FORM 2: UNCONDITIONAL WAIVER FOR PROGRESS PAYMENTS**

\* \* \* \* \*

NOTICE: THIS DOCUMENT WAIVES RIGHTS UNCONDITIONALLY AND STATES THAT YOU HAVE BEEN PAID FOR GIVING UP THOSE RIGHTS. IT IS PROHIBITED FOR A PERSON TO REQUIRE YOU TO SIGN THIS DOCUMENT IF YOU HAVE NOT BEEN PAID THE PAYMENT AMOUNT SET FORTH BELOW. IF YOU HAVE NOT BEEN PAID, USE A CONDITIONAL RELEASE FORM.

**UNCONDITIONAL WAIVER AND RELEASE ON PROGRESS PAYMENT**

Project:

Job No.:

The signer of this document has been paid and has received a progress payment in the sum of \$ \_\_\_\_\_ for all labor, services, equipment, or materials furnished to the property or to \_\_\_\_\_ (person with whom signer contracted) on the property of \_\_\_\_\_ (owner) located at \_\_\_\_\_ (location) to the following extent: \_\_\_\_\_

\_\_\_\_\_ (job description). The signer therefore waives and releases any mechanic's lien right, any right arising from a payment bond that complies with a state or federal statute, any common law payment bond right, any claim for payment, and any rights under any similar ordinance, rule, or statute related to claim or payment rights for persons in the signer's position that the signer has on the above referenced project to the following extent: \_\_\_\_\_

This release covers a progress payment for all labor, services, equipment, or materials furnished to the property or to \_\_\_\_\_ (person with whom signer contracted) as indicated in the attached statement(s) or progress payment request(s), except for unpaid retention, pending modifications and changes, or other items furnished.

The signer warrants that the signer has already paid or will use the funds received from this progress payment to promptly pay in **full** all of the signer's laborers, subcontractors, materialmen, and suppliers for all work, materials, equipment, or services provided for or to the above referenced project in regard to the attached statement(s) or progress payment request(s).

Date: \_\_\_\_\_

\_\_\_\_\_ (Company name)

By \_\_\_\_\_ (Signature)

\_\_\_\_\_ (Title)

**FORM 3: CONDITIONAL WAIVER FOR FINAL PAYMENT**

\* \* \* \* \*

**CONDITIONAL WAIVER AND RELEASE ON FINAL PAYMENT**

Project:

Job No.:

On receipt by the signer of this document of a check from \_\_\_\_\_

\_\_\_\_\_ (maker of check) in the sum of  
\$ \_\_\_\_\_ payable to

\_\_\_\_\_ (payee or payees of check) and when the check has been properly  
endorsed and has been paid by the bank on which it is drawn, this document becomes effective to  
release any mechanic's lien right, any right arising from a payment bond that complies with a state or  
federal statute, any common law payment bond right, any claim for payment, and any rights under any  
similar ordinance, rule, or statute related to claim or payment rights for persons in the signer's  
position that the signer has on the property of \_\_\_\_\_

\_\_\_\_\_ (owner) located at \_\_\_\_\_

\_\_\_\_\_ (location) to the following extent: \_\_\_\_\_

\_\_\_\_\_ (job description).

This release covers the final payment to the signer for all labor, services, equipment, or materials  
furnished to the property or to \_\_\_\_\_  
(person with whom signer contracted).

Before any recipient of this document relies on this document, the recipient should verify evidence of  
payment to the signer.

The signer warrants that the signer has already paid or will use the funds received from this final  
payment to promptly pay in full all of the signer's laborers, subcontractors, materialmen, and suppliers  
for all work, materials, equipment, or services provided for or to the above referenced project up to  
the date of this waiver and release.

Date: \_\_\_\_\_

\_\_\_\_\_ (Company name)

By \_\_\_\_\_ (Signature)

\_\_\_\_\_ (Title)



**FORM 4: UNCONDITIONAL WAIVER FOR FINAL PAYMENT**

\* \* \* \* \*

NOTICE: THIS DOCUMENT WAIVES RIGHTS UNCONDITIONALLY AND STATES THAT YOU HAVE BEEN PAID FOR GIVING UP THOSE RIGHTS. IT IS PROHIBITED FOR A PERSON TO REQUIRE YOU TO SIGN THIS DOCUMENT IF YOU HAVE NOT BEEN PAID THE PAYMENT AMOUNT SET FORTH BELOW. IF YOU HAVE NOT BEEN PAID, USE A CONDITIONAL RELEASE FORM.

UNCONDITIONAL WAIVER AND RELEASE ON FINAL PAYMENT

Project: \_\_\_\_\_

Job No.: \_\_\_\_\_

The signer of this document has been paid in full for all labor, services, equipment, or materials furnished to the property or to \_\_\_\_\_

\_\_\_\_\_ (person with whom signer contracted) on the property of \_\_\_\_\_

\_\_\_\_\_ (owner) located at \_\_\_\_\_

\_\_\_\_\_ (location) to the following extent \_\_\_\_\_

: \_\_\_\_\_ (job description). The signer therefore waives and releases any mechanic's lien right, any right arising from a payment bond that complies with a state or federal statute, any common law payment bond right, any claim for payment, and any rights under any similar ordinance, rule, or statute related to claim or payment rights for persons in the signer's position.

The signer warrants that the signer has already paid or will use the funds received from this final payment to promptly pay in full all of the signer's laborers, subcontractors, materialmen, and suppliers for all work, materials, equipment, or services provided for or to the above referenced project up to the date of this waiver and release.

Date: \_\_\_\_\_

\_\_\_\_\_ (Company name)

By \_\_\_\_\_ (Signature)

\_\_\_\_\_ (Title)

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# AIA® Document A201® – 2017

## General Conditions of the Contract for Construction

**for the following PROJECT:**

*(Name and location or address)*

KISD 2024 FRP  
Klein Independent School District  
KISD 2024 FRP  
VLK Project No. 24-047.00

**THE OWNER:**

*(Name, legal status and address)*

Klein Independent School District  
7200 Spring Cypress Road  
Klein, Texas 77379

**THE ARCHITECT:**

*(Name, legal status and address)*

VLK Architects, LLC  
20445 State Highway 249, Suite 350  
Houston, Texas 77070

**TABLE OF ARTICLES**

- 1 GENERAL PROVISIONS
- 2 OWNER
- 3 CONTRACTOR
- 4 ARCHITECT
- 5 SUBCONTRACTORS
- 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS
- 7 CHANGES IN THE WORK
- 8 TIME
- 9 PAYMENTS AND COMPLETION
- 10 PROTECTION OF PERSONS AND PROPERTY
- 11 INSURANCE AND BONDS
- 12 UNCOVERING AND CORRECTION OF WORK
- 13 MISCELLANEOUS PROVISIONS

**ADDITIONS AND DELETIONS:**

The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

For guidance in modifying this document to include supplementary conditions, see AIA Document A503™, Guide for Supplementary Conditions.

Init.

/

User Notes:

(2034853681)

14 TERMINATION OR SUSPENSION OF THE CONTRACT

15 CLAIMS AND DISPUTES



Init.

/

## INDEX

(Topics and numbers in bold are Section headings.)

### Acceptance of Nonconforming Work

9.6.6, 9.9.3, **12.3**

Acceptance of Work

9.6.6, 9.8.2, 9.9.3, 9.10.1, 9.10.3, 12.3

### Access to Work

**3.16**, 6.2.1, 12.1

Accident Prevention

10

Acts and Omissions

3.2, 3.3.2, 3.12.8, 3.18, 4.2.3, 8.3.1, 9.5.1, 10.2.5,  
10.2.8, 13.3.2, 14.1, 15.1.2, 15.2

Addenda

1.1.1

Additional Costs, Claims for

3.7.4, 3.7.5, 10.3.2, 15.1.5

### Additional Inspections and Testing

9.4.2, 9.8.3, 12.2.1, **13.4**

### Additional Time, Claims for

3.2.4, 3.7.4, 3.7.5, 3.10.2, 8.3.2, **15.1.6**

### Administration of the Contract

3.1.3, **4.2**, 9.4, 9.5

Advertisement or Invitation to Bid

1.1.1

Aesthetic Effect

4.2.13

### Allowances

**3.8**

### Applications for Payment

4.2.5, 7.3.9, 9.2, **9.3**, 9.4, 9.5.1, 9.5.4, 9.6.3, 9.7, 9.10

Approvals

2.1.1, 2.3.1, 2.5, 3.1.3, 3.10.2, 3.12.8, 3.12.9,  
3.12.10.1, 4.2.7, 9.3.2, 13.4.1

### Arbitration

8.3.1, 15.3.2, **15.4**

## ARCHITECT

**4**

Architect, Definition of

### 4.1.1

Architect, Extent of Authority

2.5, 3.12.7, 4.1.2, 4.2, 5.2, 6.3, 7.1.2, 7.3.4, 7.4, 9.2,  
9.3.1, 9.4, 9.5, 9.6.3, 9.8, 9.10.1, 9.10.3, 12.1, 12.2.1,  
13.4.1, 13.4.2, 14.2.2, 14.2.4, 15.1.4, 15.2.1

Architect, Limitations of Authority and Responsibility

2.1.1, 3.12.4, 3.12.8, 3.12.10, 4.1.2, 4.2.1, 4.2.2, 4.2.3,  
4.2.6, 4.2.7, 4.2.10, 4.2.12, 4.2.13, 5.2.1, 7.4, 9.4.2,  
9.5.4, 9.6.4, 15.1.4, 15.2

Architect's Additional Services and Expenses

2.5, 12.2.1, 13.4.2, 13.4.3, 14.2.4

Architect's Administration of the Contract

3.1.3, 3.7.4, 15.2, 9.4.1, 9.5

Architect's Approvals

2.5, 3.1.3, 3.5, 3.10.2, 4.2.7

Architect's Authority to Reject Work

3.5, 4.2.6, 12.1.2, 12.2.1

Architect's Copyright

1.1.7, 1.5

Architect's Decisions

3.7.4, 4.2.6, 4.2.7, 4.2.11, 4.2.12, 4.2.13, 4.2.14, 6.3,  
7.3.4, 7.3.9, 8.1.3, 8.3.1, 9.2, 9.4.1, 9.5, 9.8.4, 9.9.1,  
13.4.2, 15.2

Architect's Inspections

3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.8.3, 9.9.2, 9.10.1, 13.4

Architect's Instructions

3.2.4, 3.3.1, 4.2.6, 4.2.7, 13.4.2

Architect's Interpretations

4.2.11, 4.2.12

Architect's Project Representative

4.2.10

Architect's Relationship with Contractor

1.1.2, 1.5, 2.3.3, 3.1.3, 3.2.2, 3.2.3, 3.2.4, 3.3.1, 3.4.2,  
3.5, 3.7.4, 3.7.5, 3.9.2, 3.9.3, 3.10, 3.11, 3.12, 3.16,  
3.18, 4.1.2, 4.2, 5.2, 6.2.2, 7, 8.3.1, 9.2, 9.3, 9.4, 9.5,  
9.7, 9.8, 9.9, 10.2.6, 10.3, 11.3, 12, 13.3.2, 13.4, 15.2

Architect's Relationship with Subcontractors

1.1.2, 4.2.3, 4.2.4, 4.2.6, 9.6.3, 9.6.4, 11.3

Architect's Representations

9.4.2, 9.5.1, 9.10.1

Architect's Site Visits

3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.5.1, 9.9.2, 9.10.1, 13.4

Asbestos

10.3.1

Attorneys' Fees

3.18.1, 9.6.8, 9.10.2, 10.3.3

Award of Separate Contracts

6.1.1, 6.1.2

### Award of Subcontracts and Other Contracts for Portions of the Work

**5.2**

### Basic Definitions

**1.1**

Bidding Requirements

1.1.1

Binding Dispute Resolution

8.3.1, 9.7, 11.5, 13.1, 15.1.2, 15.1.3, 15.2.1, 15.2.5,  
15.2.6.1, 15.3.1, 15.3.2, 15.3.3, 15.4.1

Bonds, Lien

7.3.4.4, 9.6.8, 9.10.2, 9.10.3

### Bonds, Performance, and Payment

7.3.4.4, 9.6.7, 9.10.3, **11.1.2**, 11.1.3, **11.5**

### Building Information Models Use and Reliance

**1.8**

Building Permit

3.7.1

### Capitalization

**1.3**

Certificate of Substantial Completion

9.8.3, 9.8.4, 9.8.5

## **Certificates for Payment**

4.2.1, 4.2.5, 4.2.9, 9.3.3, **9.4**, 9.5, 9.6.1, 9.6.6, 9.7, 9.10.1, 9.10.3, 14.1.1.3, 14.2.4, 15.1.4

Certificates of Inspection, Testing or Approval  
13.4.4

Certificates of Insurance  
9.10.2

## **Change Orders**

1.1.1, 3.4.2, 3.7.4, 3.8.2.3, 3.11, 3.12.8, 4.2.8, 5.2.3, 7.1.2, 7.1.3, **7.2**, 7.3.2, 7.3.7, 7.3.9, 7.3.10, 8.3.1, 9.3.1.1, 9.10.3, 10.3.2, 11.2, 11.5, 12.1.2

**Change Orders**, Definition of

### **7.2.1**

## **CHANGES IN THE WORK**

2.2.2, 3.11, 4.2.8, **7**, 7.2.1, 7.3.1, 7.4, 8.3.1, 9.3.1.1, 11.5

**Claims**, Definition of

### **15.1.1**

Claims, Notice of  
1.6.2, 15.1.3

## **CLAIMS AND DISPUTES**

3.2.4, 6.1.1, 6.3, 7.3.9, 9.3.3, 9.10.4, 10.3.3, **15**, 15.4  
Claims and Timely Assertion of Claims  
15.4.1

**Claims for Additional Cost**

3.2.4, 3.3.1, 3.7.4, 7.3.9, 9.5.2, 10.2.5, 10.3.2, **15.1.5**

**Claims for Additional Time**

3.2.4, 3.3.1, 3.7.4, 6.1.1, 8.3.2, 9.5.2, 10.3.2, **15.1.6**

**Concealed or Unknown Conditions, Claims for**  
**3.7.4**

Claims for Damages

3.2.4, 3.18, 8.3.3, 9.5.1, 9.6.7, 10.2.5, 10.3.3, 11.3, 11.3.2, 14.2.4, 15.1.7

Claims Subject to Arbitration  
15.4.1

**Cleaning Up**

**3.15**, 6.3

Commencement of the Work, Conditions Relating to  
2.2.1, 3.2.2, 3.4.1, 3.7.1, 3.10.1, 3.12.6, 5.2.1, 5.2.3, 6.2.2, 8.1.2, 8.2.2, 8.3.1, 11.1, 11.2, **15.1.5**

**Commencement of the Work**, Definition of  
**8.1.2**

**Communications**

3.9.1, **4.2.4**

Completion, Conditions Relating to

3.4.1, 3.11, 3.15, 4.2.2, 4.2.9, 8.2, 9.4.2, 9.8, 9.9.1, 9.10, 12.2, 14.1.2, 15.1.2

**COMPLETION, PAYMENTS AND**  
**9**

Completion, Substantial

3.10.1, 4.2.9, 8.1.1, 8.1.3, 8.2.3, 9.4.2, 9.8, 9.9.1, 9.10.3, 12.2, 15.1.2

Compliance with Laws

2.3.2, 3.2.3, 3.6, 3.7, 3.12.10, 3.13, 9.6.4, 10.2.2, 13.1, 13.3, 13.4.1, 13.4.2, 13.5, 14.1.1, 14.2.1.3, 15.2.8, 15.4.2, 15.4.3

Concealed or Unknown Conditions

3.7.4, 4.2.8, 8.3.1, 10.3

Conditions of the Contract

1.1.1, 6.1.1, 6.1.4

Consent, Written

3.4.2, 3.14.2, 4.1.2, 9.8.5, 9.9.1, 9.10.2, 9.10.3, 13.2, 15.4.4.2

**Consolidation or Joinder**

### **15.4.4**

**CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS**

1.1.4, **6**

**Construction Change Directive**, Definition of  
**7.3.1**

**Construction Change Directives**

1.1.1, 3.4.2, 3.11, 3.12.8, 4.2.8, 7.1.1, 7.1.2, 7.1.3, **7.3**, 9.3.1.1

Construction Schedules, Contractor's

3.10, 3.11, 3.12.1, 3.12.2, 6.1.3, 15.1.6.2

**Contingent Assignment of Subcontracts**

**5.4**, 14.2.2.2

**Continuing Contract Performance**

### **15.1.4**

**Contract**, Definition of

### **1.1.2**

**CONTRACT, TERMINATION OR SUSPENSION OF THE**

5.4.1.1, 5.4.2, 11.5, **14**

Contract Administration

3.1.3, 4, 9.4, 9.5

Contract Award and Execution, Conditions Relating to

3.7.1, 3.10, 5.2, 6.1

Contract Documents, Copies Furnished and Use of  
1.5.2, 2.3.6, 5.3

**Contract Documents**, Definition of

### **1.1.1**

**Contract Sum**

2.2.2, 2.2.4, 3.7.4, 3.7.5, 3.8, 3.10.2, 5.2.3, 7.3, 7.4, **9.1**, 9.2, 9.4.2, 9.5.1.4, 9.6.7, 9.7, 10.3.2, 11.5, 12.1.2, 12.3, 14.2.4, 14.3.2, 15.1.4.2, **15.1.5**, **15.2.5**

**Contract Sum**, Definition of

### **9.1**

Contract Time

1.1.4, 2.2.1, 2.2.2, 3.7.4, 3.7.5, 3.10.2, 5.2.3, 6.1.5, 7.2.1.3, 7.3.1, 7.3.5, 7.3.6, 7, 7, 7.3.10, 7.4, 8.1.1, 8.2.1, 8.2.3, 8.3.1, 9.5.1, 9.7, 10.3.2, 12.1.1, 12.1.2, 14.3.2, 15.1.4.2, 15.1.6.1, 15.2.5

**Contract Time**, Definition of

8.1.1

**CONTRACTOR**

### **3**

Contractor, Definition of

### **3.1**

**3.1**, **6.1.2**

**Contractor's Construction and Submittal Schedules**

**3.10**, 3.12.1, 3.12.2, 4.2.3, 6.1.3, 15.1.6.2

Contractor's Employees  
2.2.4, 3.3.2, 3.4.3, 3.8.1, 3.9, 3.18.2, 4.2.3, 4.2.6, 10.2,  
10.3, 11.3, 14.1, 14.2.1.1

### **Contractor's Liability Insurance**

#### **11.1**

Contractor's Relationship with Separate Contractors  
and Owner's Forces

3.12.5, 3.14.2, 4.2.4, 6, 11.3, 12.2.4

Contractor's Relationship with Subcontractors

1.2.2, 2.2.4, 3.3.2, 3.18.1, 3.18.2, 4.2.4, 5, 9.6.2, 9.6.7,  
9.10.2, 11.2, 11.3, 11.4

Contractor's Relationship with the Architect

1.1.2, 1.5, 2.3.3, 3.1.3, 3.2.2, 3.2.3, 3.2.4, 3.3.1, 3.4.2,  
3.5.1, 3.7.4, 3.10, 3.11, 3.12, 3.16, 3.18, 4.2, 5.2, 6.2.2,  
7, 8.3.1, 9.2, 9.3, 9.4, 9.5, 9.7, 9.8, 9.9, 10.2.6, 10.3,  
11.3, 12, 13.4, 15.1.3, 15.2.1

Contractor's Representations

3.2.1, 3.2.2, 3.5, 3.12.6, 6.2.2, 8.2.1, 9.3.3, 9.8.2

Contractor's Responsibility for Those Performing the  
Work

3.3.2, 3.18, 5.3, 6.1.3, 6.2, 9.5.1, 10.2.8

Contractor's Review of Contract Documents

3.2

Contractor's Right to Stop the Work

2.2.2, 9.7

Contractor's Right to Terminate the Contract

14.1

Contractor's Submittals

3.10, 3.11, 3.12, 4.2.7, 5.2.1, 5.2.3, 9.2, 9.3, 9.8.2,  
9.8.3, 9.9.1, 9.10.2, 9.10.3

Contractor's Superintendent

3.9, 10.2.6

Contractor's Supervision and Construction

Procedures

1.2.2, 3.3, 3.4, 3.12.10, 4.2.2, 4.2.7, 6.1.3, 6.2.4, 7.1.3,  
7.3.4, 7.3.6, 8.2, 10, 12, 14, 15.1.4

Coordination and Correlation

1.2, 3.2.1, 3.3.1, 3.10, 3.12.6, 6.1.3, 6.2.1

Copies Furnished of Drawings and Specifications

1.5, 2.3.6, 3.11

Copyrights

1.5, **3.17**

Correction of Work

2.5, 3.7.3, 9.4.2, 9.8.2, 9.8.3, 9.9.1, 12.1.2, **12.2**, 12.3,  
15.1.3.1, 15.1.3.2, 15.2.1

**Correlation and Intent of the Contract Documents**

**1.2**

**Cost**, Definition of

**7.3.4**

Costs

2.5, 3.2.4, 3.7.3, 3.8.2, 3.15.2, 5.4.2, 6.1.1, 6.2.3,  
7.3.3.3, 7.3.4, 7.3.8, 7.3.9, 9.10.2, 10.3.2, 10.3.6, 11.2,  
12.1.2, 12.2.1, 12.2.4, 13.4, 14

**Cutting and Patching**

**3.14**, 6.2.5

Damage to Construction of Owner or Separate  
Contractors

3.14.2, 6.2.4, 10.2.1.2, 10.2.5, 10.4, 12.2.4

Damage to the Work

3.14.2, 9.9.1, 10.2.1.2, 10.2.5, 10.4, 12.2.4

Damages, Claims for

3.2.4, 3.18, 6.1.1, 8.3.3, 9.5.1, 9.6.7, 10.3.3, 11.3.2,  
11.3, 14.2.4, 15.1.7

Damages for Delay

6.2.3, 8.3.3, 9.5.1.6, 9.7, 10.3.2, 14.3.2

**Date of Commencement of the Work**, Definition of

**8.1.2**

**Date of Substantial Completion**, Definition of

**8.1.3**

**Day**, Definition of

**8.1.4**

Decisions of the Architect

3.7.4, 4.2.6, 4.2.7, 4.2.11, 4.2.12, 4.2.13, 6.3, 7.3.4,  
7.3.9, 8.1.3, 8.3.1, 9.2, 9.4, 9.5.1, 9.8.4, 9.9.1, 13.4.2,  
14.2.2, 14.2.4, 15.1, 15.2

**Decisions to Withhold Certification**

9.4.1, **9.5**, 9.7, 14.1.1.3

Defective or Nonconforming Work, Acceptance,  
Rejection and Correction of

2.5, 3.5, 4.2.6, 6.2.3, 9.5.1, 9.5.3, 9.6.6, 9.8.2, 9.9.3,  
9.10.4, 12.2.1

Definitions

1.1, 2.1.1, 3.1.1, 3.5, 3.12.1, 3.12.2, 3.12.3, 4.1.1, 5.1,  
6.1.2, 7.2.1, 7.3.1, 8.1, 9.1, 9.8.1, 15.1.1

**Delays and Extensions of Time**

**3.2**, **3.7.4**, 5.2.3, 7.2.1, 7.3.1, **7.4**, **8.3**, 9.5.1, **9.7**,  
10.3.2, **10.4**, 14.3.2, **15.1.6**, 15.2.5

**Digital Data Use and Transmission**

**1.7**

Disputes

6.3, 7.3.9, 15.1, 15.2

**Documents and Samples at the Site**

**3.11**

**Drawings**, Definition of

**1.1.5**

Drawings and Specifications, Use and Ownership of

3.11

Effective Date of Insurance

8.2.2

**Emergencies**

**10.4**, 14.1.1.2, **15.1.5**

Employees, Contractor's

3.3.2, 3.4.3, 3.8.1, 3.9, 3.18.2, 4.2.3, 4.2.6, 10.2,  
10.3.3, 11.3, 14.1, 14.2.1.1

Equipment, Labor, or Materials

1.1.3, 1.1.6, 3.4, 3.5, 3.8.2, 3.8.3, 3.12, 3.13, 3.15.1,  
4.2.6, 4.2.7, 5.2.1, 6.2.1, 7.3.4, 9.3.2, 9.3.3, 9.5.1.3,  
9.10.2, 10.2.1, 10.2.4, 14.2.1.1, 14.2.1.2

Execution and Progress of the Work

1.1.3, 1.2.1, 1.2.2, 2.3.4, 2.3.6, 3.1, 3.3.1, 3.4.1, 3.7.1,  
3.10.1, 3.12, 3.14, 4.2, 6.2.2, 7.1.3, 7.3.6, 8.2, 9.5.1,  
9.9.1, 10.2, 10.3, 12.1, 12.2, 14.2, 14.3.1, 15.1.4

Extensions of Time  
3.2.4, 3.7.4, 5.2.3, 7.2.1, 7.3, 7.4, 9.5.1, 9.7, 10.3.2,  
10.4, 14.3, 15.1.6, **15.2.5**

#### **Failure of Payment**

9.5.1.3, **9.7**, 9.10.2, 13.5, 14.1.1.3, 14.2.1.2

#### **Faulty Work**

(See Defective or Nonconforming Work)

#### **Final Completion and Final Payment**

4.2.1, 4.2.9, 9.8.2, **9.10**, 12.3, 14.2.4, 14.4.3

#### **Financial Arrangements, Owner's**

2.2.1, 13.2.2, 14.1.1.4

### **GENERAL PROVISIONS**

#### **1**

#### **Governing Law**

##### **13.1**

Guarantees (See Warranty)

#### **Hazardous Materials and Substances**

10.2.4, **10.3**

#### **Identification of Subcontractors and Suppliers**

5.2.1

#### **Indemnification**

3.17, **3.18**, 9.6.8, 9.10.2, 10.3.3, 11.3

#### **Information and Services Required of the Owner**

2.1.2, **2.2**, 2.3, 3.2.2, 3.12.10.1, 6.1.3, 6.1.4, 6.2.5,  
9.6.1, 9.9.2, 9.10.3, 10.3.3, 11.2, 13.4.1, 13.4.2,  
14.1.1.4, 14.1.4, 15.1.4

#### **Initial Decision**

##### **15.2**

#### **Initial Decision Maker, Definition of**

1.1.8

#### **Initial Decision Maker, Decisions**

14.2.4, 15.1.4.2, 15.2.1, 15.2.2, 15.2.3, 15.2.4, 15.2.5

#### **Initial Decision Maker, Extent of Authority**

14.2.4, 15.1.4.2, 15.2.1, 15.2.2, 15.2.3, 15.2.4, 15.2.5

#### **Injury or Damage to Person or Property**

**10.2.8**, 10.4

#### **Inspections**

3.1.3, 3.3.3, 3.7.1, 4.2.2, 4.2.6, 4.2.9, 9.4.2, 9.8.3,  
9.9.2, 9.10.1, 12.2.1, 13.4

#### **Instructions to Bidders**

1.1.1

#### **Instructions to the Contractor**

3.2.4, 3.3.1, 3.8.1, 5.2.1, 7, 8.2.2, 12, 13.4.2

#### **Instruments of Service, Definition of**

##### **1.1.7**

#### **Insurance**

6.1.1, 7.3.4, 8.2.2, 9.3.2, 9.8.4, 9.9.1, 9.10.2, 10.2.5, **11**

#### **Insurance, Notice of Cancellation or Expiration**

11.1.4, 11.2.3

#### **Insurance, Contractor's Liability**

##### **11.1**

Insurance, Effective Date of  
8.2.2, 14.4.2

#### **Insurance, Owner's Liability**

##### **11.2**

#### **Insurance, Property**

**10.2.5**, 11.2, 11.4, 11.5

#### **Insurance, Stored Materials**

9.3.2

### **INSURANCE AND BONDS**

#### **11**

#### **Insurance Companies, Consent to Partial Occupancy**

9.9.1

#### **Insured loss, Adjustment and Settlement of**

11.5

#### **Intent of the Contract Documents**

1.2.1, 4.2.7, 4.2.12, 4.2.13

#### **Interest**

##### **13.5**

#### **Interpretation**

1.1.8, 1.2.3, **1.4**, 4.1.1, 5.1, 6.1.2, 15.1.1

#### **Interpretations, Written**

4.2.11, 4.2.12

#### **Judgment on Final Award**

15.4.2

#### **Labor and Materials, Equipment**

1.1.3, 1.1.6, **3.4**, 3.5, 3.8.2, 3.8.3, 3.12, 3.13, 3.15.1,  
5.2.1, 6.2.1, 7.3.4, 9.3.2, 9.3.3, 9.5.1.3, 9.10.2, 10.2.1,  
10.2.4, 14.2.1.1, 14.2.1.2

#### **Labor Disputes**

8.3.1

#### **Laws and Regulations**

1.5, 2.3.2, 3.2.3, 3.2.4, 3.6, 3.7, 3.12.10, 3.13, 9.6.4,  
9.9.1, 10.2.2, 13.1, 13.3.1, 13.4.2, 13.5, 14, 15.2.8,  
15.4

#### **Liens**

2.1.2, 9.3.1, 9.3.3, 9.6.8, 9.10.2, 9.10.4, 15.2.8

#### **Limitations, Statutes of**

12.2.5, 15.1.2, 15.4.1.1

#### **Limitations of Liability**

3.2.2, 3.5, 3.12.10, 3.12.10.1, 3.17, 3.18.1, 4.2.6,  
4.2.7, 6.2.2, 9.4.2, 9.6.4, 9.6.7, 9.6.8, 10.2.5, 10.3.3,  
11.3, 12.2.5, 13.3.1

#### **Limitations of Time**

2.1.2, 2.2, 2.5, 3.2.2, 3.10, 3.11, 3.12.5, 3.15.1, 4.2.7,  
5.2, 5.3, 5.4.1, 6.2.4, 7.3, 7.4, 8.2, 9.2, 9.3.1, 9.3.3,  
9.4.1, 9.5, 9.6, 9.7, 9.8, 9.9, 9.10, 12.2, 13.4, 14, 15,  
15.1.2, 15.1.3, 15.1.5

#### **Materials, Hazardous**

10.2.4, **10.3**

#### **Materials, Labor, Equipment and**

1.1.3, 1.1.6, 3.4.1, 3.5, 3.8.2, 3.8.3, 3.12, 3.13, 3.15.1,  
5.2.1, 6.2.1, 7.3.4, 9.3.2, 9.3.3, 9.5.1.3, 9.10.2,  
10.2.1.2, 10.2.4, 14.2.1.1, 14.2.1.2

#### **Means, Methods, Techniques, Sequences and Procedures of Construction**

3.3.1, 3.12.10, 4.2.2, 4.2.7, 9.4.2

#### **Mechanic's Lien**

2.1.2, 9.3.1, 9.3.3, 9.6.8, 9.10.2, 9.10.4, 15.2.8

#### **Mediation**

8.3.1, 15.1.3.2, 15.2.1, 15.2.5, 15.2.6, **15.3**, 15.4.1,  
15.4.1.1

#### **Minor Changes in the Work**

1.1.1, 3.4.2, 3.12.8, 4.2.8, 7.1, **7.4**

Init.

/



## MISCELLANEOUS PROVISIONS

### 13

#### Modifications, Definition of

##### 1.1.1

#### Modifications to the Contract

1.1.1, 1.1.2, 2.5, 3.11, 4.1.2, 4.2.1, 5.2.3, 7, 8.3.1, 9.7, 10.3.2

#### Mutual Responsibility

### 6.2

#### Nonconforming Work, Acceptance of

9.6.6, 9.9.3, **12.3**

Nonconforming Work, Rejection and Correction of  
2.4, 2.5, 3.5, 4.2.6, 6.2.4, 9.5.1, 9.8.2, 9.9.3, 9.10.4, 12.2

#### Notice

**1.6**, 1.6.1, 1.6.2, 2.1.2, 2.2.2., 2.2.3, 2.2.4, 2.5, 3.2.4, 3.3.1, 3.7.4, 3.7.5, 3.9.2, 3.12.9, 3.12.10, 5.2.1, 7.4, 8.2.2, 9.6.8, 9.7, 9.10.1, 10.2.8, 10.3.2, 11.5, 12.2.2.1, 13.4.1, 13.4.2, 14.1, 14.2.2, 14.4.2, 15.1.3, 15.1.5, 15.1.6, 15.4.1

#### Notice of Cancellation or Expiration of Insurance

11.1.4, 11.2.3

#### Notice of Claims

1.6.2, 2.1.2, 3.7.4, 9.6.8, 10.2.8, **15.1.3**, 15.1.5, 15.1.6, 15.2.8, 15.3.2, 15.4.1

#### Notice of Testing and Inspections

13.4.1, 13.4.2

#### Observations, Contractor's

3.2, 3.7.4

#### Occupancy

2.3.1, 9.6.6, 9.8

#### Orders, Written

1.1.1, 2.4, 3.9.2, 7, 8.2.2, 11.5, 12.1, 12.2.2.1, 13.4.2, 14.3.1

## OWNER

### 2

#### Owner, Definition of

##### 2.1.1

#### Owner, Evidence of Financial Arrangements

**2.2**, 13.2.2, 14.1.1.4

#### Owner, Information and Services Required of the

2.1.2, **2.2**, 2.3, 3.2.2, 3.12.10, 6.1.3, 6.1.4, 6.2.5, 9.3.2, 9.6.1, 9.6.4, 9.9.2, 9.10.3, 10.3.3, 11.2, 13.4.1, 13.4.2, 14.1.1.4, 14.1.4, 15.1.4

#### Owner's Authority

1.5, 2.1.1, 2.3.32.4, 2.5, 3.4.2, 3.8.1, 3.12.10, 3.14.2, 4.1.2, 4.2.4, 4.2.9, 5.2.1, 5.2.4, 5.4.1, 6.1, 6.3, 7.2.1, 7.3.1, 8.2.2, 8.3.1, 9.3.2, 9.5.1, 9.6.4, 9.9.1, 9.10.2, 10.3.2, 11.4, 11.5, 12.2.2, 12.3, 13.2.2, 14.3, 14.4, 15.2.7

#### Owner's Insurance

### 11.2

#### Owner's Relationship with Subcontractors

1.1.2, 5.2, 5.3, 5.4, 9.6.4, 9.10.2, 14.2.2

#### Owner's Right to Carry Out the Work

**2.5**, 14.2.2

#### Owner's Right to Clean Up

### 6.3

#### Owner's Right to Perform Construction and to Award Separate Contracts

### 6.1

#### Owner's Right to Stop the Work

### 2.4

#### Owner's Right to Suspend the Work

14.3

#### Owner's Right to Terminate the Contract

14.2, 14.4

#### Ownership and Use of Drawings, Specifications and Other Instruments of Service

1.1.1, 1.1.6, 1.1.7, **1.5**, 2.3.6, 3.2.2, 3.11, 3.17, 4.2.12, 5.3

#### Partial Occupancy or Use

9.6.6, **9.9**

#### Patching, Cutting and

**3.14**, 6.2.5

#### Patents

3.17

#### Payment, Applications for

4.2.5, 7.3.9, 9.2, **9.3**, 9.4, 9.5, 9.6.3, 9.7, 9.8.5, 9.10.1, 14.2.3, 14.2.4, 14.4.3

#### Payment, Certificates for

4.2.5, 4.2.9, 9.3.3, **9.4**, 9.5, 9.6.1, 9.6.6, 9.7, 9.10.1, 9.10.3, 14.1.1.3, 14.2.4

#### Payment, Failure of

9.5.1.3, **9.7**, 9.10.2, 13.5, 14.1.1.3, 14.2.1.2

#### Payment, Final

4.2.1, 4.2.9, **9.10**, 12.3, 14.2.4, 14.4.3

#### Payment Bond, Performance Bond and

7.3.4.4, 9.6.7, 9.10.3, **11.1.2**

#### Payments, Progress

9.3, **9.6**, 9.8.5, 9.10.3, 14.2.3, 15.1.4

## PAYMENTS AND COMPLETION

### 9

#### Payments to Subcontractors

5.4.2, 9.5.1.3, 9.6.2, 9.6.3, 9.6.4, 9.6.7, 14.2.1.2

#### PCB

10.3.1

#### Performance Bond and Payment Bond

7.3.4.4, 9.6.7, 9.10.3, **11.1.2**

#### Permits, Fees, Notices and Compliance with Laws

2.3.1, **3.7**, 3.13, 7.3.4.4, 10.2.2

## PERSONS AND PROPERTY, PROTECTION OF

### 10

#### Polychlorinated Biphenyl

10.3.1

#### Product Data, Definition of

### 3.12.2

#### Product Data and Samples, Shop Drawings

3.11, **3.12**, 4.2.7

#### Progress and Completion

4.2.2, **8.2**, 9.8, 9.9.1, 14.1.4, 15.1.4

#### Progress Payments

9.3, **9.6**, 9.8.5, 9.10.3, 14.2.3, 15.1.4

**Project, Definition of**  
**1.1.4**  
Project Representatives  
4.2.10  
**Property Insurance**  
10.2.5, **11.2**  
**Proposal Requirements**  
1.1.1  
**PROTECTION OF PERSONS AND PROPERTY**  
**10**  
Regulations and Laws  
1.5, 2.3.2, 3.2.3, 3.6, 3.7, 3.12.10, 3.13, 9.6.4, 9.9.1,  
10.2.2, 13.1, 13.3, 13.4.1, 13.4.2, 13.5, 14, 15.2.8, 15.4  
Rejection of Work  
4.2.6, 12.2.1  
Releases and Waivers of Liens  
9.3.1, 9.10.2  
Representations  
3.2.1, 3.5, 3.12.6, 8.2.1, 9.3.3, 9.4.2, 9.5.1, 9.10.1  
Representatives  
2.1.1, 3.1.1, 3.9, 4.1.1, 4.2.10, 13.2.1  
Responsibility for Those Performing the Work  
3.3.2, 3.18, 4.2.2, 4.2.3, 5.3, 6.1.3, 6.2, 6.3, 9.5.1, 10  
Retainage  
9.3.1, 9.6.2, 9.8.5, 9.9.1, 9.10.2, 9.10.3  
**Review of Contract Documents and Field**  
**Conditions by Contractor**  
**3.2**, 3.12.7, 6.1.3  
Review of Contractor's Submittals by Owner and  
Architect  
3.10.1, 3.10.2, 3.11, 3.12, 4.2, 5.2, 6.1.3, 9.2, 9.8.2  
Review of Shop Drawings, Product Data and Samples  
by Contractor  
3.12  
**Rights and Remedies**  
1.1.2, 2.4, 2.5, 3.5, 3.7.4, 3.15.2, 4.2.6, 5.3, 5.4, 6.1,  
6.3, 7.3.1, 8.3, 9.5.1, 9.7, 10.2.5, 10.3, 12.2.1, 12.2.2,  
12.2.4, **13.3**, 14, 15.4  
**Royalties, Patents and Copyrights**  
**3.17**  
Rules and Notices for Arbitration  
15.4.1  
**Safety of Persons and Property**  
**10.2**, 10.4  
**Safety Precautions and Programs**  
3.3.1, 4.2.2, 4.2.7, 5.3, **10.1**, 10.2, 10.4  
**Samples, Definition of**  
**3.12.3**  
**Samples, Shop Drawings, Product Data and**  
3.11, **3.12**, 4.2.7  
**Samples at the Site, Documents and**  
**3.11**  
**Schedule of Values**  
**9.2**, 9.3.1  
Schedules, Construction  
3.10, 3.12.1, 3.12.2, 6.1.3, 15.1.6.2

Separate Contracts and Contractors  
1.1.4, 3.12.5, 3.14.2, 4.2.4, 4.2.7, 6, 8.3.1, 12.1.2  
**Separate Contractors, Definition of**  
**6.1.1**  
**Shop Drawings, Definition of**  
**3.12.1**  
**Shop Drawings, Product Data and Samples**  
3.11, **3.12**, 4.2.7  
**Site, Use of**  
**3.13**, 6.1.1, 6.2.1  
Site Inspections  
3.2.2, 3.3.3, 3.7.1, 3.7.4, 4.2, 9.9.2, 9.4.2, 9.10.1, 13.4  
Site Visits, Architect's  
3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.5.1, 9.9.2, 9.10.1, 13.4  
Special Inspections and Testing  
4.2.6, 12.2.1, 13.4  
**Specifications, Definition of**  
**1.1.6**  
**Specifications**  
1.1.1, **1.1.6**, 1.2.2, 1.5, 3.12.10, 3.17, 4.2.14  
Statute of Limitations  
15.1.2, 15.4.1.1  
Stopping the Work  
2.2.2, 2.4, 9.7, 10.3, 14.1  
Stored Materials  
6.2.1, 9.3.2, 10.2.1.2, 10.2.4  
**Subcontractor, Definition of**  
**5.1.1**  
**SUBCONTRACTORS**  
**5**  
Subcontractors, Work by  
1.2.2, 3.3.2, 3.12.1, 3.18, 4.2.3, 5.2.3, 5.3, 5.4, 9.3.1.2,  
9.6.7  
**Subcontractual Relations**  
**5.3**, 5.4, 9.3.1.2, 9.6, 9.10, 10.2.1, 14.1, 14.2.1  
Submittals  
3.10, 3.11, 3.12, 4.2.7, 5.2.1, 5.2.3, 7.3.4, 9.2, 9.3, 9.8,  
9.9.1, 9.10.2, 9.10.3  
Submittal Schedule  
3.10.2, 3.12.5, 4.2.7  
**Subrogation, Waivers of**  
6.1.1, **11.3**  
**Substances, Hazardous**  
**10.3**  
**Substantial Completion**  
4.2.9, 8.1.1, 8.1.3, 8.2.3, 9.4.2, **9.8**, 9.9.1, 9.10.3, 12.2,  
15.1.2  
**Substantial Completion, Definition of**  
**9.8.1**  
Substitution of Subcontractors  
5.2.3, 5.2.4  
Substitution of Architect  
2.3.3  
Substitutions of Materials  
3.4.2, 3.5, 7.3.8  
**Sub-subcontractor, Definition of**  
**5.1.2**

Subsurface Conditions  
3.7.4

**Successors and Assigns**  
**13.2**

**Superintendent**  
**3.9, 10.2.6**

**Supervision and Construction Procedures**  
1.2.2, **3.3**, 3.4, 3.12.10, 4.2.2, 4.2.7, 6.1.3, 6.2.4, 7.1.3,  
7.3.4, 8.2, 8.3.1, 9.4.2, 10, 12, 14, 15.1.4

Suppliers  
1.5, 3.12.1, 4.2.4, 4.2.6, 5.2.1, 9.3, 9.4.2, 9.5.4, 9.6,  
9.10.5, 14.2.1

Surety  
5.4.1.2, 9.6.8, 9.8.5, 9.10.2, 9.10.3, 11.1.2, 14.2.2,  
15.2.7

Surety, Consent of  
9.8.5, 9.10.2, 9.10.3

Surveys  
1.1.7, 2.3.4

**Suspension by the Owner for Convenience**  
**14.3**

Suspension of the Work  
3.7.5, 5.4.2, 14.3  
Suspension or Termination of the Contract  
5.4.1.1, 14

**Taxes**  
3.6, 3.8.2.1, 7.3.4.4

**Termination by the Contractor**  
**14.1, 15.1.7**

**Termination by the Owner for Cause**  
5.4.1.1, **14.2**, 15.1.7

**Termination by the Owner for Convenience**  
**14.4**

Termination of the Architect  
2.3.3  
Termination of the Contractor Employment  
14.2.2

**TERMINATION OR SUSPENSION OF THE CONTRACT**

**14**

**Tests and Inspections**  
3.1.3, 3.3.3, 3.7.1, 4.2.2, 4.2.6, 4.2.9, 9.4.2, 9.8.3,  
9.9.2, 9.10.1, 10.3.2, 12.2.1, **13.4**

**TIME**  
**8**

**Time, Delays and Extensions of**  
3.2.4, 3.7.4, 5.2.3, 7.2.1, 7.3.1, 7.4, **8.3**, 9.5.1, 9.7,  
10.3.2, 10.4, 14.3.2, 15.1.6, 15.2.5

**Time Limits**

2.1.2, 2.2, 2.5, 3.2.2, 3.10, 3.11, 3.12.5, 3.15.1, 4.2,  
5.2, 5.3, 5.4, 6.2.4, 7.3, 7.4, 8.2, 9.2, 9.3.1, 9.3.3, 9.4.1,  
9.5, 9.6, 9.7, 9.8, 9.9, 9.10, 12.2, 13.4, 14, 15.1.2,  
15.1.3, 15.4

**Time Limits on Claims**

3.7.4, 10.2.8, 15.1.2, 15.1.3

Title to Work

9.3.2, 9.3.3

**UNCOVERING AND CORRECTION OF WORK**  
**12**

**Uncovering of Work**  
**12.1**

Unforeseen Conditions, Concealed or Unknown  
3.7.4, 8.3.1, 10.3

Unit Prices

7.3.3.2, 9.1.2

Use of Documents

1.1.1, 1.5, 2.3.6, 3.12.6, 5.3

**Use of Site**

**3.13**, 6.1.1, 6.2.1

**Values, Schedule of**  
**9.2**, 9.3.1

Waiver of Claims by the Architect  
13.3.2

Waiver of Claims by the Contractor  
9.10.5, 13.3.2, **15.1.7**

Waiver of Claims by the Owner  
9.9.3, 9.10.3, 9.10.4, 12.2.2.1, 13.3.2, 14.2.4, **15.1.7**

Waiver of Consequential Damages  
14.2.4, 15.1.7

Waiver of Liens  
9.3, 9.10.2, 9.10.4

**Waivers of Subrogation**  
6.1.1, **11.3**

**Warranty**  
**3.5**, 4.2.9, 9.3.3, 9.8.4, 9.9.1, 9.10.2, 9.10.4, 12.2.2,  
15.1.2

Weather Delays  
8.3, 15.1.6.2

**Work, Definition of**  
**1.1.3**

Written Consent  
1.5.2, 3.4.2, 3.7.4, 3.12.8, 3.14.2, 4.1.2, 9.3.2, 9.10.3,  
13.2, 13.3.2, 15.4.4.2

Written Interpretations  
4.2.11, 4.2.12

Written Orders

1.1.1, 2.4, 3.9, 7, 8.2.2, 12.1, 12.2, 13.4.2, 14.3.1

## **ARTICLE 1 GENERAL PROVISIONS**

### **§ 1.1 Basic Definitions**

#### **§ 1.1.1 The Contract Documents**

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement, and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive, or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding or proposal requirements.

#### **§ 1.1.2 The Contract**

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants, or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

#### **§ 1.1.3 The Work**

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

#### **§ 1.1.4 The Project**

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by Separate Contractors.

#### **§ 1.1.5 The Drawings**

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams.

#### **§ 1.1.6 The Specifications**

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

#### **§ 1.1.7 Instruments of Service**

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

#### **§ 1.1.8 Initial Decision Maker**

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith.

### **§ 1.2 Correlation and Intent of the Contract Documents**

**§ 1.2.1** The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

§ 1.2.1.1 The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

### § 1.3 Capitalization

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles, or (3) the titles of other documents published by the American Institute of Architects.

### § 1.4 Interpretation

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

### § 1.5 Ownership and Use of Drawings, Specifications, and Other Instruments of Service

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and retain all common law, statutory, and other reserved rights in their Instruments of Service, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors, and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7 and 1.8, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect's consultants.

### § 1.6 Notice

§ 1.6.1 Except as otherwise provided in Section 1.6.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission if a method for electronic transmission is set forth in the Agreement.

§ 1.6.2 Notice of Claims as provided in Section 15.1.3 shall be provided in writing and shall be deemed to have been duly served only if delivered to the designated representative of the party to whom the notice is addressed by certified or registered mail, or by courier providing proof of delivery.

### § 1.7 Digital Data Use and Transmission

The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. The parties will use AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

### § 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document

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G202™–2013, Project Building Information Modeling Protocol Form, shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

## **ARTICLE 2 OWNER**

### **§ 2.1 General**

**§ 2.1.1** The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

**§ 2.1.2** The Owner shall furnish to the Contractor, within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of, or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

### **§ 2.2 Evidence of the Owner's Financial Arrangements**

**§ 2.2.1** Prior to commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. The Contractor shall have no obligation to commence the Work until the Owner provides such evidence. If commencement of the Work is delayed under this Section 2.2.1, the Contract Time shall be extended appropriately.

**§ 2.2.2** Following commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract only if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due; or (3) a change in the Work materially changes the Contract Sum. If the Owner fails to provide such evidence, as required, within fourteen days of the Contractor's request, the Contractor may immediately stop the Work and, in that event, shall notify the Owner that the Work has stopped. However, if the request is made because a change in the Work materially changes the Contract Sum under (3) above, the Contractor may immediately stop only that portion of the Work affected by the change until reasonable evidence is provided. If the Work is stopped under this Section 2.2.2, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided in the Contract Documents.

**§ 2.2.3** After the Owner furnishes evidence of financial arrangements under this Section 2.2, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

**§ 2.2.4** Where the Owner has designated information furnished under this Section 2.2 as "confidential," the Contractor shall keep the information confidential and shall not disclose it to any other person. However, the Contractor may disclose "confidential" information, after seven (7) days' notice to the Owner, where disclosure is required by law, including a subpoena or other form of compulsory legal process issued by a court or governmental entity, or by court or arbitrator(s) order. The Contractor may also disclose "confidential" information to its employees, consultants, sureties, Subcontractors and their employees, Sub-subcontractors, and others who need to know the content of such information solely and exclusively for the Project and who agree to maintain the confidentiality of such information.

### **§ 2.3 Information and Services Required of the Owner**

**§ 2.3.1** Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

**§ 2.3.2** The Owner shall retain an architect lawfully licensed to practice architecture, or an entity lawfully practicing architecture, in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 2.3.3 If the employment of the Architect terminates, the Owner shall employ a successor to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

§ 2.3.4 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.3.5 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.3.6 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

#### § 2.4 Owner's Right to Stop the Work

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

#### § 2.5 Owner's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect and the Architect may, pursuant to Section 9.5.1, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect, or failure. If current and future payments are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 15.

### ARTICLE 3 CONTRACTOR

#### § 3.1 General

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of its obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

#### § 3.2 Review of Contract Documents and Field Conditions by Contractor

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed, and correlated personal observations with requirements of the Contract Documents.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.4, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall submit Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner, subject to Section 15.1.7, as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

### § 3.3 Supervision and Construction Procedures

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be solely responsible for the jobsite safety of such means, methods, techniques, sequences, or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely notice to the Owner and Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. Unless the Architect objects to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

### § 3.4 Labor and Materials

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 3.4.2 Except in the case of minor changes in the Work approved by the Architect in accordance with Section 3.12.8 or ordered by the Architect in accordance with Section 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.



§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

### § 3.5 Warranty

§ 3.5.1 The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.5.2 All material, equipment, or other special warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 9.8.4.

### § 3.6 Taxes

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

### § 3.7 Permits, Fees, Notices and Compliance with Laws

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

### § 3.7.4 Concealed or Unknown Conditions

If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 14 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend that an equitable adjustment be made in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may submit a Claim as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

### **§ 3.8 Allowances**

**§ 3.8.1** The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

**§ 3.8.2** Unless otherwise provided in the Contract Documents,

- .1 allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
- .2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit, and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and
- .3 whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

**§ 3.8.3** Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

### **§ 3.9 Superintendent**

**§ 3.9.1** The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

**§ 3.9.2** The Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the name and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the Architect may notify the Contractor, stating whether the Owner or the Architect (1) has reasonable objection to the proposed superintendent or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

**§ 3.9.3** The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

### **§ 3.10 Contractor's Construction and Submittal Schedules**

**§ 3.10.1** The Contractor, promptly after being awarded the Contract, shall submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits current under the Contract Documents. The schedule shall be revised at appropriate intervals as required by the conditions of the Work and Project.

**§ 3.10.2** The Contractor, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, shall submit a submittal schedule for the Architect's approval. The Architect's approval shall not be unreasonably delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, or fails to provide submittals in accordance with the approved submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

**§ 3.10.3** The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

### **§ 3.11 Documents and Samples at the Site**

The Contractor shall make available, at the Project site, the Contract Documents, including Change Orders, Construction Change Directives, and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and the approved Shop Drawings, Product Data, Samples, and similar required submittals. These shall be in electronic form or paper copy, available to the Architect and Owner, and

delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

**§ 3.12 Shop Drawings, Product Data and Samples**

**§ 3.12.1** Shop Drawings are drawings, diagrams, schedules, and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier, or distributor to illustrate some portion of the Work.

**§ 3.12.2** Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

**§ 3.12.3** Samples are physical examples that illustrate materials, equipment, or workmanship, and establish standards by which the Work will be judged.

**§ 3.12.4** Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. Their purpose is to demonstrate how the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

**§ 3.12.5** The Contractor shall review for compliance with the Contract Documents, approve, and submit to the Architect, Shop Drawings, Product Data, Samples, and similar submittals required by the Contract Documents, in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of Separate Contractors.

**§ 3.12.6** By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

**§ 3.12.7** The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples, or similar submittals, until the respective submittal has been approved by the Architect.

**§ 3.12.8** The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from the requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples, or similar submittals, unless the Contractor has specifically notified the Architect of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples, or similar submittals, by the Architect's approval thereof.

**§ 3.12.9** The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples, or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such notice, the Architect's approval of a resubmission shall not apply to such revisions.

**§ 3.12.10** The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures. The Contractor shall not be required to provide professional services in violation of applicable law.

**§ 3.12.10.1** If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will

specify all performance and design criteria that such services must satisfy. The Contractor shall be entitled to rely upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings, and other submittals related to the Work, designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review and approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

**§ 3.12.10.2** If the Contract Documents require the Contractor's design professional to certify that the Work has been performed in accordance with the design criteria, the Contractor shall furnish such certifications to the Architect at the time and in the form specified by the Architect.

### **§ 3.13 Use of Site**

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, lawful orders of public authorities, and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

### **§ 3.14 Cutting and Patching**

**§ 3.14.1** The Contractor shall be responsible for cutting, fitting, or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting, or patching shall be restored to the condition existing prior to the cutting, fitting, or patching, unless otherwise required by the Contract Documents.

**§ 3.14.2** The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or Separate Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter construction by the Owner or a Separate Contractor except with written consent of the Owner and of the Separate Contractor. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold, from the Owner or a Separate Contractor, its consent to cutting or otherwise altering the Work.

### **§ 3.15 Cleaning Up**

**§ 3.15.1** The Contractor shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus materials from and about the Project.

**§ 3.15.2** If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the Owner shall be entitled to reimbursement from the Contractor.

### **§ 3.16 Access to Work**

The Contractor shall provide the Owner and Architect with access to the Work in preparation and progress wherever located.

### **§ 3.17 Royalties, Patents and Copyrights**

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for 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 the Owner or Architect. However, if an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the information is promptly furnished to the Architect.

### **§ 3.18 Indemnification**

**§ 3.18.1** To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

**§ 3.18.2** In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation, or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts, or other employee benefit acts.

## **ARTICLE 4 ARCHITECT**

### **§ 4.1 General**

**§ 4.1.1** The Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the Agreement.

**§ 4.1.2** Duties, responsibilities, and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified, or extended without written consent of the Owner, Contractor, and Architect. Consent shall not be unreasonably withheld.

### **§ 4.2 Administration of the Contract**

**§ 4.2.1** The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents. "Work" as used herein with regard to the performance of the Architect, shall mean those elements and systems of the Project within the Architect's Scope of Service under the Architectural Service Agreement."

**§ 4.2.2** The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents.

**§ 4.2.3** On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner (1) known deviations from the Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of, and will not be responsible for acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

### **§ 4.2.4 Communications**

The Owner and Contractor shall include the Architect in all communications that relate to or affect the Architect's services or professional responsibilities. The Owner shall promptly notify the Architect of the substance of any direct communications between the Owner and the Contractor otherwise relating to the Project. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and suppliers shall be through the Contractor. Communications by and with Separate Contractors shall be through the Owner. The Contract Documents may specify other communication protocols.

§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, whether or not the Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5, and 3.12. The Architect's review shall not constitute approval of safety precautions or of any construction means, methods, techniques, sequences, or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may order minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more Project representatives to assist in carrying out the Architect's responsibilities at the site. The Owner shall notify the Contractor of any change in the duties, responsibilities and limitations of authority of the Project representatives.

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either, and will not be liable for results of interpretations or decisions rendered in good faith.

§ 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

## ARTICLE 5 SUBCONTRACTORS

### § 5.1 Definitions

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a Separate Contractor or the subcontractors of a Separate Contractor.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

### § 5.2 Award of Subcontracts and Other Contracts for Portions of the Work

§ 5.2.1 Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the persons or entities proposed for each principal portion of the Work, including those who are to furnish materials or equipment fabricated to a special design. Within 14 days of receipt of the information, the Architect may notify the Contractor whether the Owner or the Architect (1) has reasonable objection to any such proposed person or entity or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person, or entity for one previously selected if the Owner or Architect makes reasonable objection to such substitution.

### § 5.3 Subcontractual Relations

By appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work that the Contractor, by these Contract Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies, and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

### § 5.4 Contingent Assignment of Subcontracts

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

- .1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor; and
- .2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Upon assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

## **ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS**

### **§ 6.1 Owner's Right to Perform Construction and to Award Separate Contracts**

§ 6.1.1 The term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate agreements. The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each Separate Contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with any Separate Contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to its construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, Separate Contractors, and the Owner until subsequently revised.

§ 6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces or with Separate Contractors, the Owner or its Separate Contractors shall have the same obligations and rights that the Contractor has under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6, and Articles 10, 11, and 12.

### **§ 6.2 Mutual Responsibility**

§ 6.2.1 The Contractor shall afford the Owner and Separate Contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a Separate Contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly notify the Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Architect of apparent discrepancies or defects prior to proceeding with the Work shall constitute an acknowledgment that the Owner's or Separate Contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractor that are not apparent.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a Separate Contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a Separate Contractor's delays, improperly timed activities, damage to the Work or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage that the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or Separate Contractor as provided in Section 10.2.5.



§ 6.2.5 The Owner and each Separate Contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

### § 6.3 Owner's Right to Clean Up

If a dispute arises among the Contractor, Separate Contractors, and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

## ARTICLE 7 CHANGES IN THE WORK

### § 7.1 General

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor, and Architect. A Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor. An order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents. The Contractor shall proceed promptly with changes in the Work, unless otherwise provided in the Change Order, Construction Change Directive, or order for a minor change in the Work.

### § 7.2 Change Orders

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor, and Architect stating their agreement upon all of the following:

- .1 The change in the Work;
- .2 The amount of the adjustment, if any, in the Contract Sum; and
- .3 The extent of the adjustment, if any, in the Contract Time.

### § 7.3 Construction Change Directives

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

- .1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
- .2 Unit prices stated in the Contract Documents or subsequently agreed upon;
- .3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
- .4 As provided in Section 7.3.4.

§ 7.3.4 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.4 shall be limited to the following:

- .1 Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Architect;
- .2 Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;
- .3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;
- .4 Costs of premiums for all bonds and insurance, permit fees, and sales, use, or similar taxes, directly related to the change; and
- .5 Costs of supervision and field office personnel directly attributable to the change.

§ 7.3.5 If the Contractor disagrees with the adjustment in the Contract Time, the Contractor may make a Claim in accordance with applicable provisions of Article 15.

§ 7.3.6 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.7 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

#### § 7.4 Minor Changes in the Work

The Architect may order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order for minor changes shall be in writing. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Architect and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor change without prior notice to the Architect that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.

### ARTICLE 8 TIME

#### § 8.1 Definitions

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

## § 8.2 Progress and Completion

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement, the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, commence the Work prior to the effective date of insurance required to be furnished by the Contractor and Owner.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

## § 8.3 Delays and Extensions of Time

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by (1) an act or neglect of the Owner or Architect, of an employee of either, or of a Separate Contractor; (2) by changes ordered in the Work; (3) by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, adverse weather conditions documented in accordance with Section 15.1.6.2, or other causes beyond the Contractor's control; (4) by delay authorized by the Owner pending mediation and binding dispute resolution; or (5) by other causes that the Contractor asserts, and the Architect determines, justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

## ARTICLE 9 PAYMENTS AND COMPLETION

### § 9.1 Contract Sum

§ 9.1.1 The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.1.2 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed so that application of such unit prices to the actual quantities causes substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

### § 9.2 Schedule of Values

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit a schedule of values to the Architect before the first Application for Payment, allocating the entire Contract Sum to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy, required by the Architect. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment. Any changes to the schedule of values shall be submitted to the Architect and supported by such data to substantiate its accuracy as the Architect may require, and unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's subsequent Applications for Payment.

### § 9.3 Applications for Payment

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. The application shall be notarized, if required, and supported by all data substantiating the Contractor's right to payment that the Owner or Architect require, such as copies of requisitions, and releases and waivers of liens from Subcontractors and suppliers, and shall reflect retainage if provided for in the Contract Documents.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage, and transportation to the site, for such materials and equipment stored off the site.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information, and belief, be free and clear of liens, claims, security interests, or encumbrances, in favor of the Contractor, Subcontractors, suppliers, or other persons or entities that provided labor, materials, and equipment relating to the Work.

#### § 9.4 Certificates for Payment

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either (1) issue to the Owner a Certificate for Payment in the full amount of the Application for Payment, with a copy to the Contractor; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Contractor and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Application for Payment, and notify the Contractor and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data in the Application for Payment, that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is entitled to payment in the amount certified. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion, and to specific qualifications expressed by the Architect. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work; (2) reviewed construction means, methods, techniques, sequences, or procedures; (3) reviewed copies of requisitions received from Subcontractors and suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

#### § 9.5 Decisions to Withhold Certification

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

- .1 defective Work not remedied;
- .2 third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;
- .3 failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;

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- .4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- .5 damage to the Owner or a Separate Contractor;
- .6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
- .7 repeated failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When either party disputes the Architect's decision regarding a Certificate for Payment under Section 9.5.1, in whole or in part, that party may submit a Claim in accordance with Article 15.

§ 9.5.3 When the reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.4 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or supplier to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Contractor shall reflect such payment on its next Application for Payment.

## § 9.6 Progress Payments

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

§ 9.6.2 The Contractor shall pay each Subcontractor, no later than seven days after receipt of payment from the Owner, the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors and suppliers to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay, or to see to the payment of money to, a Subcontractor or supplier, except as may otherwise be required by law.

§ 9.6.5 The Contractor's payments to suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors or provided by suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, create any fiduciary liability or tort liability on the part of the Contractor for breach of trust, or entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.6.8 Provided the Owner has fulfilled its payment obligations under the Contract Documents, the Contractor shall defend and indemnify the Owner from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any Subcontractor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Contractor. If approved by the applicable court, when required, the Contractor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

## **§ 9.7 Failure of Payment**

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents, the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided for in the Contract Documents.

## **§ 9.8 Substantial Completion**

**§ 9.8.1** Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

**§ 9.8.2** When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

**§ 9.8.3** Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

**§ 9.8.4** When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

**§ 9.8.5** The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in the Certificate. Upon such acceptance, and consent of surety if any, the Owner shall make payment of retainage applying to the Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

## **§ 9.9 Partial Occupancy or Use**

**§ 9.9.1** The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

**§ 9.9.2** Immediately prior to such partial occupancy or use, the Owner, Contractor, and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

### § 9.10 Final Completion and Final Payment

§ 9.10.1 Upon receipt of the Contractor's notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection. When the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect, (3) a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment, (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, and (6) if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts and releases and waivers of liens, claims, security interests, or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging the lien, claim, security interest, or encumbrance, including all costs and reasonable attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed, corrected, and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of the surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

- .1 liens, Claims, security interests, or encumbrances arising out of the Contract and unsettled;
- .2 failure of the Work to comply with the requirements of the Contract Documents;
- .3 terms of special warranties required by the Contract Documents; or
- .4 audits performed by the Owner, if permitted by the Contract Documents, after final payment.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor, or a supplier, shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

## ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

### § 10.1 Safety Precautions and Programs

The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract.

### § 10.2 Safety of Persons and Property

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury, or loss to

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- .1 employees on the Work and other persons who may be affected thereby;
- .2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor; and
- .3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.

§ 10.2.2 The Contractor shall comply with, and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities, bearing on safety of persons or property or their protection from damage, injury, or loss.

§ 10.2.3 The Contractor shall implement, erect, and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards; promulgating safety regulations; and notifying the owners and users of adjacent sites and utilities of the safeguards.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment, or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3. The Contractor may make a Claim for the cost to remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

#### § 10.2.8 Injury or Damage to Person or Property

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, notice of the injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

#### § 10.3 Hazardous Materials and Substances

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials or substances. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and notify the Owner and Architect of the condition.

§ 10.3.2 Upon receipt of the Contractor's notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor and the Architect will



promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up.

**§ 10.3.3** To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss, or expense is due to the fault or negligence of the party seeking indemnity.

**§ 10.3.4** The Owner shall not be responsible under this Section 10.3 for hazardous materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for hazardous materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

**§ 10.3.5** The Contractor shall reimburse the Owner for the cost and expense the Owner incurs (1) for remediation of hazardous materials or substances the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

**§ 10.3.6** If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall reimburse the Contractor for all cost and expense thereby incurred.

#### **§ 10.4 Emergencies**

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury, or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

### **ARTICLE 11 INSURANCE AND BONDS**

#### **§ 11.1 Contractor's Insurance and Bonds**

**§ 11.1.1** The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Owner, Architect, and Architect's consultants shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.

**§ 11.1.2** The Contractor shall provide surety bonds of the types, for such penal sums, and subject to such terms and conditions as required by the Contract Documents. The Contractor shall purchase and maintain the required bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

**§ 11.1.3** Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

**§ 11.1.4 Notice of Cancellation or Expiration of Contractor's Required Insurance.** Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act

or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

## **§ 11.2 Owner's Insurance**

**§ 11.2.1** The Owner shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Owner shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located.

**§ 11.2.2 Failure to Purchase Required Property Insurance.** If the Owner fails to purchase and maintain the required property insurance, with all of the coverages and in the amounts described in the Agreement or elsewhere in the Contract Documents, the Owner shall inform the Contractor in writing prior to commencement of the Work. Upon receipt of notice from the Owner, the Contractor may delay commencement of the Work and may obtain insurance that will protect the interests of the Contractor, Subcontractors, and Sub-Subcontractors in the Work. When the failure to provide coverage has been cured or resolved, the Contract Sum and Contract Time shall be equitably adjusted. In the event the Owner fails to procure coverage, the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent the loss to the Owner would have been covered by the insurance to have been procured by the Owner. The cost of the insurance shall be charged to the Owner by a Change Order. If the Owner does not provide written notice, and the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain the required insurance, the Owner shall reimburse the Contractor for all reasonable costs and damages attributable thereto.

**§ 11.2.3 Notice of Cancellation or Expiration of Owner's Required Property Insurance.** Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any property insurance required by the Contract Documents, the Owner shall provide notice to the Contractor of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Contractor: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.

## **§ 11.3 Waivers of Subrogation**

**§ 11.3.1** The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other; (2) the Architect and Architect's consultants; and (3) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Architect, Architect's consultants, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this section 11.3.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

**§ 11.3.2** If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, to the extent permissible by such policies, the Owner waives all rights in accordance with the terms of Section 11.3.1 for damages caused by fire or other causes of loss covered by this separate property insurance.

## **§ 11.4 Loss of Use, Business Interruption, and Delay in Completion Insurance**

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The Owner, at the Owner's option, may purchase and maintain insurance that will protect the Owner against loss of use of the Owner's property, or the inability to conduct normal operations, due to fire or other causes of loss. The Owner waives all rights of action against the Contractor and Architect for loss of use of the Owner's property, due to fire or other hazards however caused.

#### **§11.5 Adjustment and Settlement of Insured Loss**

**§ 11.5.1** A loss insured under the property insurance required by the Agreement shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.5.2. The Owner shall pay the Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

**§ 11.5.2** Prior to settlement of an insured loss, the Owner shall notify the Contractor of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The Contractor shall have 14 days from receipt of notice to object to the proposed settlement or allocation of the proceeds. If the Contractor does not object, the Owner shall settle the loss and the Contractor shall be bound by the settlement and allocation. Upon receipt, the Owner shall deposit the insurance proceeds in a separate account and make the appropriate distributions. Thereafter, if no other agreement is made or the Owner does not terminate the Contract for convenience, the Owner and Contractor shall execute a Change Order for reconstruction of the damaged or destroyed Work in the amount allocated for that purpose. If the Contractor timely objects to either the terms of the proposed settlement or the allocation of the proceeds, the Owner may proceed to settle the insured loss, and any dispute between the Owner and Contractor arising out of the settlement or allocation of the proceeds shall be resolved pursuant to Article 15. Pending resolution of any dispute, the Owner may issue a Construction Change Directive for the reconstruction of the damaged or destroyed Work.

### **ARTICLE 12 UNCOVERING AND CORRECTION OF WORK**

#### **§ 12.1 Uncovering of Work**

**§ 12.1.1** If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

**§ 12.1.2** If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an equitable adjustment to the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense.

#### **§ 12.2 Correction of Work**

##### **§ 12.2.1 Before Substantial Completion**

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, discovered before Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

##### **§ 12.2.2 After Substantial Completion**

**§ 12.2.2.1** In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.5.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction of the Owner or Separate Contractors, whether completed or partially completed, caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

### § 12.3 Acceptance of Nonconforming Work

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

## ARTICLE 13 MISCELLANEOUS PROVISIONS

### § 13.1 Governing Law

The Contract shall be governed by the law of the place where the Project is located, excluding that jurisdiction's choice of law rules. If the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

### § 13.2 Successors and Assigns

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to covenants, agreements, and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate the assignment.

### § 13.3 Rights and Remedies

§ 13.3.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights, and remedies otherwise imposed or available by law.

§ 13.3.2 No action or failure to act by the Owner, Architect, or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed upon in writing.

### § 13.4 Tests and Inspections

§ 13.4.1 Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and

approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

§ 13.4.2 If the Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense.

§ 13.4.3 If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure, including those of repeated procedures and compensation for the Architect's services and expenses, shall be at the Contractor's expense.

§ 13.4.4 Required certificates of testing, inspection, or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.4.5 If the Architect is to observe tests, inspections, or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.4.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

### § 13.5 Interest

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at the rate the parties agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

## ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

### § 14.1 Termination by the Contractor

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, for any of the following reasons:

- .1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;
- .2 An act of government, such as a declaration of national emergency, that requires all Work to be stopped;
- .3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or
- .4 The Owner has failed to furnish to the Contractor reasonable evidence as required by Section 2.2.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, repeated suspensions, delays, or interruptions of the entire Work by the Owner as described in Section 14.3, constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, as well as reasonable overhead and profit on Work not executed, and costs incurred by reason of such termination.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or their agents or employees or any other persons or entities performing portions of the Work because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

#### § 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

- .1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
- .2 fails to make payment to Subcontractors or suppliers in accordance with the respective agreements between the Contractor and the Subcontractors or suppliers;
- .3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- .4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, and upon certification by the Architect of the existence of facts supporting such reasons and upon certification by the Owner's legal Representative that sufficient cause exists to justify such action, the Owner may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

- .1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- .2 Accept assignment of subcontracts pursuant to Section 5.4; and
- .3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

#### § 14.3 Suspension by the Owner for Convenience

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work, in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay, or interruption under Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

- .1 that performance is, was, or would have been, so suspended, delayed, or interrupted, by another cause for which the Contractor is responsible; or
- .2 that an equitable adjustment is made or denied under another provision of the Contract.

#### § 14.4 Termination by the Owner for Convenience

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of notice from the Owner of such termination for the Owner's convenience, the Contractor shall

- .1 cease operations as directed by the Owner in the notice;
- .2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and

- .3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work properly executed; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts; and the termination fee, if any, set forth in the Agreement.

## **ARTICLE 15 CLAIMS AND DISPUTES**

### **§ 15.1 Claims**

#### **§ 15.1.1 Definition**

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, a change in the Contract Time, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.

#### **§ 15.1.2 Time Limits on Claims**

The Owner and Contractor shall commence all Claims and causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, in accordance with the requirements of the binding dispute resolution method selected in the Agreement and within the period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all Claims and causes of action not commenced in accordance with this Section 15.1.2.

#### **§ 15.1.3 Notice of Claims**

§ 15.1.3.1 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party under this Section 15.1.3.1 shall be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3.2 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party. In such event, no decision by the Initial Decision Maker is required.

#### **§ 15.1.4 Continuing Contract Performance**

§ 15.1.4.1 Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

§ 15.1.4.2 The Contract Sum and Contract Time shall be adjusted in accordance with the Initial Decision Maker's decision, subject to the right of either party to proceed in accordance with this Article 15. The Architect will issue Certificates for Payment in accordance with the decision of the Initial Decision Maker.

#### **§ 15.1.5 Claims for Additional Cost**

If the Contractor wishes to make a Claim for an increase in the Contract Sum, notice as provided in Section 15.1.3 shall be given before proceeding to execute the portion of the Work that is the subject of the Claim. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

#### **§ 15.1.6 Claims for Additional Time**

§ 15.1.6.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, notice as provided in Section 15.1.3 shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.6.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated, and had an adverse effect on the scheduled construction.

### § 15.1.7 Waiver of Claims for Consequential Damages

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

- .1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and
- .2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit, except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

### § 15.2 Initial Decision

§ 15.2.1 Claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim. If an initial decision has not been rendered within 30 days after the Claim has been referred to the Initial Decision Maker, the party asserting the Claim may demand mediation and binding dispute resolution without a decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of the request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished, or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.



§ 15.2.6.1 Either party may, within 30 days from the date of receipt of an initial decision, demand in writing that the other party file for mediation. If such a demand is made and the party receiving the demand fails to file for mediation within 30 days after receipt thereof, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

### § 15.3 Mediation

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract, except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.7, shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

§ 15.3.3 Either party may, within 30 days from the date that mediation has been concluded without resolution of the dispute or 60 days after mediation has been demanded without resolution of the dispute, demand in writing that the other party file for binding dispute resolution. If such a demand is made and the party receiving the demand fails to file for binding dispute resolution within 60 days after receipt thereof, then both parties waive their rights to binding dispute resolution proceedings with respect to the initial decision.

§ 15.3.4 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

### § 15.4 Arbitration

§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. The Arbitration shall be conducted in the place where the Project is located, unless another location is mutually agreed upon. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement, shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

**§ 15.4.4 Consolidation or Joinder**

§ 15.4.4.1 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

§ 15.4.4.2 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as those of the Owner and Contractor under this Agreement.

# Additions and Deletions Report for AIA® Document A201® – 2017

This Additions and Deletions Report, as defined on page 1 of the associated document, reproduces below all text the author has added to the standard form AIA document in order to complete it, as well as any text the author may have added to or deleted from the original AIA text. Added text is shown underlined. Deleted text is indicated with a horizontal line through the original AIA text.

Note: This Additions and Deletions Report is provided for information purposes only and is not incorporated into or constitute any part of the associated AIA document. This Additions and Deletions Report and its associated document were generated simultaneously by AIA software at 16:39:44 CT on 11/13/2024.

## PAGE 1

KISD 2024 FRP  
Klein Independent School District  
KISD 2024 FRP  
VLK Project No. 24-047.00

...

Klein Independent School District  
7200 Spring Cypress Road  
Klein, Texas 77379

...

VLK Architects, LLC  
20445 State Highway 249, Suite 350  
Houston, Texas 77070

## PAGE 11

The parties shall agree upon ~~written~~ protocols governing the transmission and use of, and reliance on, of Instruments of Service or any other information or documentation in digital form. The parties will use AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

...

Any use of, or reliance on, all or a portion of a building information model without agreement to ~~written~~ protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document G202™–2013, Project Building Information Modeling Protocol Form, shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

## PAGE 19

**§ 4.2.1** The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents. "Work" as used herein with regard to the performance of the Architect, shall mean those elements and systems of the Project within the Architect's Scope of Service under the Architectural Service Agreement.

## PAGE 36

§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, and upon certification by the Architect of the existence of facts supporting such reasons and upon certification by the Owner's legal Representative that sufficient cause exists to justify such action, the Owner may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:



# **Certification of Document's Authenticity**

**AIA® Document D401™ – 2003**

I, \_\_\_\_\_, hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 16:39:44 CT on 11/13/2024 under Order No. 3104238995 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A201™ – 2017, General Conditions of the Contract for Construction, other than those additions and deletions shown in the associated Additions and Deletions Report.

\_\_\_\_\_  
*(Signed)*

\_\_\_\_\_  
*(Title)*

\_\_\_\_\_  
*(Dated)*

## **KLEIN ISD SUPPLEMENTARY CONDITIONS TO THE AIA DOCUMENT A201-2017 GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION**

The following supplements modify the “General Conditions of the Contract for Construction”, AIA Document A201, Sixteenth Edition, 2017. Where a portion of the General Conditions is modified or deleted by these Supplementary Conditions, the unaltered portions of the General Conditions shall remain in effect. As appropriate, for purposes of this Request for Proposal, the term “Bid” shall mean “Proposal” and the term “Bidder” shall mean “Offeror”, wherever they appear in the Construction Documents. The term “Contractor” shall include a Construction Manager-at-Risk.

### **ARTICLE 1 -- GENERAL PROVISIONS**

#### **1.1 BASIC DEFINITIONS**

##### **1.1.1 THE CONTRACT DOCUMENT**

Delete Section 1.1.1 in its entirety and substitute the following:

**1.1.1** The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Performance Bond, Labor and Material Payment Bond, Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to propose, instructions to Proposers, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor’s Proposal or portions of Addenda relating to proposal requirements).

To the extent any provision in the Supplementary Conditions to these AIA Document A201-2017 General Conditions, issued by Owner, conflicts with any provision in the Supplementary Conditions issued by the Architect; the Supplementary Conditions to these AIA Document A201-2017 General Conditions issued by Owner shall control.

##### **1.1.3 THE WORK**

Add the following sentence at the end of this section:

It also includes all supplies, skill, supervision, transportation services and other facilities and things necessary, proper or incidental to the carrying out and completion of the terms of the contract and all other items of cost or value needed to produce, construct and fully complete the public work identified by the Contract Documents.

#### **1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS**

Add the following Sections:

- 1.2.1.2** Precedence of the Contract Documents: The most recently issued Document takes precedence over previous issues of the same Document. The order of precedence is as follows with the highest authority listed as “1”.
- .1** Contract Modifications (such as Change Orders) signed by the Contractor and Owner.
  - .2** The Agreement. (AIA Document A101-2017)
  - .3** The Supplementary Conditions
  - .4** The General Conditions of the Contract for Construction
  - .5** Addenda, with those of later date having precedence over those of earlier date
  - .6** Drawings and Specifications

Should these Documents disagree in themselves, the Architect and Owner will select the appropriate method for performing the Work, to facilitating avoiding increase in the Contract cost.

**1.2.1.3** Relation of Specifications and Drawings: To be equivalent in authority and priority. Should they disagree in themselves, or with each other, prices shall be based on the most expensive combination of quality and quantity of Work indicated. In the event of the above mentioned disagreements, the resolution shall be determined by the Architect and Owner.

## **1.6 NOTICE**

Delete the text of Section **1.6.1** in its entirety and substitute the following:

**1.6.1** Written notice shall be deemed to have been duly served if delivered in person to the individual or a member of the firm or entity or to an officer at the corporation for which it was intended, or if delivered at or sent by certified mail, or by registered or certified mail, or by courier service providing proof of delivery, to the last business address known to the party giving notice, or if delivered by facsimile or other electronic communications to the offices of the person or corporation for which it was intended. For facsimiles or other electronic communications received after 5:00 p.m. on a business day, or on a weekend or legal holiday on which the recipient's offices are closed, notice shall be deemed to have been duly served on the next business day.

Delete the text of Section **1.6.2** in its entirety.

Add Section **1.9** as follows:

## **1.9 MISCELLANEOUS OTHER DEFINITIONS**

### **1.9.1 ADDENDA, ADDENDUM**

Documents issued by the Architect prior to execution of the Owner Contractor Agreement for this Project that modify or clarify the Proposal Documents. All addenda become a part of the Contract Documents.

### **1.9.2 ALTERNATE PROPOSAL(S)**

A separate amount stated on a separate Proposal Form which, if accepted by the Owner, will be added to or deducted from the Base Proposal. If accepted, the work that corresponds to the alternate proposal will become part of the agreement between Owner and Contractor. Alternate proposals shall remain valid for the same period of time as the Base Proposal after receipt of proposals, regardless if an Owner Contractor Agreement has been executed, unless indicated otherwise herein.

### **1.9.3 APPROVED, APPROVED EQUIVALENT, APPROVED EQUAL, OR EQUAL**

The terms Approved, Approved Equivalent, Approved Equal, and Or Equal, relate to the substitution of products or systems approved in writing by the Architect. Refer to Paragraph 3.4.2, Substitution of Products and Systems, for procedures which must be followed after award of contract. The substitution procedure process to be followed prior to receipt of proposals is described in the Instructions to Bidders.

### **1.9.4 BASE PROPOSAL**

The Contractor's proposal for the Work, not including any Alternates.

### **1.9.5 CONTRACT TIME**

The period of time which is established in the Contract Documents for Substantial Completion of the Work. This period of time is subject to authorized adjustments as enumerated in the Contract Documents.

### **1.9.6 DATE OF AGREEMENT**

The date the Owner formally awards a Contract for Construction of the Work. This date will be inserted in the first page of the Agreement between Owner and Contractor and shall be referenced in Performance Bond and Payment Bond forms. See also Date of Commencement of Work.

### **1.9.7 DATE OF COMMENCEMENT OF THE WORK**

The date of a written Notice to Proceed to the Contractor for a given portion of the Work. This date constitutes day zero (0) of the stated Contract Time. The Notice to Proceed will be issued after the District has received and validated the Contractor's Payment Bond, Performance Bond and Insurance.

### **1.9.8 DATE OF FINAL COMPLETION**

The end of construction. See AIA Document A201, Section 9.10.

### **1.9.9 DAY**

The following days are referenced in the documents:

- .1 Calendar Days. Extensions of time granted for Regular Work Days lost, if any, will be converted to Calendar Days.
- .2 Holidays: The days officially recognized by the construction industry in this area as a holiday; normally limited to the observance days of New Year's Day, Memorial Day, Fourth of July, Labor Day, Thanksgiving Day and the day after and Christmas Day.
- .3 Regular Work Days: All calendar days except holidays, Saturdays, and Sundays. Requests for extensions of time shall be requested on the basis of Regular Work Days, and those days, if approved, will be converted to calendar days by multiplying by a factor of one and four-tenths (1.4).
- .4 **No extensions of the Contract Time will be granted due to inclement weather, except as provided in Section 8.3.1.**

### **1.9.10 NOTICE TO PROCEED**

A notice that may be given by the Owner to the Contractor that directs the Contractor to start the Work. It may also establish the Date of Commencement of the Work.

### **1.9.11 PROVIDE**

Whenever the word "provide" is used in these documents, it shall mean the same as "furnish and install".

### **1.9.12 PUNCH LIST**

A comprehensive list prepared by the Contractor prior to Substantial Completion to establish all items to be completed or corrected; this list may be supplemented by the Architect or Owner. See AIA Document A201, Section 9.8.

## **ARTICLE 2 – OWNER**

### **2.1 GENERAL**

Delete the text of Section 2.1.1 in its entirety and substitute the following:

**2.1.1** The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. All parties understand that only the Board of Trustees for the Owner acting as a body corporate has the authority to bind the Owner with respect to all matters requiring the Board's approval under current policy of the Board of Trustees for the Owner, including, but not limited to, Change Orders. Except as otherwise provided in Section 4.2.1, the Architect does not have authority to bind the Owner with respect to matters requiring the Owner's approval or authorization. The term "Owner" means the Owner or the Owner's authorized representative.

Delete the text of Section 2.1.2 in its entirety.



## **2.2 EVIDENCE OF THE OWNER'S FINANCIAL ARRANGEMENTS**

After the first sentence of Section 2.2.1, delete the remainder of Section 2.2.1 in its entirety.

Delete Sections 2.2.2 and 2.2.3 in their entirety.

## **2.3 INFORMATION AND SERVICES REQUIRED OF THE OWNER**

Delete Section 2.3.6 in its entirety and replace it with the following:

**2.3.6** The Contractor will be furnished free of charge 25 copies of the Drawings and 25 copies of the Project Manual. These copies may have been used during the Bid/Proposal process and it is the Contractor's responsibility to determine their completeness and to request replacement of any missing portions. Additional new copies will be furnished at the cost of reproduction, postage, and handling.

## **2.5 OWNER'S RIGHT TO CARRY OUT THE WORK**

Delete the text of Section 2.5. in its entirety and substitute the following:

If the Contractor defaults or neglects to carry out the work in accordance with the Contract Documents and fails, after receipt of written notice from the Owner, to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such deficiencies. In such case, an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor the actual cost of correcting such deficiencies, including the Owner's expenses and compensation for the Architect's additional services and expenses made necessary by such default, neglect or failure. Such action by the Owner and amounts charged to the Contractor are both subject to the prior approval of the Architect. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner within thirty (30) days of receipt of written notice from the Owner therefor.

Add Section 2.6 as follows:

## **2.6 OWNER'S LACK OF LIABILITY TO THIRD PARTY**

**2.6.1** The Owner is not responsible for the acts and/or omissions of, or contractually involved with, any subcontractors, suppliers of labor or materials, and/or their respective employees or agents or any other third-party claimants. Such claimants shall not constitute third party beneficiaries under this contract. The Contractor and/or his Surety solely shall deal with, take responsibility for, and be liable to such parties under this Contract. Contractor will indemnify and defend the Owner from any legal actions against Owner for unpaid bills of subcontractors.

Add Section 2.7 as follows:

## **2.7 OWNER'S RIGHT TO OCCUPY THE PROJECT**

**2.7.1** The Owner shall have the right to occupy or use without prejudice to the right of either party, any completed or largely completed portions of the project, notwithstanding the time for completing the entire work or such portions may not yet have expired. Such occupancy and use shall not constitute acceptance of any work not in accordance with the Contract Documents. If the Contractor determines that said occupancy may cause a delay to the completion of the project, he shall notify the Owner in writing immediately.

**2.7.2** Refer to Article 11 Insurance and Bonds regarding property insurance requirements in the event of such occupancy.

**2.7.3** If Contractor has not completed the obligations of the Contract Documents by the dates established by subsequent Amendments to the Agreement Between Owner and Construction Manager, the Owner shall have the right to occupy or use the entire project.

## **ARTICLE 3 -- CONTRACTOR**

### **3.1 GENERAL**

Add Section **3.1.4** as follows:

**3.1.4** The Contractor must be fully qualified under any state or local licensing laws for Contractors in effect at the time and at the location of the work. The Contractor is responsible for determining that all of his subcontractors and prospective subcontractors are duly licensed in accordance with the law.

### **3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR**

Delete the last sentence of Section **3.2.4** in its entirety and substitute the following:

If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities provided such errors, inconsistencies, omissions, differences, or nonconformities could not have been ascertained from a careful study of the Contract Documents.

Add Sections **3.2.5**, **3.2.6** and **3.2.7** as follows:

**3.2.5** The Contractor shall make a reasonable attempt to interpret the Contract Documents before asking the Architect for assistance in interpretation. The Contractor shall not ask the Architect for observation of work prior to the Contractor's field superintendent's personal inspection of the work and his determination that the work of all major subcontractors, to allow the subcontractor to demonstrate his understanding of the documents to the Architect and to allow the subcontractor to ask for any interpretation he may require.

**3.2.6** If, in the opinion of the Architect, the Contractor does not make a reasonable effort to comply with the above requirements of the Contract Documents and this causes the Architect or his Consultants to expend an unreasonable amount of time in the discharge of the duties imposed on him by the Contract Documents, then the Contractor shall bear the cost of compensation for the Architect's additional services made necessary by such failure. The Architect will give the Contractor prior notice of intent to bill for additional services related to Sections 3.2.5, 3.2.6 and 3.7 before additional services are performed.

**3.2.7** If the Contractor has knowledge that any of the products or systems specified will perform in a manner that will limit the Contractor's ability to satisfactorily perform the work or to honor his Warranty, he shall promptly notify the Architect in writing, providing substantiation for his position. Any necessary changes, including substitutions of materials, shall be accomplished by appropriate Modification.

### **3.3 SUPERVISION AND CONSTRUCTION PROCEDURES**

Delete the last sentence of Section **3.3.1** in its entirety and substitute the following:

If the Contractor is then instructed to proceed with the required means, methods, techniques, sequences or procedures without acceptance of changes proposed by the Contractor, the Owner shall be solely responsible for any resulting loss or damage arising solely from those Owner-required means, methods, techniques, sequences or procedures, but only to the extent the Owner would be responsible for any such losses or damages under state and/or federal law.

Add Sections **3.3.4** and **3.3.5** as follows:

**3.3.4** The Contractor is especially cautioned to coordinate the routing of mechanical and electrical items prior to commencing these operations.

**3.3.5** Contractor shall bear sole responsibilities for design and execution of acceptable trenching and shoring procedures, in accordance with Texas Government Code, Section 2166.303 and Texas Health and Safety Code, Subchapter C, Sections 756.021, et seq. On trench excavations in excess of 5 feet in depth, Contractor shall pay a qualified engineer, experienced in the engineering design and preparation of drawings and specifications for compliance with state requirements for trenching and shoring, to prepare and professionally seal detailed drawings and specifications directing Contractor in the safe execution of trenching and shoring.

**3.3.6** Any time that the Contractors' employees, subcontractors and their agents and employees, and other persons or entities performing portions of the work for or on behalf of the Contractor or any of its subcontractors are on site, the work shall be supervised by a qualified employee of the Contractor.

### **3.4 LABOR AND MATERIALS**

Delete Section **3.4.2** in its entirety and replace it with the following:

**3.4.2** The materials, products, and the systems covered by these specifications have been selected as a standard because of quality, particular suitability, or record of satisfactory performance. It is not intended to preclude the use of equivalent or better materials, products, or systems provided that same meets the requirements of the particular project and have been approved in an addendum as a substitution prior to the submission of bids. If prior written approval in an addendum has not been obtained, it will be assumed that the Bid is based upon the materials, products, and systems described in the Bidding Documents and no substitutions will be permitted, except as provided hereinafter.

- .1** If, after award of contract, the Contractor or one of his Subcontractors, or Suppliers determines that any of the products or systems specified will perform in a manner that will limit the Contractor's ability to satisfactorily perform the work or to honor the Warranty, the Contractor shall promptly notify the Architect, in writing, providing detailed substantiation for his position. Any changes deemed necessary by the Owner and Architect, including substitution of materials and change in Contract Sum, either upward or downward, if any, shall be accompanied by appropriate Modification.
- .2** After the Contract has been executed, the Owner and Architect will consider a formal request for the substitution of products on the Work in place of those specified only under the conditions set forth in specification referring to Product Options and Substitutions.
- .3** Requests for substitution, received by the Architect later than forty five (45) days after "Notice to Proceed" or "Date of Commencement of the Work" (whichever occurs first), may result in additional costs to the Owner. Contractor agrees to reimburse the Owner through deductive Change Order to the Contract, for all costs associated with such requests.
- .4** By making request for substitutions based on Subparagraph 3.4.2 above, the Contractor
  - .1** represents that the Contractor has personally investigated the proposed substitute product and determined that it is equivalent or superior in all respects to that specified, and is suitable for the intended purpose;
  - .2** represents that the Contractor will provide the same warranty for the substitution that the Contractor would for that specified;
  - .3** certifies that the cost data presented is complete and includes all related costs under this Contract except the Architect's redesign costs, and waives all claims for additional costs related to the substitution which subsequently become apparent; and
  - .4** will coordinate the installation of the accepted substitute, making such changes as may be required for the Work to be complete in all respects.
- .5** Substitution requests shall be submitted on the forms included herein and in accordance with the process established in specification referring to Product Options and Substitutions.

Add the following Sections after Section **3.4.3**

- 3.4.3**
- .1 State law prohibits possession and/or use of alcohol and tobacco products on school property at all times.
  - .2 State law prohibits weapons or firearms on school property.
  - .3 There shall be zero tolerance for fraternization with students, teachers and any other school district personnel, Contractor will immediately remove any employee that violates this provision from the project.
  - .4 No glass bottles shall be brought on the construction site or Owner's property by any construction personnel.

### **3.5 WARRANTY**

Delete the text of Section 3.5.1 in its entirety and substitute the following:

**3.5.1** The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new, unless the Contract Documents require or permit otherwise. The contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect cause by abuse, material alteration to the Work not executed by the Contractor, insufficient maintenance or maintenance not in compliance with written instructions therefor, operation not in compliance with written instructions therefor, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

Add Sections **3.5.3**, **3.5.4** and **3.5.5** as follows:

**3.5.3** In the event of failure in the Work, including a specified product, whether during construction, or the correction period (which shall be one (1) year from the Date of Substantial Completion, except where a longer period as specified), the Contractor shall take prompt and appropriate measures to assure correction or replacement of the defective Work or any portion thereof, including manufactured products, whether notified by the Owner or the Architect. Upon correction of warranty items, the Contractor shall provide the Owner and Architect with written notification of said correction. This obligation shall survive acceptance of the Work under the Construction Contract.

**3.5.4** The Contractual Correction Period for this Project is one (1) year from the date of Substantial Completion, except for any extended warranties as specified within the Contract Documents. Items of Work not completed until after the deadline for Substantial Completions shall have their warranties (general and any extended warranty periods) extended by the period of time between the deadline for Substantial Completion and the actual completion of the Work. Such warranties shall be submitted to the Owner in writing, documenting such time extensions. This correction period shall not restrict or modify extended warranties called for or provided on systems, equipment or other specific portions of the Work.

**3.5.5** The Contractor shall accompany the Owner and Architect for a complete reinspection of the Project approximately eleven (11) months after the Date of Substantial Completion and shall promptly complete any observed or reported deficiencies in the Work, including any uncompleted Punch List items or outstanding and incomplete warranty items. The contractor shall provide written notification to the Owner and Architect when said Punch List items and/or additional deficiencies observed have been corrected. This obligation shall survive acceptance of the Work under the Construction Contract.

### **3.6 TAXES**

Delete Section **3.6** in its entirety and substitute the following:

The Owner qualifies for exemption from State and Local Sales and Use Taxes pursuant to the provision of Article 20.04(f) of the Texas Limited Sales, Excise and Use Tax Act. Taxes normally levied on the purchase, rental and lease of materials, supplies and equipment used or consumed in performance of the Contract may be exempted by issuing to suppliers an exemption certificate in lieu of tax. Exemption certificates comply with State Comptroller of Public Accounts Ruling No. 95-0.07. Any such exemption certificate issued in lieu of tax shall be subject to State Comptroller of Public Accounts Ruling No. 95-0.09, as amended. Failure by the Contractor or Subcontractors to take advantage of the Owner's exemption and to obtain such exemption certificate shall make him responsible for paying taxes incurred on materials furnished on the Project without additional cost to or reimbursement by the Owner.

### **3.7 PERMITS, FEES, NOTICES AND COMPLIANCES WITH LAWS**

After Section **3.7.1**, add the following Sections:

- 3.7.1**
- .1** The Owner shall pay directly to the governing authority the cost of all permanent property utility assessments and similar utility connection charges.
  - .2** The Contractor shall pay directly all temporary utility charges (excluding permanent power), utility district/company inspection fees, temporary tap charges, and temporary water meter charges and any other similar fees assessed by jurisdictional authority having control over this Project. The Contractor shall secure and pay for all governing authorities' permit fees.
  - .3** Fees payable to the Texas Department of Licensing and Regulation (TDLR) for document review relative to the Elimination of Architectural Barriers Act shall be paid by the Owner and the Architect will submit the documents to the TDLR for review and approval.
  - .4** The Contractor shall pay for all measures required for the SWPPP.

### **3.8 ALLOWANCES**

Delete Section **3.8** in its entirety and substitute the following:

**3.8.1** The Contractor shall include in the Contract Sum all allowances stated in the Contract documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct and approve in writing. All unused allowance amounts shall be credited back to Owner, along with any markups included in the Contract Sum on such unused amounts.

### **3.9 SUPERINTENDENT**

Delete Section 3.9.1 in its entirety and substitute the following:

**3.9.1** The Contractor shall employ a competent superintendent, project manager and necessary assistants who shall be in attendance at the Project site during performance of the Work, including Punch List work. The superintendent and project manager shall represent the Contractor, and unless provided otherwise in Section 3.1.1, communications given to the superintendent or project manager shall be binding as if given to the Contractor.

### **3.10 CONTRACTOR'S CONSTRUCTION AND SUBMITTAL SCHEDULES**

Delete Section **3.10.1** and substitute the following:

**3.10.1** Within 30 days of being awarded an Amendment, the Contractor shall prepare and submit for the Owner and Architect's review, a construction schedule for the Work, with critical path clearly defined. The schedule shall not exceed time limits current under the Contract Documents. For further schedule requirements refer to specification section regarding project schedules in the Project Manual.

Add the following clause to Section **3.10.2**:

**3.10.2** Requirements for the submittal schedule are outlined in the specifications. If the Contractor fails to submit a submittal schedule or fails to provide submittals in accordance with the approved submittal schedule, the Contractor shall not be entitled to any increase in the Contract Sum or extension of the Contract Time based on the time required for review of submittals.

Add Section **3.10.4** as follows:

**3.10.4** The Contractor shall submit to the Architect, with each monthly Application for Payment; a copy of the progress schedule updated to reflect the current status of the project. The Contractor shall take whatever action necessary to assure that the project completion schedule is met.

### **3.11 DOCUMENTS AND SAMPLES AT THE SITE**

Add Section **3.11.1** as follows:

**3.11.1** The Contractor shall post all Addenda on Construction Documents prior to commencing work in the site.

### **3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES**

At Section **3.12.5**, add the following Sections:

**3.12.5 .1** If, in the opinion of the Architect, the Shop Drawings, Product Data, Samples and similar submittals are incomplete, indicate an inadequate understanding of the work covered by the submittals, or indicate a lack of study and review by the Contractor prior to submittal to the Architect, the submittals will be returned, unchecked, to the Contractor for correction of these three deficiencies and subsequent resubmittal. Additional service charges as outlined in 3.2.6 may be charged by the Architect in this event.

**.2** The Architect will take no action on Shop Drawings, Product Data, and Samples that have not first been certified, by stamped, signed notation, as having been checked and approved by the Contractor for use in the Work, or that are not specifically required by the Contract Documents.

At Section **3.12.7**, correct the word “approved” in the last line to read “accepted”.

At Section **3.12.8**, correct “Architect’s approval” in the last line to read “Architect’s acceptance”.

At Section **3.12.9**, correct “Architect’s approval” in the last line to read “Architect’s acceptance” and add the following Section:

**3.12.9.1** Deviation from the requirements of the Contract Documents indicated on shop Drawings, Product Data, and Samples, does not constitute the required notification “in writing.”

Add Sections **3.12.11** and **3.12.12** as follows:

**3.12.11** The Contractor shall submit complete Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents to the Architect at least thirty (30) days prior to the date the Contractor needs the reviewed submittals returned. Where colors are to be selected by the Architect, submit all Samples in adequate time to allow the Architect to prepare a complete selection schedule. In general, all submittals requiring color selection shall be submitted to the Architect within four weeks of the date of the contract for construction.

**3.12.12** The Contractor shall submit digital PDF’s of Shop Drawings, Product Data, and similar submittals in the proper format according to the procedures stipulated within the Contract Documents. Digitally submitted Shop Drawings will be reviewed and marked by the Architect and/or his consultants and returned to the Contractor for his use, distribution, correction or resubmittal as required. Contractor corrections or revisions shall be resubmitted to the Architect in accordance with same procedures. The digitally marked up prints will be retained by the Architect and his consultants. Samples shall be submitted directly to the Architect for review.

Add Section **3.12.13** as follows:

**3.12.13** The Contractor shall provide MEP coordination drawings within a schedule mutually agreed upon by the Team and prior to installing the Work, showing how all piping, ductwork, lights, conduit, equipment, etc. will fit into the ceiling space allotted, including clearances required by the manufacturer, by code, or in keeping with good construction practice. Space for all trade elements must be considered on the same drawing. Drawings shall be at ¼ inch per foot minimum scale and shall include invert elevations and sections required to meeting intended purpose. The Contractor may propose an alternate method of accomplishing MEP coordination. If the alternate method is approved by the Team, it may be utilized.

### **3.14 CUTTING AND PATCHING**

Add Section **3.14.3** as follows:

**3.14.3** Leave all chases, holes and openings, straight and true, of proper size, and cut them into existing work as may be necessary for the proper installation of the work. Consult with all Subcontractors concerned, regarding proper locations and size. In case of conflict between requirement for cutting and patching and any other requirement of the Work, submit request for direction before proceeding with the Work. In case of failure to leave or cut them in the proper place, openings shall be cut afterward at no expense to the Owner. No excessive cutting will be permitted, nor shall any piers or other structural members be cut without prior approval. After such work has been installed, satisfactorily and carefully fit around, close up, repair, patch, and point up all cuts. Work shall be done with proper tools by workmen of the particular trade to which work belongs and shall be done without extra expense to the Owner. No description of specific cutting, patching, digging, etc., required for the work under a Specification Section that may be required for the proper accommodation of that work to the work of other trades shall relieve the Contractor from responsibility described above.

### **3.15 CLEANING UP**

Add Section **3.15.3** as follows:

**3.15.3** Prior to the Architect's inspection for Substantial Completion the Contractor shall clean exterior and interior surfaces exposed to view; remove temporary labels, stains, and foreign substances; polish transparent and glossy surfaces; clean equipment and fixtures to a sanitary condition; replace air filters in mechanical equipment; clean roof, gutters, and downspouts; remove obstructions and flush debris from drainage systems; clean site; sweep paved areas and rake clean other surfaces; remove trash and surplus materials from the site.

### **3.18 INDEMNIFICATION**

Delete Sections **3.18.1** and **3.18.2** in their entirety and replace them with the following:

**3.18.1 TO THE FULLEST EXTENT PERMITTED BY LAW, CONTRACTOR SHALL INDEMNIFY DEFEND AND HOLD HARMLESS THE OWNER AND ITS TRUSTEES, OFFICERS, AGENTS, AND EMPLOYEES (COLLECTIVELY, THE "INDEMNIFIED PARTIES") FROM AND AGAINST ALL CLAIMS, LOSSES, EXPENSES, COSTS, DEMANDS, SUITS, CAUSES OF ACTION, AND DAMAGES, INCLUDING WITHOUT LIMITATION, ATTORNEYS' FEES AND EXPENSES, ATTRIBUTABLE TO BODILY INJURY, SICKNESS, DISEASE OR DEATH OF ANY EMPLOYEE OF CONTRACTOR, ITS AGENTS, OR ITS SUBCONTRACTORS OF EVERY TIER, EVEN IF THE BODILY INJURY, SICKNESS, DISEASE OR DEATH IS CAUSED BY OR ALLEGED TO HAVE BEEN CAUSED BY THE NEGLIGENCE, FAULT OR STRICT LIABILITY OF ANY OF THE INDEMNIFIED PARTIES.**

**FOR ALL CLAIMS NOT ADDRESSED IN THE ABOVE PARAGRAPH, CONTRACTOR SHALL INDEMNIFY, DEFEND AND HOLD HARMLESS THE OWNER AND ITS TRUSTEES, OFFICERS, AGENTS, AND EMPLOYEES AND (COLLECTIVELY, THE "INDEMNIFIED PARTIES"), FROM AND AGAINST ALL CLAIMS, LOSSES, EXPENSES, COSTS, DEMANDS, SUITS, CAUSES OF ACTION, AND DAMAGES, INCLUDING WITHOUT LIMITATION, ATTORNEYS' FEES AND EXPENSES, OF ANY NATURE WHATSOEVER ARISING OUT OF OR RELATED TO THIS AGREEMENT OR THE WORK TO BE PERFORMED UNDER THIS AGREEMENT, BUT ONLY TO THE EXTENT OF THE NEGLIGENCE OR**

**OTHER FAULT OF THE CONTRACTOR, ITS AGENTS, REPRESENTATIVES, EMPLOYEES OR SUBCONTRACTORS OF ANY TIER.**

**3.18.2** It is understood and agreed that Subparagraph 3.18 above is subject to, and expressly limited by, the terms and conditions of TEX. CIV. PRACT. & REM. CODE ANN. 130.001-130.005 (Vernon Supp. 1989), as amended or modified, or any successor statute. Contractor shall not be obligated under Subparagraph 3.18 to indemnify or hold harmless Architect or any agent, servant or employee of Architect from liability or damage that is caused by or results from:

- .1 defects in plans, designs or specifications prepared, approved or used by the Architect; or
- .2 negligence of the Architect in the rendition or conduct of professional duties called for or arising out of the Contract Documents and the plans, designs or specifications that are a part of the Contract Documents; and arises from:
  - .1 personal injury or death;
  - .2 property injury; or
  - .3 any other expense that arises from personal injury, death or property injury.

Add Section **3.18.3** as follows:

**3.18.3** It is agreed with respect to any legal limitations, now or hereafter in effect and affecting the validity or enforceability of the indemnification obligation under Paragraph 3.18, such legal limitations are made a part of the indemnification obligation and shall operate to amend the indemnification obligation to the minimum extent necessary to bring the provision into conformity with the requirements of such limitations, and as so modified, the indemnification obligation shall continue in full force and effect.

Add Sections **3.19**, **3.20**, and **3.21** as follows:

**3.19 RECORD DRAWINGS**

**3.19.1** Refer Owner's Closeout Procedures

**3.20 PREVAILING WAGE RATES**

**3.20.1** As required by Chapter 2258 of the Texas Government Code Title 10 Prevailing Wage Rate, no employee used in this construction may be paid less than the minimum prevailing wage rate in effect for the Owner.

**3.20.2** The Contractor and each Subcontractor and Sub-subcontractor shall pay to all laborers, workmen, and mechanics employed in execution of this Contract not less than rates set forth by law for each craft of type of workman or mechanic needed to execute this Contract.

**3.20.3** Determination of prevailing wages shall not be construed to prohibit payment of more than the rates identified.

**3.21 ANTITRUST VIOLATIONS**

**3.21.1** Contractor hereby assigns to Owner any and all claims for overcharges associated with this Contract which arise under the antitrust laws of the United States, 15 U.S.C.A. Section 1 et.seq. (1973). The Contractor shall include this provision in his contracts with each Subcontractor and Supplier. Each Subcontractor shall include such provision in contracts with Sub-subcontractors and suppliers.

**3.22 THIRD-PARTY BENEFICIARY**

**3.22.1** No person or entity shall be deemed to be a third-party beneficiary of any provision(s) of this Contract; nor shall any provision(s) hereof be interpreted to create a right of action or otherwise permit anyone not a signatory party to the Contract to maintain an action for personal injury or property damage.



## **ARTICLE 4 – ARCHITECT**

### **4.2 Administration of the Contract**

Delete Section **4.2.2** in its entirety and substitute the following:

**4.2.2** The Architect, as a representative of the Owner, will visit the site at intervals appropriate to the stage of the Contractor's operations (1) to become generally familiar with and to keep the Owner informed about the progress and quality of the portion of the Work completed, (2) to endeavor to guard the Owner against defects and deficiencies in the work, and (3) to determine in general if the work is being performed in a manner indicating that the work, when fully completed, will be in accordance with the Contract documents. The Architect will be required to make on-site inspections as necessary to keep the Owner informed of the progress of the Work and as necessary to guard the Owner against defects and deficiencies in the Work. The Architect will neither have control over or charge of, nor be responsible for, the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents, except as provided in Section 3.3.1.

Delete Section **4.2.6** in its entirety and substitute the following:

**4.2.6** The Architect shall have authority to reject Work that does not conform to the Contract Documents. The Architect shall be required to promptly notify the Owner of any non-conforming Work and shall reject such non-conforming Work unless the Owner objects to the rejection in writing within twenty-four (24) hours of such notification. Whenever the Architect considers it necessary or advisable for implementation of the intent of the Contract documents, the Architect will have authority to require inspection or testing of the Work in accordance with the provisions of the Contract Documents, whether or not such Work is fabricated, installed or completed. Performance of any additional inspection or testing, which would result in additional cost to the Owner, shall require advance notice to and approval of the Owner. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons or entities performing portions of the Work, except when the Contractor's inability to perform the Work is a result of design flaw, error or omission.

Add the following Section **4.2.8.1**:

**4.2.8.1** Allowance Expenditure will be authorized using Allowance Expenditure authorizations (AEA) executed by the Owner, the Architect and the Contractor. All Allowance Expenditure Authorizations will be incorporated into the contract by Change Order at the completion of the project. Work authorized by an AEA may be invoiced as it is completed.

Delete Section **4.2.13** in its entirety and substitute the following:

**4.2.13** All decisions on matters relating to aesthetic effect shall initially be made by the Architect; however, all such decisions are subject to the Owner's written approval.

## **ARTICLE 5 – SUBCONTRACTORS**

### **5.1 DEFINITIONS**

At the end of Section **5.1.1** add the following sentence:

Wherever relevant, the term "Subcontractor" shall also include a person, or entity who supplies material or equipment for the Project.

At the end of Section **5.2.4**, add the following sentence:

Prior to such change the Contractor shall notify the Architect of his intent and reasons for such proposed changes.

## **5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS**

Delete the last sentence of Section **5.4.1** in its entirety and substitute the following:

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract, but only to the extent permitted by law.

Delete the last sentence of Section **5.4.3** in its entirety.

## **ARTICLE 7 -- CHANGES IN THE WORK**

### **7.1 GENERAL**

Delete the text of Section **7.1.2** in its entirety and substitute the following:

**7.1.2** A Change Order shall be based on agreement among the Owner, Contractor, and Architect, except when the Contract balance is amended as a result of Owner's Right to Carry out the Work under Section 2.4.1 or the Owner's assessment of liquidated damages as allowed by the Contract Documents. A Construction Change Directive requires agreement by the Owner or the Owner's representative and Architect, and may or may not be agreed to by the Contractor; an order for a minor change may be issued by the Architect alone.

Add Section **7.5** as follows:

### **7.5 ALLOWABLE MARKUPS FOR CHANGES IN THE WORK**

**7.5.1** Unless otherwise directed, the procedure and markup of the costs for additional work shall be determined in the following manner:

- .1** Upon Change Proposal request, the Contractor shall quote the cost for changes in the work showing separately, credits and additional costs broken down by headings used in the Schedule of Values. Further breakdown into units of labor and materials may be required if agreement on cost cannot be reached using the breakdown by headings. The final cost shall be the amount of the Total Contract Value Change shown on the Change Proposal signed by the Contractor and Owner. For general construction work, not subcontracted, the Contractor shall consider as costs the actual invoice amount for additional materials, the sales tax on additional materials when applicable, the wages paid for additional direct labor, plus the Contractor's usual markup of wages to cover additional labor related costs such as insurance, taxes and fringe benefits.
- .2** On changes executed within the Owner's Contingency Allowance, Contractor shall have included costs for combined overhead and profit, to the extent permitted by the Contract Documents, and General Conditions costs, including the cost of superintendents, field office expense, temporary facilities and services, small hand tools, construction equipment not specifically provided for the change in hand, home office expense, bond and building insurance premiums, and managing the Subcontractor's work, in his Base Contract amount. Allowed overhead and profit fee on Owner's Contingency Allowance changes to be included in the total cost to the Owner shall be based as follows:
  - .1** For each Subcontractor or Sub-subcontractor involved, for Work performed by that Subcontractor's or Sub-subcontractor's own forces, ten percent (10%) of the cost.
  - .2** For each Subcontractor, for Work performed by the Subcontractor's Sub-subcontractors, five percent (5%) of the amount due the Sub-subcontractors.

**7.5.2** If any additional Work is authorized outside of or in excess of the Owner's Contingency Allowance, the combined overhead and profit for this work shall be based as follows:

- .1** For the Contractor, for Work performed by the Contractor's own forces, a maximum total markup of ten percent (10%) of the actual cost on a lump sum project, or the Contractor's Construction Phase Fee on a Guaranteed Maximum Price Project.

- .2 For Work performed by the Contractor's Subcontractor(s), five percent (5%) of the amount due the Subcontractor(s).
- .3 For each Subcontractor or Sub-subcontractor involved, for work performed by that Subcontractor's or Sub-subcontractor's own forces, a maximum markup of ten percent (10%) of the actual cost.
- .4 For each Subcontractor, for work performed by the Subcontractor's Sub-subcontractors, five percent (5%) of the amount due the Sub-subcontractor.
- .5 Cost to which overhead and profit is to be applied shall be determined in accordance with Section 7.3.7.

**7.5.3** In order to facilitate checking of quotations for extras or credits, all proposals, (except those so minor that their propriety can be seen by inspection), shall be accompanied by a complete and detailed itemization of costs including labor, materials, and Subcontracts. Labor and materials shall be itemized in the manner prescribed above. Where major cost items are Subcontracts, they shall be itemized also. In no case will a change be approved without such itemization.

**7.5.4** Change orders, as they are accepted by the Owner, shall be entered under heading "Change Orders" in the next current Request for Payment.

**7.5.5** All credits to or deductions from the Contract Sum, a Contingency or an Allowance shall be calculated using the same methodology set forth in this Section 7.5. All unused Contingency or Allowance amounts shall be credited back to Owner prior to final payment, along with any markups included in the Contract Sum or GMP on such unused amounts.

## **ARTICLE 8 -- TIME**

### **8.1 DEFINITIONS**

At Section **8.1.4**, add the following sentence:

See further definition of "Day" in Section **1.9.10**.

### **8.3 DELAYS AND EXTENSIONS OF TIME**

Delete Section **8.3.1** in its entirety and substitute the following:

**8.3.1** If the Contractor is delayed at any time in the commencement or progress of the Work by an act or neglect of the Owner or Architect, or of an employee of either, or of a separate contractor employed by the Owner, or by changes ordered in the Work, or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties or other unforeseeable causes beyond the Contractor's control, or by other causes which the Architect determines may justify delay, then the Contract Time shall be extended by Change Order for such reasonable time as the Architect may determine. **No extensions of the Contract Time will be granted for inclement weather, except for Force Majeure weather events consisting of named storms or government declared emergencies resulting from extreme weather.**

Add Sections **8.3.4** and **8.3.5** as follows:

**8.3.4** The parties hereto agree that time is of the essence of this Contract and that pecuniary damages would be suffered by the Owner if the Contractor does not substantially complete all Work called for in the Contract Document by the specified date, which damages are, by their very nature, difficult of ascertainment. It is therefore expressly agreed, as a part of the consideration inducing the Owner to execute this Contract that the Owner may deduct from the final payment made to the Contractor a sum equal to the amount stated in the Contract Documents, per phase for each and every Calendar Day beyond the agreed date which the contractor has agreed to for Substantial Completion of the Work included in the Contract Documents. It is expressly understood that said sum per day is agreed upon as a fair estimate of the pecuniary damages which will be sustained by the Owner in the event that the Work is not substantially completed within the agreed time, or with the legally extended time, if any, otherwise provided for herein. Said sum shall be considered as liquidated damages only, and in no sense shall be considered a penalty

or forfeiture; said damage being caused by additional compensation to personnel, and other miscellaneous increased costs, all of which are difficult of exact ascertainment. The liquidated damages assessed herein shall be Owner's sole remedy for time delays between the deadline for substantial completion and Contractor's achievement of substantial completion.

**8.3.5** Failure to complete and close-out the Project, and complete all Punch List items, within sixty (60) days after the scheduled Substantial completion date will additionally entitle the Owner to deduct from the final payment made to the Contractor a sum equal to the amount stated in the Contract Documents, per phase, for each and every Calendar Day beyond the 60-day close-out period. It is expressly understood that said sum per day is agreed upon as a fair estimate of the pecuniary damages which will be sustained by the Owner in the event that the Project close-out does not occur on a timely basis. Said sum shall be considered as liquidated damages only and in no sense shall be considered a penalty or forfeiture; said damage being caused by additional compensation to personnel, and other miscellaneous increased costs, all of which are difficult of exact ascertainment. If the Contractor is delayed through no fault of the Owner, the Substantial Completion is not achieved by the agreed contract completion date, the Project close-out period of sixty (60) days will not be extended by the number of days of delay past the actual Substantial completion date and will remain based upon the agreed contract completion date.

## **ARTICLE 9 -- PAYMENTS AND COMPLETION**

### **9.1 CONTRACT SUM**

Add Section **9.1.1.1** as follows:

**9.1.1.1** The Owner is exempt from payment of Texas State Sales Tax on materials required for the Work. Therefore, to comply with the law, the Contract Sum shall be broken down into the amount of cost for labor and the amount of cost for materials. This breakdown shall be provided by the Contractor within ten (10) days of award of Contract.

### **9.2 SCHEDULE OF VALUES**

Add the following Sections:

- 9.2.1** General Contractor's cost for Contractor's fee, bonds and insurance, General Conditions, etc., shall be listed as individual line items.
- 9.2.2** Schedule of Values shall break each line into materials and labor. Once approved by the Owner and Architect, it shall be used as basis for reviewing Application for Payment but not be taken as evidence of market or other value.
- 9.2.3** Contractor's cost for various construction items shall be detailed. For example, concrete work shall be subdivided into footings, grade beams, floor slabs, paving, etc. These subdivisions shall appear as individual line items.
- 9.2.4** On major subcontracts, such as mechanical, electrical, and plumbing, the Schedule shall indicated line items and amounts in detail, (for example; underground, major equipment, fixtures, installation of fixtures, start up, etc.)
- 9.2.5** Costs for subcontract work shall be listed without any addition of General Contractor's costs for overhead, profit or supervision.
- 9.2.6** The Contractor shall include a value for the coordination documents/drawings on the schedule of values.
- 9.2.7** The Contractor shall include a value for the correction of deficiencies noted by the Commissioning Agent and the Test, Adjust and Balance consultant on the schedule of values for each sub-contractor subject to commissioning and test, adjust and balance requirements.

### **9.3 APPLICATIONS FOR PAYMENT**

Delete Sections **9.3.1** and **9.3.2** in their entirety and replace them with the following:

**9.3.1** Refer to Section 7.1.3 of the A133 Agreement for timelines related to Applications for Payment.

**9.3.1.1** As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work which have been properly authorized by Construction Change Directives but not yet included in Change Orders.

**9.3.2** Payments will be made on account of materials or equipment 1) incorporated in the Work; 2) suitably stored at the site; or 3) suitably stored at some off-site location, provided the following conditions are met for off-site storage:

- .1 The location must be agreed to, in writing, by the Owner and Surety.
- .2 The location must be a bonded warehouse.
- .3 Surety must agree, in writing, to each request for payment.
- .4 The Contractor must bear the cost of the Owner's and Architect's expenses related to visiting the offsite storage area for confirmation.

Payments for materials or equipment stored on or off the site shall be conditioned upon submission by the Contractor of bills of sale or such other procedures satisfactory to the Owner to establish the Owner's title to such materials or equipment or otherwise protect the Owner's interest, including applicable insurance (naming the Owner as insured) and transportation to the site for those materials and equipment stored off the site. Under no circumstances will the Owner reimburse the Contractor for down payments, deposits, or other advance payments for materials or equipment, without prior written approval of Owner.

The Contractor acknowledges that the review of materials and/or equipment stored off the side is an additional service of the Architect, and the Contractor shall be charged for that service. The cost for such service will be established by the Architect and is not subject to appeal.

Add Section **9.3.4** as follows:

**9.3.4** The Contractor shall submit requests for payment in duplicate, using AIA Document G702, Application and Certificate of Payment, as the cover sheet. Continuation sheets showing in detail the amounts requested, etc., shall be submitted using AIA Document G703, Continuation Sheet, or a computerized version of these documents previously approved for use. The information provided on the continuation sheets in the Description of the Work and Scheduled Values columns shall match the corresponding information shown on the approved Schedule of Values. All blank spaces on AIA Document G702, Application and Certificate of Payment, must be completed and the signatures of the Contractor and Notary Public shall be original on each form. By submitting his application for payment, the Contractor certifies that the individual signing the application is authorized to do so.

### **9.6 PROGRESS PAYMENTS**

Delete Section **9.6.1** in its entirety and substitute the following:

**9.6.1** After the Architect has issued a Certificate for Payment, the Owner shall make progress payments in accordance with the following Section and Section 7.1.3 of the A133.

- .1 Based upon the applications for payment and supporting documents submitted to the Architect by the Contractor and certification of the amount payable by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided in the Contract Documents for the period covered by the application for payment:
- .2 Applications for Payment shall be submitted by the last day of the month. Not later than the last day of the following month, ninety-five percent (95%) of the portion of the Contract Sum properly allocable to labor, materials, and equipment incorporated in the Work and ninety-five percent (95%) of the portion of the Contract Sum properly allocable to materials and equipment suitably stored at the site or at some other location agreed upon in writing (subject to the

conditions listed in Article 9.3.2 of the Supplementary Conditions to the Contract for Construction), for the period covered by the Application for Payment, less the aggregate of previous payments made by the Owner.

- .3 Upon Substantial Completion of the entire Work, a sum sufficient to increase the total payments to ninety-five percent (95%) of the Contract Sum, less such amounts as the Architect shall determine for all incomplete Work and unsettled claims as provided in the Contract Documents.

At Section **9.6.2**, insert the following sentence between the first and second sentence:

More specifically, if only five percent (5%) retainage is withheld by the Owner on payments to the Contractor, then the Contractor shall withhold only five percent (5%) retainage on payments to subcontractors; and subcontractors shall withhold only five percent (5%) retainage on payments to sub-subcontractors.

## **9.7 FAILURE OF PAYMENT**

Delete the phrase "or awarded by binding dispute resolution." Replace all references to "seven days" to "ten days."

## **9.8 SUBSTANTIAL COMPLETION**

At Section **9.8.2**, add the following sentence at the end:

Should the Architect determine that the Contractor's List of Items to be Completed or Corrected lacks sufficient detail or requires extensive supplementation, the list will be returned to the Contractor for revision, and inspection for determining the Date of Substantial Completion will be delayed until the List submitted is a reasonable representation of the work to be done.

Add Sections **9.8.6** and **9.8.7** as follows:

**9.8.6** In order for the project or a major portion thereof to be considered substantially complete, the following conditions must be met:

- .1 All inspections by governmental authorities having jurisdiction over the project must have been finalized, any remedial work required by those authorities must have been completed, and Certificates of Occupancy and similar governmental approval forms must have been issued and copies delivered to the Owner and Architect.
- .2 All work, both interior and exterior, shall have been completed and cleaned except minor items which if completed after occupancy, will not, in the Owner's opinion, cause interference to the Owner's use of the building or any portion thereof. A significantly large number of items to be completed or corrected will preclude the Architect from issuing a Certificate of Substantial Completion. The Owner and Architect will be the sole judge of what constitutes a significantly large number of items.

The following items are a partial specific list of requirements, as applicable to the Project, that must be completed prior to established Substantial Completion of all portions of the work (Including the Substantial Completion of the commissioning phase).

1. All fire alarm system components must be completed and demonstrated to the Owner.
2. Local fire marshal approval certificate, or similar Certificate of Occupancy from the governing agency, must be delivered to the Owner.
3. All exterior clean-up and landscaping must be complete.
4. All final interior clean-up must be complete.
5. All HVAC air and water balancing must be complete.
6. All required commissioning must be complete.
7. All Energy Management Systems must be complete and fully operational and demonstrated to the Owner.
8. All communications equipment, telephone system, and P.A. systems must be complete and demonstrated to the Owner.
9. All final lockset cores must be installed and all final Owner directed keying completed.

10. All room plaques and exterior signage must be completed.
11. All Owner demonstrations must be completed including kitchen equipment, HVAC equipment, plumbing equipment, and electrical equipment.
12. A final certificate of occupancy must be signed by the Contractor and delivered to the Owner.

**9.8.7** After the date of Substantial Completion of the Project is evidenced by the Certificate of Substantial Completion, the Contractor will be allowed a period of time within which to correct all deficiencies attached to the Certificate of Substantial Completion as outlined in Section 8.3.4 of these supplementary conditions. Failure of the Contractor to complete such corrections within the stipulated time will be reported to the contractor's surety. In this report, the Contractor and surety will be informed that, should correction remain incomplete for fifteen (15) days, the Owner may initiate action to complete corrective work out of the remaining Contract funds in accordance with Article 14.2.

- .1 Should corrective work following Substantial Completion require more than one reinspection after notification by the Contractor that corrections are complete, the cost of subsequent inspections may also be deducted from the Contract funds remaining unpaid to the Contractor.

### **9.10 FINAL COMPLETION AND FINAL PAYMENT**

At Section **9.10.2**, add the following sentence **at the end**:

Prior to final payment, the Contractor shall meet all of the requirements of Owner's Closeout Procedures.

Add Section **9.10.6** as follows:

**9.10.6** Final Payment, constituting the entire unpaid balance of the Contract Sum, shall be paid by the Owner to the Contractor thirty-one (31) days after Substantial Completion of the Work unless otherwise stipulated in the Certificate of Substantial Completion, provided the Work has then been completed, the Contract fully performed, all Contract Close Out Documents have been submitted, and the Final Certificate for Payment has been issued by the Architect. The final payment will not be made until all of these conditions have been satisfied.

## **ARTICLE 10 -- PROTECTION OF PERSONS AND PROPERTY**

Add Sections **10.2.9** and **10.2.10** as follows:

**10.2.9** The performance of the foregoing services by the Contractor shall not relieve the Subcontractors of their responsibilities for the safety of persons and property and for compliance with all applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to the conduct of the Work.

**10.2.10** The Contractor shall be responsible for taking all precautions necessary to protect the Work in place from any foreseeable weather conditions which could cause any potential damage to portions or all Work in place. The Contractor shall be responsible for performing all repairs and/or replacement of any Work that results from foreseeable weather conditions.

### **10.3 HAZARDOUS MATERIALS**

Delete the text of Section **10.3.1** in its entirety and substitute the following:

**10.3.1** The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and report the condition to the Owner and Architect in writing. The Owner, Contractor and Architect shall then proceed in the same manner described in Section 10.3.2.

Delete the text of Sections **10.3.3**, **10.3.4** and **10.3.5** in their entirety.

Delete the text of Section **10.3.6** in its entirety and substitute the following:

**10.3.6** If, without negligence on the part of the Contractor, the Contractor is held liable by a governmental agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall indemnify the Contractor for all costs and expenses thereby incurred, but only to the extent provided by law.

Add Section **10.3.7** as follows:

**10.3.7** As part of the construction contract close out process, and prior to receiving payment of any of the retainage, the Contractor and his subcontractors shall submit notarized statements pertaining to the above referenced hazardous materials.

## **ARTICLE 11 -- INSURANCE AND BONDS**

Delete the text of Sections 11.1 through 11.5 and substitute the following Sections:

### **11.1 CONTRACTOR'S LIABILITY INSURANCE**

The Owner reserves the right to review the insurance requirements during the effective period of any Contract to make reasonable adjustments to insurance coverages and limits when deemed reasonably prudent by Owner based upon changes in statutory laws, court decisions or potential increase in expense to loss.

**11.2** The Owner requires the following minimum insurance coverages:

<u>Types of Coverage</u>	<u>Limits of Liability</u>
Commercial General Liability	General Aggregate \$2,000,000.00
	Products/Completed Operations/Aggregate \$1,000,000.00
	Bodily Injury and Property Damage (each) \$1,000,000.00
	Contractual \$1,000,000.00
	Personal and Advertising Injury \$1,000,000.00
	Fire Damage \$500,000.00
	Medical Expense \$5,000.00

**11.2.1** The Owner shall be named as an additional insured on a primary and non-contributory basis using form CG 2010 10 01 or similar endorsement providing equal or greater coverage in favor of the Owner.

Coverage shall include the following:

- (a) Premises operations;
- (b) Blanket Contractual Liability;
- (c) Pollution;
- (d) Products/Completed Operations;
- (e) Broad Form Property Damage;
- (f) Independent Contractors;
- (g) Per project aggregate limit;
- (h) Provide a statement of claims against the aggregate limit with each renewal certificate;
- (i) X,C,U exclusions to be removed when underground work is performed; and
- (j) Waivers of subrogation in favor of Owner and its officers, directors, representatives, agents and employees shall be provided.



- 11.2.2 Automobile Liability** Combined Single Limit \$1,000,000.00
- (a) Comprehensive Automobile Liability Insurance to cover all vehicles owned by, hired by, or used on behalf of Contractor.
  - (b) Owner and its officers, directors, representatives, agents and employees shall be endorsed as Additional Insureds, as their interests may appear.
  - (c) Waivers of subrogation in favor of Owner and its officers, directors, representatives, agents and employees shall be provided.
- 11.2.3 Workers' Compensation** Statutory Limits
- (a) Coverage at Statutory Limits with All States Endorsement
  - (b) Employer's Liability
 

Each Accident	\$1,000,000.00
Disease (Policy Limit)	\$1,000,000.00
Disease (Each Employee)	\$1,000,000.00
  - (c) Waivers of subrogation in favor of Owner and its officers, directors, representatives, agents and employees shall be provided.
- 11.2.4 Excess or Umbrella Insurance** (provides coverage in excess of primary Commercial General Liability, Automobile Liability, and Worker's Compensation Coverage B limits)
- (a) Minimum coverage for the Contractor shall be one (1) times the Contract amount, subject to a minimum limit of \$1,000,000.00 and a maximum limit of \$25,000,000.00. Limits for primary policies may differ from those shown above when Excess (Umbrella) Insurance coverage is provided.
  - (b) Owner and its officers, directors, representatives, agents and employees shall be endorsed as Additional Insureds, as their interests may appear.
  - (c) Waivers of subrogation in favor of Owner and its officers, directors, representatives, agents and employees shall be provided.
- 11.3** The Owner requires that the following insurance requirements be satisfied:
- .1 No Work shall be commenced until all insurance requirements set forth in this Agreement have been approved by the Owner in writing.
  - .2 All insurance policies and certificates required hereunder shall be in form and content satisfactory to the Owner.
  - .3 The Owner shall be furnished an ACORD form Certificate of Insurance evidencing all policies and endorsements required by this Agreement prior to execution of the Contract and thereafter upon renewal or replacement of each required policy of insurance.
  - .4 Each Insurance coverage/policy shall contain a provision that at least thirty (30) days prior written notice shall be given to the Owner in the event of cancellation, material change, or non-renewal.
  - .5 Insurance shall be underwritten by a company licensed to do business in Texas, satisfactory to Owner and rated minimum A-VII by A.M. Best.
  - .6 The insurance coverages specified herein shall be maintained at all times during the term of the contract and, with the exception of builder's risk coverage, shall be maintained for a minimum of one (1) year thereafter.
  - .7 No deletions/exclusions from the standard coverage form are allowed without the prior written consent of the Owner.
  - .8 All insurance must be issued on an occurrence basis.

- .9 The Contractor shall be responsible for all deductibles; the Owner shall approve the deductibles selected.
- .10 With the exception of Excess Umbrella Coverage, the coverage afforded by each carrier must be a primary over any other applicable insurance.
- .11 In addition to certificates of insurance, copies of policy endorsements must be provided (a) listing the Owner as Additional Insured, and (b) showing waivers of subrogation in favor of the Owner.

#### **11.4 PERFORMANCE BOND AND PAYMENT BOND**

Add the following Sections:

**11.4.1** The Contractor shall provide a Performance Bond, in the penal sum equal to one hundred percent (100%) of the Contract Sum, if the formal Contract is in excess of One Hundred Thousand Dollars (\$100,000.00) and a Labor and Material Payment bond, in the penal sum equal to one hundred percent (100%) of the Contract sum if the formal contract is in excess of Twenty Five Thousand Dollars (\$25,000.00).

**11.4.2** The Work will not be started until the bonds and issuing companies have been accepted as satisfactory by the Owner. The original bonds will be delivered to the Owner with an attached authorized power of attorney. Such Bonds shall be issued by a company authorized to do business in the State of Texas with an A.M. Best Company rating of a least A-X and included on the U.S. Department of the Treasury Listing of Approved Sureties (Dept. Circular 570).

**11.4.3** The Performance Bond Form and the Payment Bond Form included herein shall be executed and submitted to the Architect in duplicate prior to commencement of the work. The surety companies must be acceptable to the Owner and licensed admitted carriers in the State of Texas; and the companies must appear in a current Federal Treasury list as Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring companies.

**11.4.4** Each bond shall be of penal sum equal to one hundred percent (100%) of the Contract Sum and shall be compatible with the provisions of the governing authority. The Contractor shall file copies of each bond with the county clerk and furnish the Owner with a file receipt. The bonds shall remain in force throughout the warranty period of the contract. The Work will not be started until the bonds and issuing companies have been accepted as satisfactory by the Owner. The original bonds will be delivered to the Owner with an authorized power of attorney attached.

**11.4.5** Claims must be sent to the Contractor and his Surety in accordance with Article 5160, Revised Civil Statutes. The Owner will furnish in accordance with such Article, a copy of the Payment Bond as provided therein to claimants upon request. All claimants are cautioned that no lien exists on the funds unpaid to the contractor on such Contract, and that reliance on notices sent to the Owner may result in loss of their rights against the Contractor and/or his Surety. The Owner is not responsible in any manner to a claimant for collection of unpaid bills, and accepts no responsibility because of any representation by any agent or employee.

#### **11.5 WORKER'S COMPENSATION INSURANCE COVERAGE**

**11.5.1** Comply with the requirements of Rule 28, TAC §110.110, Reporting Requirements for Building or Construction Projects for Governmental Entities

##### **11.5.2 DEFINITIONS:**

- .1 Certificate of coverage ("certificate"). A copy of a certificate of insurance, a certificate of authority to self-insure issued by the commission, or a coverage agreement (TWCC-81, TWCC-82, TWCC-83, or TWCC-84), showing statutory workers' compensation insurance coverage for the person's or entity's employees providing service as on a project, for the duration of the project.

- .2 Duration of the project –includes the time from the beginning of the work on the project until the contractor's/person's work on the project has been completed and accepted by the governmental entity.
- .3 Persons providing services on the project ("subcontractor" in §406.096)-includes all persons or entities performing all or part of the services the contractor has undertaken to perform on the project, regardless of whether that person has employees. This includes, without limitation, independent contractors, subcontractors, leasing companies, motor carriers, owner-operators, employees of any such entity which furnishes persons to provide services on the project. "Services" include without limitation, providing hauling, or delivering equipment or materials, or providing labor, transportation, or other service related to a project. "Services" does not include activities unrelated to the project, such as food/beverage vendors, office supply delivery, and delivery of portable toilets.

**11.5.3** The Contractor shall provide coverage, based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements, which meets the statutory requirements of Texas Labor Code, Section 401.011(44) for all employees of the Contractor providing services on the project, for the duration of the project.

**11.5.4** The Contractor must provide a certificate of coverage to the governmental entity prior to being awarded the contract.

**11.5.5** If the coverage period shown on the Contractor's current certificate of coverage ends during the duration of the project, the Contractor must, prior to the end of the coverage period, file a new certificate of coverage with the governmental entity showing that coverage has been extended.

**11.5.6** The Contractor shall obtain from each person providing services on a project, and provide to the governmental entity:

- .1 A certificate of coverage, prior to that person beginning work on the projects so the governmental entity will have on file certificates of coverage showing coverage for all persons providing services on the project, and
- .2 No later than seven days after receipt by the Contractor, a new certificate of coverage showing extension of coverage, if the coverage period shown on the current certificate of coverage ends during the duration of the project.

**11.5.7** The Contractor shall retain all required certificates of coverage for the duration of the project and for one year thereafter.

**11.5.8** The Contractor shall notify the governmental entity in writing by certified mail or personal delivery, within 10 days after the Contractor knew or should have known, of any change that materially affects the provision of coverage of any person providing services on the project.

**11.5.9** The Contractor shall post on each project site a notice, in the text, form and manner prescribed by the Texas Worker's Compensation, informing all persons providing services on the project that they are required to be covered, and stating how a person may verify coverage and report lack coverage.

**11.5.10** The Contractor shall contractually require each person with whom it contracts to provide services on a project, to:

- .1 Provide coverage, based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements, which meet the statutory requirements of Texas Labor code, Section 401.011(44) for all of its employees providing services on the project, for the duration of the project.
- .2 Provide the Contractor, prior to that person beginning work on the project, a certificate of coverage showing that coverage is being provided for all employees of the person providing services on the project, for the duration of the project.
- .3 Provide the Contractor, prior to the end of the coverage period shown on the current certificate ends during the duration of the project.

- .4 Obtain from each other person with whom it contracts, and provides to the Contractor:
  - .1 A certificate of coverage, prior to the other person beginning work on the project, and
  - .2 A new certificate of coverage showing extension of coverage, prior to the end of the coverage period, if the coverage period shown on the current certificate of coverage ends during the duration of the project.
- .5 Retain all required certificates of coverage on file for the duration of the project and for one year thereafter.
- .6 Notify the governmental entity in writing by certified mail or personal delivery, within 10 days after the person knew or should have known, of any change that materially affects the provision of coverage of any person providing services on the project, and
- .7 Contractually require each person with whom it contracts, to perform as required by these subsections (1)-(7), with the certificates of coverage to be provided to the person for whom they are providing services.

**11.5.11** By signing this Contract or providing or causing to be provided a certificate of coverage, the Contractor is representing to the governmental entity that all employees of the Contractor who will provide services on the project will be covered by workers compensation coverage for the duration of the project, that the coverage will be based on proper reporting of classification codes and payroll amounts, and that all coverage agreements will be filed with the appropriate insurance carrier or, in the case of a self-insured, with the commission's Division of Self-Insurance Regulation. Providing false or misleading information may subject the Contractor to administrative penalties, criminal penalties, civil penalties, or other actions.

**11.5.12** The Contractor's failure to comply with any of these provisions is a breach of contract by the Contractor which entitles the governmental entity to declare the contract void if the Contractor does not remedy the breach within ten days after receipt of notice of breach from the governmental entity.

## **ARTICLE 12—UNCOVERING AND CORRECTION OF WORK**

### **12.2.1 BEFORE SUBSTANTIAL COMPLETION**

After Section **12.2.1** add the following Sections:

**12.2.1.1** In the event of failure of a specified project, either during construction or the correction period, the Contractor shall take appropriate measures with the manufacturer of the product to assure correction or replacement of the defective products.

**12.2.1.2** Refer to 01 77 00, Closeout Procedures in Division One for further terms regarding warranties which will be required prior to final payment.

### **12.2.2 AFTER SUBSTANTIAL COMPLETION**

After Section **12.2.2** add the following Section:

**12.2.2.1** Approximately eleven months after substantial completion, the contractor shall accompany the Owner and Architect on an "end of the one year correction period" reinspection of the Project. Additional deficiencies observed or reported shall be corrected by the Contractor.

## **12.3 ACCEPTANCE OF NONCONFORMING WORK**

Number the existing provision as Section **12.3.1**, and add Section **12.3.2** as follows:

**12.3.2** The Owner's use and/or occupancy of any or all of the Project site shall never be construed as an acceptance of Work not in conformance with Contract Documents. The Owner reserves the right to enforce provisions of the Contract unless the Owner's acceptance is provided to the Contractor in writing.

## **ARTICLE 13—MISCELLANEOUS PROVISIONS**

Add Sections **13.7**, **13.8**, **13.9**, **13.10**, and **13.11** as follows:

### **13.7 EQUAL OPPORTUNITY**

**13.7.1** The contractor shall maintain policies of employment as follows:

- .1 The Contractor and the Contractor's Subcontractors shall not discriminate against any employee or applicant for employment because of race, religion, color, sex or national origin. The Contractor shall take affirmative action to insure that applicants are employed, and that employees are treated during employment without regard to their race, religion, color, sex or national origin. Such action shall include, but not be limited to, the following: employment, upgrading, demotion transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the policies of non-discrimination.

### **13.8 CRIMINAL BACKGROUND CHECKS**

The Contractor/Subcontractor shall certify the Criminal Background Check, as stated in Owner's Board Policy CJA and the form included herein, as required by Texas Education Code Section 22.0834 and Texas Administrative Code Section 153.1101 and 153.1117, and shall comply with all requirements of such laws and policy.

### **13.9 REQUIRED CERTIFICATIONS**

Contractor hereby certifies that it is not a company identified on the Texas Comptroller's list of companies known to have contracts with, or provide supplies or services to, a foreign organization designated as a Foreign Terrorist Organization by the U.S. Secretary of State under federal law. Contractor hereby certifies and verifies that neither Contractor, nor any affiliate, subsidiary, or parent company of Contractor, if any (the "Contractor Companies"), boycotts Israel, and contractor agrees that Contractor and Contractor Companies will not boycott Israel during the term of this Agreement. For purposes of this Agreement, the term "boycott" shall mean and include terminating business activities or otherwise taking any action that is intended to penalize, inflict economic harm on, or limit commercial relations with Israel, or with a person or entity doing business in Israel or in an Israeli-controlled territory.

### **13.11 PROHIBITION ON CONTRACTS WITH COMPANIES THAT BOYCOTT ENERGY COMPANIES**

By entering into this Agreement, Contractor represents and warrants that: (1) it does not, and will not for the duration of the contract, boycott energy companies or (2) the verification required by Section 2274.002 of the Texas Government Code does not apply to the contract.

### **13.12 PROHIBITION ON COMPANIES THAT DISCRIMINATE AGAINST FIREARM INDUSTRY**

By entering into this Agreement, Contractor verifies that: (1) it does not, and will not for the duration of the contract, have a practice, policy, guidance, or directive that discriminates against a firearm entity or firearm trade association or (2) the verification required by Section 2274.002 of the Texas Government Code does not apply to the contract.

## **ARTICLE 14—TERMINATION OR SUSPENSION OF THE CONTRACT**

Delete the text of Section 14.1.3 in its entirety and substitute the following:

**14.1.3** If one of the reasons described in Section 14.4.1 or 14.4.2 exists, the Contractor may, upon seven day's written notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed as of the date of the notice, plus costs of demobilization.

#### **14.4 TERMINATION BY THE OWNER FOR CONVENIENCE**

Delete the text of Section **14.4.3** in its entirety and substitute the following:

**14.4.3** In the case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment for Work executed up to date of receipt of the notice of termination, plus costs of demobilization.

### **ARTICLE 15—CLAIMS AND DISPUTES**

#### **15.1 CLAIMS**

Delete the text of Section **15.1.1** in its entirety and substitute the following:

##### **15.1.1 DEFINITION**

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, adjustment or interpretation of contract terms, payment of money, extension of time or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner, Architect, and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim. Nothing herein shall require the Owner to make or file a Claim in order to assess liquidated damages provided for in the Contract Documents.

##### **15.1.2 TIME LIMITS ON CLAIMS**

Delete the last sentence of Section **15.1.2** in its entirety.

##### **15.1.3 NOTICE OF CLAIMS**

Delete the second sentence of Section **15.1.3** in its entirety and substitute the following:

Claims by either party must be initiated within ninety (90) days after occurrence of the event giving rise to such Claim or within ninety (90) days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

##### **15.1.6 CLAIMS FOR ADDITIONAL TIME**

Delete the text of **Section 15.1.6.2** in its entirety and substitute the following:

**15.1.6.2** **No extensions of the Contract Time will be granted for inclement weather, except as provided in Section 8.3.1.**

##### **15.1.7 CLAIMS FOR CONSEQUENTIAL DAMAGES**

Delete the text of Section **15.1.7** in its entirety.

#### **15.2 INITIAL DECISION**

Delete the text of Section **15.2.1** in its entirety and substitute the following:

**15.2.1** Claims, excluding those alleging an error or omission by the Architect or those arising after expiration of the period for correction of the Work, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. If the parties are unable to agree, any claim, dispute or matters arising out of the contract between the Architect, Owner and Contractor or any combination of those parties shall be submitted to a court of appropriate jurisdiction.

Delete the text of Section **15.2.5** in its entirety and substitute the following:

**15.2.5** The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefore; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties, but subject to mediation, if both parties so agree, and subject to legal or equitable proceedings in a court having jurisdiction thereof. It is understood and agreed that, in the event that any dispute, controversy, or conflict arises during the design and construction of the Project or following its completion, the parties hereto will cooperate in good faith, if possible, to resolve the issues without resorting to litigation.

Delete the text of Sections **15.2.6** and **15.2.6.1** in their entirety.

Add the following Section **15.2.9**

**15.2.9** The prevailing party in any judicial proceeding arising from the Contract Documents shall recover its reasonable and necessary attorneys' fees.

### **15.3 MEDIATION**

**15.3.1** Delete the text of **15.3.1** in its entirety.

Delete Section **15.3.2** in its entirety and replace with the following:

**15.3.2** The parties may mutually agree to resolve their claims by mediation which, unless the parties mutually agree otherwise, shall be in accordance with the Construction Industry Mediation Rules of the American Arbitration Association currently in effect. Request for mediation shall be filed in writing with the other party to the Contract. Mediation shall proceed in advance of legal or equitable proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing unless stayed for a longer period of agreement of the parties or court order.

### **15.4 ARBITRATION**

Delete the text of Sections **15.4.1** through **15.4.3** and **15.4.4.1** through **15.4.4.3** in their entirety.

**END OF DOCUMENT**

## **Prevailing Wage Rate Determination Information**

*The following information is from Chapter 2258 Texas Government Code:*

### **Sec. 2258.021. Right to be Paid Prevailing Wage Rates.**

- (a) A worker employed on a public work by or on behalf of the state or a political subdivision of the state shall be paid:
  - (1) not less than the general prevailing rate of per diem wages for work of a similar character in the locality in which the work is performed; and
  - (2) not less than the general prevailing rate of per diem wages for legal holiday and overtime work.
- (b) Subsection (a) does not apply to maintenance work.
- (c) A worker is employed on a public work for the purposes of this section if the worker is employed by a contractor or subcontractor in the execution of a contract for the public work with the state, a political subdivision of the state, or any officer or public body of the state or a political subdivision of the state.

### **Sec. 2258.023. Prevailing Wage Rates to be paid by Contractor and Subcontractor; Penalty.**

- (a) The contractor who is awarded a contract by a public body or a subcontractor of the contractor shall pay not less than the rates determined under Section 2258.022 to a worker employed by it in the execution of the contract.
- (b) A contractor or subcontractor who violates this section shall pay to the state or a political subdivision of the state on whose behalf the contract is made, \$60 for each worker employed for each calendar day or part of the day that the worker is paid less than the wage rates stipulated in the contract. A public body awarding a contract shall specify this penalty in the contract.
- (c) A contractor or subcontractor does not violate this section if a public body awarding a contract does not determine the prevailing wage rates and specify the rates in the contract as provided by Section 2258.022.
- (d) The public body shall use any money collected under this section to offset the costs incurred in the administration of this chapter.
- (e) A municipality is entitled to collect a penalty under this section only if the municipality has a population of more than 10,000.

### **Sec. 2258.051. Duty of Public Body to Hear Complaints and Withhold Payment.**

A public body awarding a contract, and an agent or officer of the public body, shall:

- (1) take cognizance of complaints of all violations of this chapter committed in the execution of the contract; and
- (2) withhold money forfeited or required to be withheld under this chapter from the payments to the contractor under the contract, except that the public body may not withhold money from other than the final payment without a determination by the public body that there is good cause to believe that the contractor has violated this chapter.



# Prevailing Wage Rates – School Construction Trades

Effective: June 12, 2019

## Texas Gulf Coast Area

<b>CLASSIFICATION</b>	<b>2019 HOURLY RATE</b>
ASBESTOS WORKER	\$18.00
BRICKLAYER; MASON	\$18.98
CARPENTER; CASEWORKER	\$18.90
CARPET LAYER; FLOOR INSTALLER	\$19.80
CONCRETE FINISHER	\$13.90
DATA COMM/TELE COMM	\$22.58
DRYWALL INSTALLER; CEILING INSTALLER	\$16.40
ELECTRICIAN	\$25.50
ELEVATOR MECHANIC	\$31.50
FIREPROOFING INSTALLER	\$19.17
GLAZIER	\$19.67
HEAVY EQUIPMENT OPERATOR	\$21.00
INSULATOR	\$14.90
IRONWORKER	\$23.00
LABORER, HELPER	\$11.75
LATHERER; PLASTERER	\$18.60
LIGHT EQUIPMENT OPERATOR	\$13.25
METAL BUILDING ASSEMBLER	\$16.33
MILLWRIGHT	\$26.30
PAINTER; WALL COVERING INSTALLER	\$14.67
PIPEFITTER	\$25.17
PLUMBER	\$31.00
ROOFER	\$15.10
SHEET METAL WORKER	\$20.25
SPRINKLER FITTER	\$20.61
STEEL ERECTOR	\$23.33
TERRAZZO WORKER	\$16.42
TILE SETTER	\$15.30
WATERPROOFER; CAULKER	\$14.90

# Prevailing Wage Rates

## Worker Classification Definition Sheet

CLASSIFICATION	DEFINITION
ASBESTOS WORKER	Worker who removes and disposes of asbestos materials.
BRICKLAYER; MASON	Craftsman who works with masonry products, stone, brick, block, or any material substituting those materials and accessories.
CARPENTER; CASEWORKER	Worker who build wood structures or structures of any material which has replaces wood. Includes rough and finish carpentry, hardware and trim.
CARPET LAYER; FLOOR INSTALLER	Worker who installs carpets and/or floor coverings, vinyl tile.
CONCRETE FINISHER	Worker who floats, trowels, and finishes concrete.
DATA COMM/TELE COMM	Worker who installs data/telephone and television cable and associate equipment and accessories.
DRYWALL; CEILING INSTALLER	Worker who installs metal framed walls and ceiling, drywall coverings, ceiling grids, and ceilings.
ELECTRICIAN	Skilled craftsman who installs or repairs electrical wiring and devices. Includes fire alarm systems and HVAC electrical controls.
ELEVATOR MECHANIC	Craftsman skilled in the installation and maintenance of elevators.
FIREPROOFING INSTALLER	Worker who sprays or applies fire proofing materials.
GLAZIER	Worker who installs glass, glazing, and glass framing.
HEAVY EQUIPMENT OPERATOR	Includes but not limited to: all CAT tractors, all derrick-powered, all power operated cranes, back-hoes, back-fillers, power operated shovels, winch trucks, and all trenching machines.
INSULATOR	Worker who applies, sprays, or installs insulation.
IRONWORKER	Skilled craftsman who erects structural steel framing, and installs structural concrete Rebar.
LABORER, HELPER	Worker qualified for only unskilled or semi-skilled work. Lifting, carrying materials or tools, hauling, digging, clean up.
LATHERER; PLASTERER	Worker who installs metal framing and lath. Worker who applies plaster to lathing and installs associated accessories.
LIGHT EQUIPMENT OPERATOR	Includes but not limited to , air compressors, truck crane drivers, flex planes, building elevators, form graders, concrete mixers less than 14cf, conveyers.
METAL BUILDING ASSEMBLER	Worker who assembles pre-made metal buildings.
MILLWRIGHT	Mechanic specializing in the installation of heavy machinery, conveyance, wrenches, dock levelers, hydraulic lifts, and align pumps.
PAINTER; WALL COVERING INSTALLER	Worker who prepares wall surfaces and applies paint and/or coverings, tape, and bedding.
PIPEFITTER	Trained worker who installs piping systems, chilled water piping and hot water (boiler) piping, pneumatic tubing controls, chillers, boilers, and associated mechanical equipment.
PLUMBER	Skilled craftsman who installs domestic hot and cold water piping, waste piping, storm system piping, water closets, sinks, urinals, and related work.
ROOFER	Worker who installs roofing materials, Bitumen (asphalt and coal tar) felts, flashings, all types of roofing membranes, and associated products.
SHEET METAL WORKER	Worker who installs sheet metal products, Roof metal, flashings and curbs, ductwork, mechanical equipment, and associated metals.
SPRINKLER FITTER	Worker who installs fire sprinklers systems and fire protectant equipment.
STEEL ERECTOR	Worker who erects and dismantles structural steel frames of buildings and other structures.
TERRAZZO WORKER	Craftsman who places and finishes Terrazzo.
TILE SETTER	Worker who prepares wall and/or floor surfaces and applies ceramic tiles to these surfaces.
WATERPROOFER; CAULKER	Worker who applies water proofing material to buildings. Products include sealant, caulk, sheet membranes, and liquid membranes, sprayed, rolled or brushed.



DOCUMENT 00 73 50

WEATHER TABLE

MONTH	AVERAGE DAYS RAIN (1)	INCHES RAINFALL (2)	SNOW/ICE PELLETS (3)
JANUARY	10.0	3.76	0.0
FEBRUARY	8.8	2.97	0.0
MARCH	8.8	3.47	0.0
APRIL	7.3	3.95	0.0
MAY	8.6	5.01	0.0
JUNE	10.0	6.00	0.0
JULY	9.1	3.77	0.0
AUGUST	8.5	4.84	0.0
SEPTEMBER	8.4	4.71	0.0
OCTOBER	7.7	5.46	0.0
NOVEMBER	7.6	3.87	0.0
DECEMBER	9.6	4.03	0.1
ANNUALLY	104.4	51.84	0.1

(1) Mean number of days rainfall, 0.01" or more.

(2) Mean precipitation, in inches.

(3) Mean number of days 1.0" or more.

\* Less than 0.05".

This table is based on information reported from Houston Intercontinental Airport, Texas. Latitude 29.9800° N, Longitude -95.3600° W, elevation (ground) 95 feet.

Means are based on records covering a period of 30 years. Normals based on record for the 1991-2020 period.

END OF DOCUMENT

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SECTION 01 11 00

SUMMARY OF WORK

GENERAL

1.1 SUMMARY

A. Related Requirements:

1. Document 00 21 16 - Instructions to Proposers.
2. Document 00 70 00 - General Conditions of the Contract for Construction: Provisions for use of site; Owner occupancy; Relations of Contractor - subcontractors.
3. Document 00 73 00 – Supplementary Conditions to the Contract for Construction.
4. Section 01 32 16 - Construction Progress Schedules: Format of work schedule.
5. Section 01 45 23 - Testing and Inspection Services.
6. Section 01 50 00 - Temporary Facilities and Controls.

1.2 DESCRIPTION

- A. The work comprises interior, exterior, and site renovation construction at eleven campuses of Klein Independent School District, Klein, Texas, as shown on the drawings and described in the specifications. The work will be done under one lump sum contract.
- B. Indication on the drawings or mention in the specifications of articles, materials, operations or methods requires that the Contractor provide each item indicated or mentioned of the quality or subject to the qualifications noted, and perform according to the conditions stated each operation described and provide therefor all necessary labor, equipment, services and incidentals.
1. Subcontractors are responsible for examining the architectural drawings for structural, mechanical, electrical, and plumbing items. Items shown on these drawings shall be furnished by the appropriate subcontractor.

1.3 CONDITIONS OF THE CONTRACT

- A. The General Conditions (Modified) and Supplementary Conditions, bound herewith as preceding portions of these specifications, form a part thereof and shall govern the work under each section.

1.4 EXISTING SITE CONDITIONS

- A. Visit and examine the site. Upon award of the Contract, the Contractor shall accept the condition of the site before beginning the work required.

1.5 SPECIAL REQUIREMENTS

- A. The present buildings house operating facilities that must continue in operation during the construction period, except as the Architect and Owner may otherwise direct. Plumbing, heating, ventilating, electrical and telephone systems shall continue to function with a minimum of interruptions in service. Do not block required fire exits.
- B. Assume responsibility for the protection of areas of work and provide and maintain protections required. Protect existing surfaces of the building and equipment, both interior and exterior, as required during the construction period. Provide necessary dust screens, drop cloths and temporary walls and/or coverings as may be required for protection. Existing surfaces that are damaged due to construction shall be patched or replaced to original condition.
- C. Where designated on the drawings, salvage, relocate and reinstall certain items. Existing items so designated shall be properly installed, securely fastened as required, set plumb and level and left complete and operational. Exercise extensive care in relocating such items so as to prevent damage. Other existing building materials indicated to be removed or demolished, unless noted otherwise or claimed by the Owner shall become property of the Contractor and shall be removed from the site immediately.
- D. Wherever exterior walls are to be demolished or existing doors replaced, the exposed portion of the existing building shall be protected by the Contractor against the elements, construction debris and intrusion by unauthorized persons, by means subject to approval of the Architect.

- E. Execute Certificate of Substantial Completion for each designated portion of work prior to Owner occupancy. Following execution of a Substantial Completion Certificate for a designated portion of the work, the Contractor shall permit:
  - 1. Access for Owner personnel.
  - 2. Use of parking facilities for the benefit of the Owner.
  - 3. Operation of HVAC and electrical systems for the benefit of the Owner.

Despite partial Owner occupancy, the Contractor shall remain responsible for portions of the work which have not attained Substantial Completion and for which a Substantial Completion Certificate, which shall designate the date on which the Owner shall become responsible for utilities, maintenance, security, damage to the work and insurance, has not been executed.

- F. The loop fire lane and fire hydrants are required by the City to be in place and operational during construction at existing buildings.

#### 1.6 SEQUENCE OF CONSTRUCTION

- A. Work shall be started upon formal "Notice-to-Proceed" and shall be substantially complete by August 1, 2025.
- B. The successful Contractor may propose alternatives to the sequence of construction that would accelerate the work, provided there is no increase in the contract amount or extension of the contract time, or, in the Owner's judgment, any activity that would disrupt, impede, or prohibit normal school operations. Proposals shall be submitted in writing and are subject to the approval of the Owner and Architect.

#### 1.7 CONTRACTOR USE OF PREMISES

- A. Limit use of premises for work, for storage and for access, to allow for Owner occupancy.
- B. Coordinate use of premises under direction of Owner.
- C. Assume full responsibility for protection and safekeeping of products under this contract.
- D. Obtain and pay for use of additional storage or work areas needed when required for operations under this Contract.
- E. During construction the Owner will continue to perform normal activities in and around the adjacent existing building. Proper and safe access to the Owner-occupied areas shall be maintained. Interruption of mechanical and electrical services to the building shall be only at such times and for lengths of time as approved by the Owner.
- F. There shall be no storage of materials or equipment in the occupied portions of the existing building. There shall be no fires on the site or in the building. There shall be no dumping on Owner's property.
- G. Worker Identity Badging Requirements: Provide construction personnel (including subcontractors and suppliers regularly visiting the project site) with identification badges, with photograph. Identification badges shall be worn visibly by construction personnel on the construction site or on Owner's property. **NO EMPLOYEE WILL BE PERMITTED ON SITE WITHOUT THIS BADGE DISPLAYED ON THE EMPLOYEE.** Contractor must assure that the Crisis Management contact information is provided on the reverse side of each worker's badge. Temporary or visitor badges will be provided for persons who are identified as having an infrequent or temporary legitimate business need for access to the site.

#### 1.8 WORK RESTRICTIONS

- A. On-Site Work Hours: Work shall be generally performed on the project site during normal business working hours of 6:00 a.m. to sundown, Monday through Friday or City ordinance whichever is more restrictive.
  - 1. Weekend Hours: Comply with City ordinance restrictions for weekend work. No work shall be performed on Sundays, unless specifically allowed by City and Owner.
  - 2. Early Morning Hours: Comply with City noise ordinances for restriction of early-morning concrete pours and other noisy construction activities. Owner's testing laboratory personnel will be available only during on-site work hours listed above.

- B. Work Restrictions within Existing Building(s): Work shall be generally performed inside the existing building during the summer break and after normal school classes Monday through Friday. During student holidays when the faculty and staff may be on campus, extent of work and utility interruption shall be coordinated with the Owner in advance. On dates designated as STAAR testing days, work within the existing building is not allowed and work in other areas may need to be limited to keeping down the amount of noise and distraction for the students. Work on these days shall be coordinated with the Owner in advance.

#### 1.9 OWNER-FURNISHED PRODUCTS

- A. Contractor Responsibilities
  1. Protect products from damage.
  2. Repair or replace items damaged by Contractor.
- B. Schedule of Owner-furnished items
  1. Refer to Drawings.

#### 1.10 COORDINATION

- A. Drawing details and other sections of these specifications covering work connected with or relating to that specified under a specific heading shall be examined for conditions which may affect that part of the work. Failure to do so will not relieve those furnishing materials and/or labor under a specification heading from supplying materials or performing work reasonably necessary to properly coordinate their work with that of other trades.

#### 1.11 LAYING OUT WORK, MEASUREMENTS

- A. Employ a competent engineer or surveyor to establish and maintain lines and levels. Establish and maintain at least two elevation bench marks remote from each other and located outside the building area. Set alignment and location stakes.
- B. Verify measurements at the building. No extra compensation will be allowed for differences between actual dimensions and dimensions indicated on the drawings. Figured dimensions and measurements taken at the site shall take precedence over scaled dimensions.

#### 1.12 DISCREPANCIES

- A. In case of discrepancies within the drawings, within the specifications, or between the drawings and specifications, the better quality and greater quantity, in the opinion of the Architect, shall be furnished and installed.

#### 1.13 PIPING

- A. Should active piping or conduit be encountered below grade within the building structure and be found at variance with the known conditions indicated by the drawings and specifications, said piping and/or conduit shall be relocated as required by the Architect, and the contract sum shall be fairly adjusted on the basis of the cost of labor and materials. The Contractor shall provide temporary support of active piping and conduit encountered in the excavations until permanently supported or removed. The Contractor shall cut off and cap or plug abandoned lines at least 3 ft. outside the building lines. Conform to the applicable requirements of the locality or governing agency.

#### 1.14 PROTECTION

- A. General: Limit use of the premises to construction activities in areas indicated; allow for Owner occupancy in adjacent spaces and around the site.
  1. Confine operations to areas within Contract limits indicated. Portions of the building which are outside the areas construction operations are indicated, are not to be disturbed.
  2. Keep driveways and entrances serving the premises clear and available to the Owner and the Owner's employees. Do not use these areas for parking or storage of materials without prior approval. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on site.
  3. Do not dispose of organic and hazardous material on site, either by burial or by burning. Disposable material and trash must be removed properly.



- B. Assume responsibility for the premises and provide and maintain protections required by the governing laws, regulations and ordinances. The Contractor shall be responsible for loss or damage caused by him or his workmen to the property of the Owner or to the work or materials installed, and shall make good loss, damage or injury without cost to the Owner.
- C. The protection of adjacent property shall include but will not necessarily be limited to the erection and maintenance of shoring, underpinning and fences as necessary to protect and support existing work to be left in place.
- D. Finished floors shall be protected against damage by workmen and equipment during the work. Where materials are carried into the building, the building floors shall be covered to protect the work against dirt or grit being ground in.
- E. Where existing roofing, flashing, exterior walls, doors and windows are removed, the openings and exposed portions of the construction shall be covered and protected so as to be weathertight until new work is in place.
- F. Where work is being done on the existing building, the furniture, fixtures and equipment in the building shall be covered with heavy plastic sheeting or clean tarpaulins to protect the property against damage and stains. The furniture and equipment shall not be removed from the building.
- G. Trees and shrubs on the site which do not have to be removed for the new work shall be protected against damage. No Contractor shall remove or trim trees and shrubs in the area without the express approval of the Architect.
- H. Send proper notices, make necessary arrangements and perform other services required for the care, protection and maintenance of Public Utilities, including fire plugs and wires and other items of this character on and around the building site.
- I. Maintain accessible building exits required by the City during construction. Protection of these exits shall include dust-proof enclosures, illumination and exit lighting required.
- J. While school is in session, provide appropriate measures to control the migration of dust and odors into occupied areas of the school.

#### 1.15 CUTTING AND PATCHING

- A. Cutting and chasing of existing construction for relocation of mechanical and electrical work and for installation of pipes and ducts will be done by the trades concerned. Patching and finishing shall be done by the Contractor. This work shall be done with proper tools and by careful workmen of the particular trade to which such work belongs and shall be done without extra cost to the Owner.

#### 1.16 RECORD DRAWINGS

- A. Maintain a complete clean set of drawings and Project Manual in the project field office for the sole purpose of recording "installed" conditions. Installed conditions shall include addendum items, change orders, or other items which come up during the construction phase which deviate from the Construction Documents. Changes made in these drawings and Project manual in connection with the final construction and installation shall be neatly made in red ink. Upon completion of the project, the marked set of drawings and Project Manual shall be delivered to the Architect for subsequent transmittal to the Owner. These drawings shall be maintained to reflect the current conditions of the work and changes shall be reviewed on a monthly basis with the Architect's representative. The Contractor's updating of the "installed" condition drawings and Project Manual shall be a prerequisite to the monthly review of the Contractor's payment request by the Architect's representative.

#### 1.17 INSTRUCTIONS CONCERNING ASBESTOS

- A. In the event the Contractor encounters on the site material reasonably believed to be asbestos which has not been rendered harmless, the Contractor shall immediately stop work in the area affected and report the condition to the Owner in writing. If, in fact the material is asbestos and has not been rendered harmless, the work in the affected area shall not thereafter be resumed until the asbestos has been removed or rendered harmless by the Owner. The work in the affected area shall be resumed in the absence of asbestos, or when it has been rendered harmless, by written agreement of the Owner and Contractor.

B. The Contractor will not be required to perform without consent work relating to asbestos.

PART 2 - PRODUCTS

Not used

PART 3 - EXECUTION

Not used

END OF SECTION

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SECTION 01 21 00

ALLOWANCES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Administrative and procedural requirements governing allowances.
  - 1. Certain materials and equipment 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 additional information is available for evaluation. If necessary, additional requirements will be issued by change order.
- B. Related Requirements:
  - 1. General Conditions of the Contract for Construction.
  - 2. Section 01 22 00 - Unit Prices; procedures for using unit prices.
  - 3. Section 01 32 16 - Construction Progress Schedules: Product delivery and installation dates.
  - 4. Individual Specifications Sections Listed Under Schedule of Allowances: Specification of products and installation under allowances.

1.2 COSTS INCLUDED IN ALLOWANCES

- A. Cost of product to Contractor or subcontractor, less applicable trade discounts.
- B. Delivery to site.
- C. Applicable taxes.

1.3 CONTRACTOR COSTS INCLUDED IN CONTRACT SUM

- A. Products handling at site, including unloading, uncrating and storage.
- B. Protection of products from elements and from damage.
- C. Labor for installation and finishing.
- D. Other expenses required to complete installation.
- E. Contractor overhead and profit.

1.4 ADJUSTMENT OF COSTS

- A. Should the net cost be more or less than the specified amount of the allowance, the contract sum will be adjusted accordingly by change order.
- B. Submit any claims for anticipated additional costs at the site, or other expenses caused by the selection under the allowance, prior to execution of the work.
- C. Submit documentation for actual additional costs at the site, or other expenses caused by the selection under the allowance, prior to execution of the work.
- D. Failure to submit claims within the designated time will constitute a waiver of claims for additional costs.

### 1.5 ARCHITECT RESPONSIBILITIES

- A. Consult with Contractor in consideration of products, suppliers and installers.
- B. Select products, obtain Owner's written decision, and transmit full information to Contractor as follows
  1. Manufacturer, product, model or catalog number, accessories, attachments and finishes.
  2. Supplier and installer as applicable.
  3. Cost to Contractor, delivered to site (and installed, if so specified).

### 1.6 CONTRACTOR RESPONSIBILITIES

- A. At the earliest practical date after award of the contract, advise Architect 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. Assist Architect in determining suppliers; and installers; obtain proposals when requested.
- C. Make recommendations for Architect consideration.
- D. Promptly notify Architect of any reasonable objections against supplier or installer.
- E. On notification of selection execute purchase agreement with designated supplier and installer.
- F. Arrange for and process shop drawings, product data and samples.
- G. Arrange for delivery. Promptly inspect products upon delivery for completeness, damage and defects. Submit claims for transportation damage.
- H. Install, adjust and finish products.
- I. Provide warranties for products and installation.

### 1.7 CORRELATION WITH CONTRACTOR SUBMITTALS

- A. Schedule shop drawings, product data, samples and delivery dates, in progress schedule for products selected under allowances.

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 allowance work with related work to ensure proper integration and interface.

#### 3.3 SCHEDULE OF ALLOWANCES

- A. Allowance No. 1: Furnish a betterment allowance for the lump sum of \$400,000.00 for changes requested by the Owner.

END OF SECTION

SECTION 01 23 00

ALTERNATES

PART 1 - GENERAL

1.1 SUMMARY

- A. Requirements Included:
  - 1. Identification and description of alternate work.
  - 2. The amount shown in the proposal form for each alternate shall include all overhead, profit, insurance and other costs incidental to the performance under the alternate.
- B. Related Requirements:
  - 1. Proposal Form: Quotation of cost of each alternate.
  - 2. Contract Form: Alternates accepted by Owner for incorporation into the work.
  - 3. Section of specifications identified in each alternate.

1.2 PROCEDURES

- A. Proposers are required to submit alternate amounts to add work or to deduct work from the base proposal as described below. Failure to submit alternate amounts in spaces provided on proposal form shall be basis for disqualification of proposal.
- B. The successful proposer shall not modify, withdraw or cancel any of the alternate proposals or any part thereof for 30 days after date of receipt of proposals, unless specifically noted otherwise.
- C. Contractor shall be responsible for any changes in the Work affected by acceptance of alternates. Claims for additional costs or time extensions resulting from changes to the Work as a result of the Owner's election of any or all alternates will not be allowed.
- D. Refer to drawings and technical specifications sections for items of work affected by alternates.
- E. Election of alternates will be exercised at the option of Owner.
- F. Coordinate related work and modify or adjust surrounding work as required to complete the Work, including changes under each alternate.
  - 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.
  - 2. Cost listed for each alternate include cost of related coordination, modification, or adjustment.
- G. Notification: Immediately following the award of contract, Contractor shall prepare and distribute to each entity or person to be involved in the performance of the Work, a notification of the status of each alternate scheduled herein. Indicate which alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates, if any.

1.3 SELECTION AND AWARD OF ALTERNATES

- A. Indicate variation in base proposal amount as a result of the prices for the alternates described below and listed on the proposal form document or any supplement to it, by adding to, or deducting from, the base proposal amount or by indicating "No Change."
- B. Indicating "No Proposal" as an alternate is unacceptable and is reason for rejection of proposal.

1.4 SCHEDULE OF ALTERNATES

- A. Alternate No. 1: State in the proposal form the amount to be added to the base proposal for providing a marquee sign at Blackshear Elementary School as indicated on the drawings.
- B. Alternate No. 2: State in the proposal form the amount to be added to the base proposal for providing a marquee sign at Kohrville Elementary School as indicated on the drawings.
- C. Alternate No. 3: State in the proposal form the amount to be added to the base proposal for providing a marquee sign at Metzler Elementary School as indicated on the drawings.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION

SECTION 01 29 00

PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
  - 1. Applications and Certificates for Payment.
  - 2. Change Order Procedures.
  - 3. Schedule of Values: Submit to the Architect the Schedule of Values allocated to various portions of the work within five days after "Notice-to-Proceed". Upon request of Architect, support values with data which will substantiate their correctness.
- B. Related Requirements:
  - 1. Conditions of the Contract for Construction.
  - 2. Section 01 32 16 - Construction Progress Schedules.
  - 3. Section 01 77 00 - Closeout Procedures.
  - 4. Section 01 78 39 - Project Record Documents.

1.2 APPLICATIONS AND CERTIFICATES FOR PAYMENT

- A. Provide a separate Application for Payment for each school.
- B. Progress payments shall be made as the work proceeds at intervals stated in the Contract.
- C. Work covered by progress payments shall, at the time of payment, become the property of the Owner.
- D. Form of Application and Certificate for Payment shall be notarized AIA Document G702 - Application and Certification for Payment, supported by AIA document G703 - Continuation Sheet. Submit two hard copies. Architect will retain a digital copy and return signed hard copies to the Owner and Contractor.
- E. Conditions governing regular schedule for applications, payment and retainage are as stated in the Contract.
- F. With each Application for Payment, Contractor shall certify that such Application for Payment represents a just estimate of cost reimbursable to Contractor under terms of Contract.

1.3 CONSTRUCTION CHANGE ORDER PROCEDURES

- A. Contractor to submit to Architect within five days of execution of Owner/Contractor Agreement name of individual authorized to accept changes on behalf of Contractor, and to be responsible for informing others in Contractor's employ of changes in the work.
- B. Change Order forms will be furnished and issued by Architect.
- C. Contractor Documentation of Changes:
  - 1. Maintain detailed records of work done on an accounting basis acceptable to Architect and Owner. Provide full information required for evaluation of proposed changes.
  - 2. Document each quotation for a change in cost or time with sufficient data to allow evaluation of quotation.
  - 3. On request, provide additional data to support computations:
    - a. Quantities of products, labor and equipment.
    - b. Insurance and bonds.
    - c. Overhead and profit.
    - d. Justification for any change in Contract Time.
    - e. Credit for deletions from Contract, similarly documented.
  - 4. Support each request for additional costs, and for work proposed on a time and material basis, with description of products, equipment, cost of labor and subcontracts, completely documented.
  - 5. Computation for changes in work will be computed in one of the manners described in the Conditions of the Contract.



- D. Initiation of Changes:
1. Architect may submit Proposal Request which includes detailed description of change with supplementary or revised drawings and specifications.
  2. Contractor may initiate a proposed change by submittal of a request to Architect describing proposed change with statement of reason for change, and proposed effect on Contract Sum and Contract Time with full documentation and a statement of the effect on work of separate contractors. Document any requested substitutions in accordance with SECTION 01 62 00 - PRODUCT OPTIONS. Submission of such requests and receipt of same by Architect does not mean acceptance, or approval of proposed change.
- E. Authorization:
1. The Owner may request, through the Architect, a Construction Change Directive, in writing, instructing Contractor to proceed with changes of all or in part of work, for subsequent inclusion in a Change Order that is pending. Directive will propose basis for necessary adjustments, if any, to Contract Sum or Time.
  2. Changes that affect Contract Sum and/or Contract Time will require a Change Order signed by the Owner and the Architect. Contractor's signature indicates agreement. Other orders, written or oral, by the Owner through the Architect or by the Architect shall be treated as a Change Order only if Contractor gives Owner proper written notice as described in Conditions of Contract.
  3. Promptly execute the change in work only upon receipt of approved Change Order or Owner's written Construction Change Directive.
- F. Execution:
1. Architect will issue Change Orders for signatures of parties as provided in Conditions of Contract.
  2. Promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust Contract Sum as shown on Change Order.
  3. Promptly revise Progress Schedules to reflect change in Contract Time, revise sub-schedules to adjust times for other items of work affected by Change, and resubmit Schedule.
  4. Promptly enter Changes in Project Record Documents.

#### 1.4 SCHEDULE OF VALUES FORM AND CONTENT

- A. Provide a separate Schedule of Values for each school and provide a breakdown between additions and renovations for major items of work.
- B. Type schedule on 8-1/2" x 11" white paper; Contractor's standard forms and automated printout will be considered for approval by Architect upon Contractor's request. Identify schedule with:
1. Title of project and location.
  2. Architect and Architect's project number.
  3. Name and address of Contractor.
  4. Contract designation.
  5. Date of submission.
- C. Follow the table of contents of this project manual as the format for listing component items.
1. Identify each line item with the number and title of the respective major section of the specifications.
- D. For each major line-item list sub-values of major products or operations under the item.
- E. For the various portions of the work:
1. Each item shall include a directly proportional amount of the Contractor's overhead and profit.
  2. For items on which progress payments will be requested for stored materials, break down the value into:
    - a. Cost of the materials, delivered and unloaded, with taxes paid.
    - b. Total installed value.
- F. The sum of values listed in the schedule shall equal the total contract sum.
- G. Indicate separate value associated with materials and labor.
- H. Re-submittal: After review by Architect, revise and resubmit schedule as necessary.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION

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SECTION 01 31 00

PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Coordination of work of the contract.
- B. Related Requirements:
  - 1. Section 01 11 00 - Summary of Work: Sequence of construction and Owner occupancy.
  - 2. Section 01 31 19 - Project Meetings.
  - 3. Section 01 50 00 - Temporary Facilities and Controls: Architect's project management system.
  - 4. Section 01 62 00 - Product Options.
  - 5. Section 01 73 29 - Cutting and Patching.
  - 6. Section 01 77 00 - Closeout Procedures: Closeout submittals.

1.2 DESCRIPTION

- A. Coordinate scheduling, submittals and work of the various sections of specifications to ensure efficient and orderly sequence of installation of construction elements, with provisions for accommodating items to be installed later.
- B. Coordinate sequence of work to accommodate Owner occupancy as specified in SECTION 01 11 00 - SUMMARY OF WORK.

1.3 MEETINGS

- A. In addition to progress meetings specified in SECTION 01 31 19 - PROJECT MEETINGS, hold coordination meetings and pre-installation conferences with personnel and subcontractors to ensure coordination of work.

1.4 COORDINATION OF SUBMITTALS

- A. Schedule and coordinate submittals specified in SECTION 01 33 23 - SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.
- B. Coordinate work of various sections having interdependent responsibilities for equipment, such as installing, connecting to and placing in service.
- C. Coordinate requests for substitutions to ensure compatibility of space, of operating elements and effect on work of other sections.

1.5 REQUEST FOR INFORMATION (RFI)

- A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified. Reference SECTION 01 50 00 - TEMPORARY CONTROLS for Architect's project management system.
  - 1. Architect will return without response those RFIs submitted to Architect by other entities controlled by Contractor.
  - 2. Coordinate and submit RFIs in a prompt manner to avoid delays in Contractor's work or work of subcontractors.
  - 3. Contractor shall always include a proposed solution along with the RFI.
  - 4. RFI's submitted to the Contractor by subcontractors, vendors, suppliers, or other parties to the Work shall be reviewed by the Contractor prior to submission to the Architect. If the Architect deems that such RFI requests have not been adequately reviewed by the Contractor, such requests will be returned to the Contractor for further action.

5. RFI requests are limited to a request for interpretation or clarification of the requirements of the Contract Documents. Interpretations provided by the Architect shall not change the requirements of the Contract or the Contract Documents. If the Contractor determines that the Architect's response to an RFI gives cause for a change in the Contract or the Contract Documents, the Contractor shall promptly, within 5 working days, give written notice to the Architect of request for adjustments. Requests for adjustments to the Contract shall be submitted in a manner consistent with the terms and conditions of the Contract Documents.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
1. Project name.
  2. Owner name.
  3. Owner's Project number.
  4. Name of Architect.
  5. Architect's Project number.
  6. Date.
  7. Name of Contractor.
  8. RFI number, numbered sequentially.
  9. RFI subject.
  10. Specification Section number and title and related paragraphs, as appropriate.
  11. Drawing number and detail references, as appropriate.
  12. Field dimensions and conditions, as appropriate.
  13. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
  14. Contractor's signature.
  15. 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. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow five working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.
1. The following Contractor-generated RFIs will be returned without action:
    - a. Requests for approval of submittals.
    - b. Requests for approval of substitutions.
    - c. Requests for approval of Contractor's means and methods.
    - d. Requests for coordination information already indicated in the Contract Documents.
    - e. Requests for adjustments in the Contract Time or the Contract Sum.
    - f. Requests for interpretation of Architect's actions on submittals.
    - g. Incomplete RFIs or inaccurately prepared RFIs.
  2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt by Architect of additional information.

## 1.6 COORDINATION OF SPACE

- A. Coordinate use of project space and sequence of installation of mechanical and electrical work which is indicated diagrammatically on drawings. Follow routings shown for pipes, ducts and conduits as closely as practicable, with due allowance for available physical space; make runs parallel with lines of building. Utilize space efficiently to maximize accessibility for other installations, for maintenance and for repairs.
- B. In finished areas, except as otherwise shown, conceal pipes, ducts and wiring in the construction. Coordinate locations of fixtures and outlets with finish elements.

## 1.7 COORDINATION OF CONTRACT CLOSEOUT

- A. Coordinate completion and cleanup of work of separate sections in preparation for substantial completion of portions of work designated for Owner partial occupancy.
- B. After Owner occupancy of premises, coordinate access to site by various sections for correction of defective work and work not in accordance with contract documents, to minimize disruption of Owner's activities.

C. Assemble and coordinate closeout submittals specified in SECTION 01 77 00 - CLOSEOUT PROCEDURES.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION

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SECTION 01 31 19

PROJECT MEETINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
  - 1. Scheduling and administration of progress meetings.
  - 2. Pre-installation conferences.
- B. Related Requirements:
  - 1. Section 01 31 00 - Project Management and Coordination.
  - 2. Section 01 31 19.13 - Preconstruction Meetings: Owner's preconstruction conference and pre-mobilization conference.
  - 3. Section 01 32 16 - Construction Progress Schedules.
  - 4. Section 01 33 23 - Shop Drawings, Product Data and Samples.
  - 5. Section 01 45 00 - Quality Control.
  - 6. Section 01 78 23 - Operation and Maintenance Data.
  - 7. Section 01 78 39 - Project Record Documents.

1.2 PROGRESS MEETINGS

- A. The Architect will schedule monthly construction progress meetings, throughout progress of work. They will prepare agenda and distribute notice of each meeting to participants.
- B. Contractor shall make physical arrangements.
- C. Architect will preside at meetings and issue meeting minutes
- D. Location of Meetings: Location of meeting shall be coordinated with the Owner.
- E. Attendance: Contractor, job superintendent, and Architect. Owner and professional consultants will attend as appropriate. Subcontractors and suppliers shall attend as Architect or Contractor sees necessary to agenda.
- F. Anticipated Agenda:
  - 1. Review of any outstanding old business from prior meeting minutes.
  - 2. Review of Contractor's updated Construction Schedule, including minimum two-week look ahead schedule.
  - 3. Review of work in-progress.
  - 4. Field observations and decisions.
  - 5. Status of correction of deficient items.
  - 6. Review of outstanding RFI's.
  - 7. Identification of problems which impede planned progress.
  - 8. Review of submittal schedule and status of submittals, including pending submittals and resubmittals.
  - 9. Review of off-site fabrication and delivery schedules.
  - 10. Corrective measures to regain projected schedules if project is behind schedule.
  - 11. Review of quality and work standards.
  - 12. Review of Proposal Request and Change Proposal Logs, including any known pending changes.
  - 13. Effect of proposed changes on progress schedule and coordination.
  - 14. Review of Contractor's updates to Project Record Documents.
  - 15. Review and signing of formal Application for Payment, as applicable.
  - 16. For Construction Manager projects, discuss variances between actual and estimated GMP costs.
  - 17. Other business relating to work.

1.3 PRE-INSTALLATION CONFERENCES

- A. When required in individual specification section, convene a pre-installation conference at work site prior to commencing work of the section.
- B. Require attendance of entities directly affecting, or affected by, work of the section.



- C. Notify Architect four days in advance of meeting date.
- D. Prepare agenda, preside at conference, record minutes and distribute copies within two days after conference to participants.
- E. Review conditions of installation, preparation and installation procedures and coordination with related work.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION

SECTION 01 31 19.13

PRECONSTRUCTION MEETINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Contractor participation in preconstruction meetings.
- B. Related Requirements:
  - 1. Section 01 11 00 - Summary of Work: Administrative provisions.
  - 2. Section 01 31 00 - Project Management and Coordination: Coordination of multiple-contract work.
  - 3. Section 01 31 19 - Project Meetings.

1.2 PRECONSTRUCTION MEETING

- A. Architect will schedule meeting within 15 days after notice of award.
- B. Attendance: Owner, Architect, General Contractor, and representatives of major subcontractors.
- C. Agenda
  - 1. Submittal of executed bonds and insurance certificates.
  - 2. Execution of Owner-Contractor Agreement.
  - 3. Distribution of Contract Documents.
  - 4. Submittal of list of subcontractors, list of products, schedule of values and progress schedule.
  - 5. Designation of responsible personnel.
  - 6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal requests, change orders, allowances and Contract closeout procedures.
  - 7. Scheduling.
  - 8. Use of premises by Owner and Contractor.
  - 9. Owner's requirements and occupancy.
  - 10. Temporary facilities.
  - 11. Survey and building layout.
  - 12. Security and housekeeping procedures.
  - 13. Procedures for testing.
  - 14. Procedures for maintaining record documents.
  - 15. Requirements for startup of equipment.
  - 16. Accessibility Issues.
  - 17. Inspection and acceptance of equipment put into service during construction period.
  - 18. Notice to proceed.
  - 19. Color samples.
  - 20. Procedures for site meetings.
  - 21. Site access and security.
  - 22. Procedures and processing of TEA "Certification of Project Compliance" form.
  - 23. Substantial and final project completion procedures.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION

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SECTION 01 32 16

CONSTRUCTION PROGRESS SCHEDULES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Procedures for preparation and submittal of digital construction progress schedules and periodical updating.
- B. Related Requirements:
  - 1. Section 01 11 00 - Summary of Work: Work sequence.
  - 2. Section 01 21 00 - Allowances.
  - 3. Section 01 29 00 - Payment Procedures: Schedule of Values.
  - 4. Section 01 33 23 - Shop Drawings, Product Data and Samples.

1.2 SUBMITTALS

- A. Within 10 days of the contract date, Contractor shall prepare and submit a digital Critical Path construction schedule for the work showing the critical path for each campus and the aggregate critical path. After review, resubmit required revised data within 5 days.
- B. Submit revised, comprehensive digital Critical Path Construction Schedule monthly with each Application for Payment.
- C. Submit under transmittal letter specified in SECTION 01 33 23 - SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.

1.3 WORK SCHEDULE FORMAT

- A. The schedule shall not exceed time limits current under the Contract Documents and shall be subject to the approval of the Architect. The Contractor shall prosecute the work vigorously and make every effort to start and complete each phase of the work on or before the dates stated.
- B. Should actual construction of project vary from the Critical Path schedule, Contractor shall take whatever actions are necessary to improve progress as quickly as possible in order to meet pre-determined milestones. Revise and re-submit schedule not less than every 30 calendar days. Presentation of the existing or updated, comprehensive Critical Path schedule, in three copies, along with the Certificate of Payment Request shall be a prerequisite to the monthly review of the payment request by the Architect's representative.
- C. Sequence of Listings: The chronological order of the start of each item of work.
- D. Scale and Spacing: To provide space for notations and revisions.
- E. Sheet Size: Minimum 11" x 17".

1.4 CONTENT

- A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.
- B. Identify each item by major specification section number.
- C. Identify work of separate stages and other logically grouped activities.
- D. Provide sub-schedules for each stage of work identified in SECTION 01 11 00 - SUMMARY OF WORK.
- E. Provide sub-schedules to define critical portions of entire schedule.

- F. Show accumulated percentage of completion of each item, and total percentage of work completed, as of the first day of each month.
- G. Provide separate schedule of submittal dates for shop drawings, product data and samples, including Owner furnished products and products specified under Allowances, and dates reviewed submittals will be required from Architect. Show decision dates for selection of finishes.
- H. Show delivery dates for Owner furnished products and products specified under Allowances.
- I. Coordinate content with SECTION 01 29 00 - PAYMENT PROCEDURES, Schedule of Values.

#### 1.5 REVISIONS TO SCHEDULES

- A. Indicate progress of each activity to date of submittal, and projected completion date of each activity.
- B. Identify activities modified since previous submittal, major changes in scope and other identifiable changes.
- C. Provide narrative report to define problem areas, anticipated delays and impact on Schedule. Report corrective action taken, or proposed and its effect.

#### 1.6 DISTRIBUTION

- A. Distribute copies of reviewed schedules to job site file, subcontractors, suppliers and other concerned entities.
- B. Instruct recipients to promptly report, in writing, problems anticipated by projections shown in schedules.

#### PART 2 - PRODUCTS

Not used.

#### PART 3 - EXECUTION

Not used.

END OF SECTION

SECTION 01 33 23

SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Digital submission of shop drawings.
- B. Related Requirements:
  - 1. General Conditions of the Contract for Construction: Definitions and basic responsibilities of entities.
  - 2. Section 01 31 00 - Project Management and Coordination: Coordination of submittals.
  - 3. Section 01 32 16 - Construction Progress Schedules: Schedules for submittals.
  - 4. Section 01 45 00 - Quality Control: Mockups and samples for testing.
  - 5. Section 01 50 00 - Temporary Facilities and Controls: Project management software.
  - 6. Section 01 62 00 - Product Options.
  - 7. Section 01 78 23 - Operation and Maintenance Data.
  - 8. Section 01 78 39 - Project Record Documents.

1.2 GENERAL

- A. Refer to General Conditions, Paragraph 3.12 (for A201 & A201/CMA) (Shop Drawings, Product Data and Samples).
- B. Digital Submittals: Submit to the Architect shop drawings, product data, and samples required by specification sections. Do not submit illegible fax copies nor carbon copies of shop drawings and product data.
  - 1. Submit using the Architect's web-based project management program (Newforma Info Exchange). Prepare submittals as .pdf files, with a single file for each submittal, and upload to the Architect's project management program. Enter required data in program to fully identify submittal in accordance with the required submittal numbering format.
- C. Within 10 days of the contract date Contractor shall prepare and submit with the Schedule of Values a comprehensive schedule of shop drawings, product data and samples. This schedule shall include products which are proposed for substitution. Also include the estimated date of each submittal and anticipated date of submittal return. Allow the Architect reasonable time to review submittals.
  - 1. The schedule shall be submitted as an action submittal using the "Submittal" feature in the Architect's project management program (Newforma Info Exchange).
- D. Prepare schedule on basis of each specification section.
- E. For products specified under reference standards, include with listing of each product:
  - 1. Name and address of manufacturer.
  - 2. Trade name.
  - 3. Model or catalog designation.
  - 4. Manufacturer's data, including performance and test data, reference standards.

1.3 SHOP DRAWINGS

- A. Prepared by a qualified detailer. Prepare project-specific information, drawn accurately to scale. Do not base shop drawings on reproductions of the contract documents or standard printed data. Include supplier's / detailer's / manufacturer's title block.
- B. Identify details by reference to sheet and detail numbers shown on Contract Documents.
- C. Present in a clear and thorough manner original drawings which illustrate the portion of the work showing fabrication, layout, setting, or erection details, prepared by a qualified detailer. Title each drawing with Project and Contract name and number; identify each element of drawings by reference to sheet number and detail, schedule, or room number of Contract Documents.

#### 1.4 PRODUCT DATA

- A. Manufacturer's standard schematic drawings and diagrams:
  - 1. Modify drawings to delete information which is not applicable to the work.
  - 2. Supplement standard information to provide additional information specifically applicable to the work.
- B. Manufacturer's catalog sheets, brochures, diagrams, schedules, performance charts, illustrations and other standard descriptive data:
  - 1. Clearly mark each copy to identify pertinent materials, products or models.
  - 2. Show dimensions and clearances required.
  - 3. Show performance characteristics and capacities.
  - 4. Show wiring or piping diagrams and controls.
- C. Submit only pages which are pertinent; mark each copy of standard printed data to identify pertinent products, referenced to specification section and Article number. Show reference standards, performance characteristics and capacities; wiring and piping diagrams and controls; component parts; finishes; dimensions; and required clearances.
- D. Modify manufacturer's standard schematic drawings and diagrams to supplement standard information and to provide information specifically applicable to the work. Delete information not applicable.

#### 1.5 SAMPLES

- A. Office samples shall be of sufficient size and quantity to clearly illustrate:
  - 1. Functional characteristics of product or material, with integrally related parts and attachment devices.
  - 2. Full range of color samples.
- B. Color Selections & Samples: Provide two (2) samples for the Architect's review and record. Provide cut sheet when applicable.
  - 1. Samples for Initial Selection: Submit one (1) full set of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected. In addition to the physical samples required above, submit a .pdf file of photographs of the actual color samples and identifying labels.
  - 2. Samples for Verification: Submit two (2) full-size units or Sample 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. In addition to the physical samples required above, submit a .pdf file of photographs of the actual color samples and identifying labels.
    - a. After Color Board has been delivered to the project site, submit one (1) sample for verification in lieu of two (2). One will be retained by Contractor for mounting on Color Board after approval by Architect.
- C. Field Samples and Mock-ups:
  - 1. Erect at project site at location acceptable to Architect.
  - 2. Construct each sample or mock-up complete, including work of all trades required in finish work.
  - 3. Install each sample complete and finished. Acceptable finishes in place may be retained in completed work.
- D. Digital Samples: In addition to the physical Office Samples and Field Samples/Mock-ups, submit a .pdf file of photographs of the actual samples/mock-ups using the "Submittal" feature in the Architect's project management program (Newforma Info Exchange).
- E. Submit full range of manufacturer's standard finishes except when more restrictive requirements are specified, indicating colors, textures and patterns, for Architect selection.
- F. Submit samples to illustrate functional characteristics of products, including parts and attachments.
- G. Approved samples which may be used in the work are indicated in the specification section.

- H. Label each sample with identification required for transmittal letter.

#### 1.6 CONTRACTOR REVIEW

- A. Review submittals prior to transmittal; determine and verify field measurements, field construction criteria, quantities and details, manufacturer's catalog numbers and conformance of submittal with requirements of Contract Documents.
- B. Coordinate submittals with requirements of work and of Contract Documents.
- C. Sign or initial in a rubber-stamped review block format, each sheet of shop drawings and product data and each sample label to certify compliance with requirements of Contract Documents. Notify Architect in writing at time of submittal, of any deviations from requirements of Contract Documents.
- D. Do not fabricate products or begin work which requires submittals until return of submittal with Architect acceptance.
- E. Contractor's responsibility for errors and omissions in submittals is not relieved by Architect's review of submittals.
- F. Contractor's responsibility for deviations in submittals from requirements of contract documents is not relieved by Architect's review of submittals, unless Architect gives specific written acceptance of deviations. Architect will review submittals for general conformance to design intent only.

#### 1.7 SUBMISSION REQUIREMENTS

- A. Submit Shop Drawings and Product Data as soon as practicable after award of contract but not later than 30 calendar days before dates reviewed submittals will be needed.
- B. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
  - 1. Initial Review: Allow 10 working days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
  - 2. Resubmittal Review: Allow 10 working days for review of each resubmittal.
- C. Submit all office samples as soon as practicable but not later than **60 or 20** days after award of contract in order to facilitate color selections and coordination of the various materials. Final color selections and release of shop drawings contingent upon color selection will not be made until all office samples have been submitted, coordinated and approved.
  - 1. Color Board shall be delivered to the project site after 60 days. Contractor is responsible for updating color board with samples submitted by Contractor and approved by Architect after 60 days.
- D. Digital Submittals: Submit to the Architect, or applicable consultant, shop drawings, product data, and samples required by specification sections. Do not submit illegible fax copies nor carbon copies of shop drawings and product data.
  - 1. The submittals shall be logged in by the General Contractor and tracked using the "Submittal" feature in the Architect's project management program (Newforma Info Exchange). All submittals shall be submitted in .pdf format.
    - a. Submittals 8-1/2" x 11" and/or 11" x 17" and greater than 50 pages: Provide digital copy for the Architect's records.
    - b. Large Format Drawings (larger than 11 x 17): Provide digital copy for the Architect's records.
  - 2. Architect will indicate, via markup on each digital submittal, the appropriate action, then return submittal via the Architect's project management program (Newforma Project Center).
  - 3. Submittals to be reviewed by consultants shall be submitted to the Architect via Architect's project management program with a copy simultaneously sent to the applicable consultant. Submittals will be reviewed by the consultant and then delivered/transmitted to the Architect via the Architect's project management program (Newforma Info Exchange) for his review prior to transmitting them to the contractor. Submittals to be reviewed by the testing lab shall be handled in the same manner.
  - 4. Color Selections & Samples: Reference "Samples" Article within this specification section.



- E. Contractor is responsible for the costs associated with the digital delivery of all submittals, and hard copy where required, to the Architect and the Architect's consultants and retrieval of all submittals from the Architect, when necessary.
- F. Accompany submittals with transmittal letter containing:
  - 1. Date.
  - 2. Project title and number.
  - 3. Contractor's name and address.
  - 4. Identification of specification section and submittal numbers.
  - 5. The number of each shop drawing, product data and sample submitted.
  - 6. Notification of deviations from contract documents.
  - 7. Other pertinent data.
- G. Submittals shall include:
  - 1. Date and revision dates.
  - 2. Project title and number.
  - 3. Names of Architect, Contractor, subcontractor, supplier and manufacturer.
  - 4. Identification of product or material and specification section number.
  - 5. Relation to adjacent structure, materials or other critical features.
  - 6. Field dimensions, clearly identified as such.
  - 7. Applicable reference standards.
  - 8. A blank space 3" x 4" for Architect's stamp.
  - 9. Identification of deviations from contract documents.
  - 10. Contractor's stamp, initialed or signed, certifying to review of submittal, verification of field measurements, compliance with contract documents and coordination with requirements of the work.  
Note: Absence of the Contractor's stamp shall constitute grounds for rejection of the submittal until such time as the submittal has been processed in accordance with this requirement.
  - 11. Other pertinent data required by specifications.

#### 1.8 RE-SUBMISSION REQUIREMENTS

- A. Re-submission: For submittals not approved by Architect, make corrections and changes in submittals required by Architect and re-submit until approved.
  - 1. The digital re-submission shall be logged in using the "My Expected Submittals" feature in the Architect's project management program (Newforma Info Exchange).
- B. Shop Drawings:
  - 1. Revise initial drawings and re-submit as specified for initial submittal.
  - 2. Indicate on drawings any changes which have been made, other than those requested by Architect.
- C. Product Data and Samples: Submit new data and samples as specified for initial submittal.

#### 1.9 DISTRIBUTION OF SUBMITTALS AFTER REVIEW

- A. Distribute reviewed submittal of shop drawings and product data which carry Architect's stamp as follows: Contractor's file, project site file, record documents file, other prime contractors.
- B. Keep and maintain a full set of submittals throughout the construction phase to be submitted to the Architect with other Close-out documents for delivery to the Owner for his permanent record. Set of submittals shall be delivered to the Architect in cardboard file boxes with string and button type closures. Organize submittals by CSI divisions, utilizing neatly labeled pressboard dividers to separate the sections. Neatly label short end of box with project name, contents and duration of construction.

#### PART 2 - PRODUCTS

Not used.

#### PART 3 - EXECUTION

Not used.

END OF SECTION

SECTION 01 35 00

ALTERATION PROJECT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. General: The procedures and administrative requirements of this section apply to all of the sections of the specification which are involved in alterations to the existing building.
  2. Extent Notes: Cut into or partially remove portions of the existing buildings as necessary to make way for new construction. Include such work as:
    - a. Cutting, moving, or removal of items shown to be cut, moved, or removed.
    - b. Cutting, moving, or removal of items not shown to be cut, moved, or removed, but which must be cut, moved, or removed to allow the new work to proceed. Work or items which are to remain in the finished work shall be patched or reinstalled after their cutting, moving, or removal, and their joints and finishes made to match adjacent or similar work.
    - c. Removal of existing surface finishes as needed to install new work or finishes.
    - d. Removal of abandoned items and removal of items serving no useful purpose, such as abandoned piping.
    - e. Repair or removal of dangerous or unsanitary conditions resulting from alterations work.
- B. Related Requirements:
1. Section 01 11 00 - Summary of Work; Sequence of construction and instructions concerning asbestos.
  2. Section 01 50 00 - Temporary Facilities and Controls.
  3. Section 01 73 29 - Cutting and Patching.
  4. Section 01 74 13 - Progress Cleaning.
  5. Section 02 41 19 - Selective Structure Demolition.

1.2 SCHEDULING AND ACCESS

- A. Maintenance of Access and Operations: During period of construction, do not obstruct in any manner existing exit ways of Owner-occupied areas. Prior to removal of existing exit ways (stairs, corridors, doors) as part of new work, provide and maintain new exit ways so as to maintain same number of exit ways. Maintain existing fire doors in an operable condition.
- B. Maintenance of Existing Services:
1. Maintain environmental control in existing buildings, especially temperature, humidity and dust control.
  2. Provide temporary lines and connections as required to maintain existing mechanical and electrical services in buildings.
  3. Notify Owner a minimum of seven days prior to each required interruption of mechanical or electrical services in buildings. Such interruptions shall be only at such times and for lengths of time as approved by the Owner. In no event shall interruption occur without prior approval of the Owner.

PART 2 - PRODUCTS

2.1 PRODUCTS FOR PATCHING EXTENDING WORK

- A. New Materials: As specified in individual sections.
- B. Match existing products and work for patching and extending work.
- C. Determine type and quality of existing products by inspection and any necessary testing, and workmanship by use of existing as a standard. Presence of a product, finish, or type of work, requires that patching, extending, or matching shall be performed as necessary to make work complete and consistent with existing quality or specifications if more stringent.

## PART 3 - EXECUTION

### 3.1 INSPECTION

- A. Verify that demolition is complete, and areas are ready for installation of new work.
- B. Beginning of restoration work means acceptance of existing conditions.

### 3.2 PREPARATION

- A. Cut, move, or remove items as necessary for access to alterations and renovations work; replace and restore at completion.
- B. Remove unsuitable material not marked for salvage, such as rotted wood, rusted materials, and deteriorated masonry and concrete; replace materials as specified for finished work.
- C. Remove debris and abandoned items from area and from concealed spaces.
- D. Prepare surfaces and remove surface finishes to provide for proper installation of new work and new finishes.
- E. Close openings in exterior surfaces to protect existing work and salvage items from weather and extremes of temperature and humidity. Insulate ductwork and piping to prevent condensation in exposed areas.

### 3.3 INSTALLATION

- A. Coordinate work of alterations and renovations to expedite completion.
- B. Project shall be complete.
- C. Remove, cut, and patch work in a manner to minimize damage and to provide means of restoring products and finishes to specified condition.
- D. Refinish visible existing surfaces to remain in renovated rooms and spaces, to specified condition for each material, with a neat transition to adjacent new finishes.
- E. Install products as specified in individual sections.

### 3.4 ALTERATIONS, CUTTING, AND PROTECTION

- A. Extent:
  - 1. Cutting and removal work shall be performed so as not to cut or remove more than is necessary and so as not to damage adjacent work.
  - 2. Conduct work in such a manner as to minimize noise and to minimize accumulation and spread of dirt and dust.
  - 3. Perform cutting for ductwork and other rectangular openings with carborundum saw with approved dust arrestor.
  - 4. Drill holes for conduit and piping using core drills.
- B. Shoring, Bracing, and Capping: Provide shores, needling and bracing as needed to keep buildings structurally secure and free of deflection in all its parts, and as needed for installation of new structural members.
- C. Responsibility and Assignment to Trades:
  - 1. Contractor shall assign the work of moving, removal, cutting, patching and repair to trades under his supervision so as to cause the least damage to each type of work encountered, and so as to return the buildings as much as possible to the appearance of new work.
  - 2. Patching of finish materials shall be assigned to mechanics skilled in the work of the finish trade involved.

- D. Protection:
1. Protect remaining finishes, equipment, and adjacent work from damage caused by cutting, moving, removal and patching operations. Protect surfaces which will remain a part of the finished work.
  2. Protect existing facilities and features, within designated construction limits and along corridor access route to construction area.
  3. Cover existing wall and floor finishes in work areas, in adjacent areas, and along corridor access route to prevent damage from product delivery and construction operations. Use reinforced sheeting, listed by Underwriters' Laboratories, Inc., as having a flame spread rating of less than 25 and smoke developed rating of less than 50. Apply double thickness of sheeting, fastened to one side with no-tear fasteners. Tape joints continuously.
  4. During demolition, cutting and construction, provide positive dust control by wetting dust debris and by completely sealing openings to Owner-occupied areas with temporary partitions, so as to prevent spread of dust and dirt to adjacent areas.
  5. After materials, equipment and machinery are installed, properly protect work until final acceptance.
  6. Damage resulting from construction operations shall be repaired by the Contractor without cost to the Owner.
  7. During non-working hours, provide continuous security at openings cut into existing exterior walls and roofs.
- E. Debris:
1. Remove debris promptly from the site each day. Removed material, except that listed or marked by the Architect for retention, becomes property of the Contractor. Load removed material directly on trucks for removal from site. Do not allow debris to enter sewers.
  2. Do not let piled material endanger structure.
  3. During cutting and coring operations, use metal lined wood box secured tight against surface, to catch falling debris and water.

### 3.5 PATCHING, EXTENDING, AND MATCHING

- A. Skill: Patch and extend existing work using skilled mechanics who are capable of matching the existing quality of workmanship. The quality of patched or extended work shall not be less than that specified in the sections of the product and execution specifications which follow these general requirements.
- B. Patching:
1. In areas where any portion of an existing finishing surface is damaged, lifted, stained, or otherwise made or found to be imperfect, patch or replace the imperfect portion of the surface with matching material.
  2. Provide adequate support or substrate for patching of finishes.
  3. If the imperfect surface was a painted or coated one, re-paint or re-coat the patched portion in such a way that uniform color and texture over the entire surface results.
  4. If the surrounding surface cannot be matched, re-paint or re-coat the entire surface.
- C. Quality:
1. In the sections of the product and execution of specifications which follow these general requirements, no concerted attempt has been made to describe each of the various existing products that must be used to patch, match, extend or replace existing work. Obtain such products in time to complete the work on schedule. Such products shall be provided in quality which is in no way inferior to the existing products.
  2. The quality of the products that exist in the buildings, as apparent during pre-bid site visits, shall serve as the specification requirement for strength, appearance, and other characteristics.
- D. Transitions:
1. Where new work abuts or finishes flush with existing work, make the transition as smooth and workmanlike as possible. Patched work shall match existing adjacent work in texture and appearance so as to make the patch or transition invisible to the eye.
  2. Where masonry, or other finished surface is cut in such a way that a smooth transition with new work is not possible, terminate the existing surface in a neat fashion along a straight line at a natural line of division and provide trim appropriate to the finished surface.
  3. Where two or more spaces are indicated to become one space, rework floors and ceilings so that horizontal planes, without breaks, steps or bulkheads result.
  4. In cases of extreme change of level (3" or more), obtain instructions from Architect as to method of making transition. Either stepping, bulkheading, encasement, ramping, sloping or change of transition line shall be employed, or a combination of these, as directed in each case by the Architect.

- E. Matching:
  - 1. Restore existing work that is damaged during construction to a condition equal to its condition at the time of the start of the work.
  - 2. At locations in existing areas where partitions are removed, patch the floors, walls, and ceilings with finish materials to match adjacent finishes.
  - 3. Finish patches to produce uniform finish and texture over entire area. When finish cannot be matched, refinish entire surface to nearest intersections.

### 3.6 REPAIR

- A. Replace work damaged in the course of alterations, except at areas approved by the Architect for repair.
- B. Where full removal of extensive amounts of almost-suitable work would be needed to replace damaged portions, then filling, spackling, straightening, and similar repair techniques, followed by full painting or other finishing, will be permitted.
- C. If the repaired work is not brought up to the standard for new work, the Architect will direct that it be cut out and replaced with new work.

### 3.7 FIRESTOPPING

- A. Where existing partitions or walls are penetrated by new work, seal around penetrating conduit or sleeve with approved and listed safing.

### 3.8 CLEANING

- A. In addition to cleaning specified in SECTION 01 74 13 - PROGRESS CLEANING, clean Owner-occupied areas of work daily.

END OF SECTION

SECTION 01 41 00

REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.1 CODES

- A. Where references are made on drawings or specifications to codes, they shall be considered an integral part of the contract documents as minimum standards. Nothing contained in the contract documents shall be so construed as to be in conflict with any law, bylaw or regulation of the municipal, state, federal or other authorities having jurisdiction.
- B. Perform work in compliance with all Harris County ordinances and requirements.

1.2 GOVERNING LAWS

- A. Additional information with legal implications regarding applicable governing laws and jurisdictions can be found in the conditions of the contract.

1.3 PERMITTING

- A. Contractor shall, without additional expense to Owner, obtain necessary licenses and permits, and be responsible for complying with any federal, state, county and municipal laws, codes and regulations applicable to the performance of the work, including, but not limited to, any laws or regulations requiring the use of licensed contractors to perform parts of the work.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION

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SECTION 01 42 00

REFERENCES

PART 1 - GENERAL

1.1 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.
- C. Copies of Standards: Each entity engaged in construction on project must be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the contract documents.
1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.
- D. Abbreviations and Acronyms for Standards and Regulations: Where abbreviations and acronyms are used in specifications or other contract documents, they shall mean the recognized name of the standards and regulations in the following list. Names, telephone numbers, and web-site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the contract documents.

ADAAG	Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities Available from Access Board <a href="http://www.access-board.gov">www.access-board.gov</a>	800.872.2253 202.272.0080
CRD	Handbook for Concrete and Cement Available from Army Corps of Engineers Waterway Experiment Station <a href="http://www.erdc.usace.army.mil/">http://www.erdc.usace.army.mil/</a>	601.634.2355
FED-STD	Federal Standard (See FS)	
FS	Federal Specification Available from Department of Defense Single Stock Point <a href="http://www.dodssp.daps.dla.mil">www.dodssp.daps.dla.mil</a>	215.697.6257
	Available from General Services Administration <a href="http://www.gsa.gov">www.gsa.gov</a>	202.501.1021
	Available from National Institute of Building Sciences <a href="http://www.nibs.org">www.nibs.org</a>	202.289.7800
ICC-ES	ICC Evaluation Services, Inc. <a href="http://www.icc-es.org">www.icc-es.org</a>	800.423.6587 562.699.0543
TAS	Texas Accessibility Standards P.O. Box 12157 Austin, TX 78711 <a href="http://www.license.state.tx.us/ab/abtas.htm">www.license.state.tx.us/ab/abtas.htm</a>	512.463.3211



## 1.2 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 in the following list. Names, telephone numbers, and web-site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the contract documents.

AA	Aluminum Association, Inc. (The) www.aluminum.org	703.358.2960
AAMA	American Architectural Manufacturers Association www.aamanet.org	847.303.5664
AASHTO	American Association of State Highway and Transportation Officials www.transportation.org	202.624.5800
ACI	ACI International (American Concrete Institute) www.aci-int.org (www.concrete.org)	248.848.3700
AGA	American Gas Association www.aga.org	202.824.7000
AISC	American Institute of Steel Construction www.aisc.org	800.644.2400 312.670.2400
AISI	American Iron and Steel Institute www.steel.org	202.452.7100
ANSI	American National Standards Institute www.ansi.org	202.293.8020
APA	APA-The Engineered Wood Association www.apawood.org	253.565.6600
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers www.ashrae.org	404.636.8400
ASTM	ASTM International (American Society for Testing and Materials International) www.astm.org	610.832.9585
AWI	Architectural Woodwork Institute www.awinet.org	571.323.3636
AWPA	American Wood Protection Association www.awpa.com	205.733.4077
AWS	American Welding Society www.aws.org	800.443.9353 305.443.9353
BHMA	Builders Hardware Manufacturers Association www.buildershardware.com	212.297.2122
BIA	Brick Industry Association (The) www.gobrick.com	703.620.0010
CISCA	Ceilings & Interior Systems Construction Association www.cisca.org	630.584.1919

CLFMI	Chain Link Fence Manufacturers Institute <a href="http://www.chainlinkinfo.org">www.chainlinkinfo.org</a>	301.596.2583
CRSI	Concrete Reinforcing Steel Institute <a href="http://www.crsi.org">www.crsi.org</a>	847.517.1200
DHI	Door and Hardware Institute <a href="http://www.dhi.org">www.dhi.org</a>	703.222.2010
FM	Factory Mutual System (See FMG)	
FMG	FM Global (Formerly: FM - Factory Mutual System) <a href="http://www.fmglobal.com">www.fmglobal.com</a>	401.275.3000
GA	Gypsum Association <a href="http://www.gypsum.org">www.gypsum.org</a>	301.277.8686
GANA	Glass Association of North America <a href="http://www.glasswebsite.com">www.glasswebsite.com</a>	785.271.0208
HMMA	Hollow Metal Manufacturers Association (See NAAMM)	
HPVA	Hardwood Plywood & Veneer Association <a href="http://www.hpva.org">www.hpva.org</a>	703.435.2900
IGCC	Insulating Glass Certification Council <a href="http://www.igcc.org">www.igcc.org</a>	315.646.2234
IGMA	Insulating Glass Manufacturers Alliance (The) <a href="http://www.igmaonline.org">www.igmaonline.org</a>	613.233.1510
MBMA	Metal Building Manufacturers Association <a href="http://www.mbma.com">www.mbma.com</a>	216.241.7333
MFMA	Maple Flooring Manufacturers Association, Inc. <a href="http://www.maplefloor.org">www.maplefloor.org</a>	888.480.9138
MFMA	Metal Framing Manufacturers Association <a href="http://www.metalframingmfg.org">www.metalframingmfg.org</a>	312.644.6610
MIA	Marble Institute of America <a href="http://www.marble-institute.com">www.marble-institute.com</a>	440.250.9222
NAAMM	National Association of Architectural Metal Manufacturers <a href="http://www.naamm.org">www.naamm.org</a>	630.942.6591
NCMA	National Concrete Masonry Association <a href="http://www.ncma.org">www.ncma.org</a>	703.713.1900
NeLMA	Northeastern Lumber Manufacturers' Association <a href="http://www.nelma.org">www.nelma.org</a>	207.829.6901
NEMA	National Electrical Manufacturers Association <a href="http://www.nema.org">www.nema.org</a>	703.841.3200
NFPA	NFPA (National Fire Protection Association) <a href="http://www.nfpa.org">www.nfpa.org</a>	800.344-3555 617.770-3000

NFRC	National Fenestration Rating Council www.nfrc.org	301.589.1776
NHLA	National Hardwood Lumber Association www.nhla.com	800.933.0318 901.377.1818
NLGA	National Lumber Grades Authority www.nlga.org	604.524.2393
NOFMA	National Oak Flooring Manufacturers Association (The Wood Flooring Manufacturers Association) www.nofma.org	901.526.5016
NRCA	National Roofing Contractors Association www.nrca.net	800.323.9545 847.299.9070
NTMA	National Terrazzo & Mosaic Association, Inc. www.ntma.com	800.323.9736 540.751.0930
NWWDA	National Wood Window and Door Association (See WDMA)	
PCI	Precast/Prestressed Concrete Institute www.pci.org	312.786.0300
PDCA	Painting and Decorating Contractors of America www.pdca.org	800.332.7322 314.514.7322
SDI	Steel Deck Institute www.sdi.org	847.458.4647
SDI	Steel Door Institute www.steeldoor.org	440.899.0010
SEFA	Scientific Equipment and Furniture Association www.sefalabs.com	516.294.5424
SGCC	Safety Glazing Certification Council www.sgcc.org	315.646.2234
SIGMA	Sealed Insulating Glass Manufacturers Association (See IGMA)	
SJI	Steel Joist Institute www.steeljoist.org	843.626.1995
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association www.smacna.org	703.803.2980
SPIB	Southern Pine Inspection Bureau (The) www.spib.org	850.434.2611
TCNA	Tile Council of America, Inc. www.tileusa.com	864.646.8453
TPI	Truss Plate Institute, Inc. www.tpinst.org	703.683.1010
UL	Underwriters Laboratories Inc. www.ul.com	800.285.4476 847.272.8800

USGBC	U.S. Green Building Council www.usgbc.org	800.795.1747 202.828.7422
WCLIB	West Coast Lumber Inspection Bureau www.wclib.org	800.283.1486 503.639.0651
WDMA	Window & Door Manufacturers Association (Formerly: NWWA - National Wood Window and Door Association) www.wdma.com	800.223.2301 312.321.6802
WI	Woodwork Institute www.woodworkinstitute.com	916.372.9943
WWPA	Western Wood Products Association www.wwpa.org	503.224.3930

- B. Code Agencies: Where abbreviations and acronyms are used in specifications or other contract documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and web-site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the contract documents.

BOCA	BOCA International, Inc. (See ICC)	
CABO	Council of American Building Officials (See ICC)	
IAPMO	International Association of Plumbing and Mechanical Officials www.iapmo.org	909.472.4100
ICBO	International Conference of Building Officials (See ICC)	
ICC	International Code Council (Formerly: CABO - Council of American Building Officials) www.iccsafe.org	888.422.7233 703.931.4533
SBCCI	Southern Building Code Congress International, Inc. (See ICC)	

- C. Federal Government Agencies: Where abbreviations and acronyms are used in specifications or other contract documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and web-site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the contract documents.

CE	Army Corps of Engineers www.usace.army.mil	
CPSC	Consumer Product Safety Commission www.cpsc.gov	800.638.2772 301.504.6816
EPA	Environmental Protection Agency www.epa.gov	202.272.0167
OSHA	Occupational Safety & Health Administration www.osha.gov	800.321.6742 202.693.1999

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION

SECTION 01 42 16

DEFINITIONS

PART 1 - GENERAL

1.1 DEFINITIONS

- A. "Furnish": Supply and deliver to project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- B. "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.
- C. "Product": Materials, systems and equipment.
- D. "Project Manual": Volume assembled for the Work which may include the bidding requirements, sample forms, conditions of the contract, and specifications.
- E. "Provide": Furnish and install, complete and ready for the intended use.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION

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SECTION 01 45 00  
QUALITY CONTROL

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
  - 1. Quality control of products and workmanship.
  - 2. Contractor's construction-related professional design services.
  - 3. Contractor's design-related professional design services.
  - 4. Manufacturer's instructions.
  - 5. Manufacturer's certificates and field services.
  - 6. Mockups.
- B. Related Requirements:
  - 1. Section 01 33 23 - Shop Drawings, Product Data, and Samples: Field samples. Submittal of manufacturer's instructions.
  - 2. Section 01 42 00 - References.
  - 3. Section 01 45 23 - Testing and Inspection Services.
  - 4. Section 01 62 00 - Product Options.
  - 5. Individual Specifications Sections: Mockups required.
  - 6. Individual Specifications Sections: Contractor's professional design services required.

1.2 DESCRIPTION

- A. Maintain quality control over supervision, subcontractors, suppliers, manufacturers, products, services, workmanship, and site conditions, to produce work in accordance with contract documents.

1.3 DEFINITIONS

- A. Contractor's Professional Design Services: Design of some aspect or portion of the project by party other than the design professional of record. Provide these services as part of the Contract for Construction.
  - 1. Submit signed and sealed drawings, calculations, specifications, certifications, shop drawings, and other submittals required by individual specification sections. Prepare such deliverables directly by, or under direct supervision of, appropriate licensed design professional in the state the project is located.
- B. Design Service Types Required:
  - 1. Construction-Related: Services Contractor needs to provide in order to carry out the Contractor's sole responsibilities for construction means, methods, techniques, sequences, and procedures.
  - 2. Design-Related: Design services explicitly required to be performed by another design professional due to highly technical and/or specialized nature of a portion of the project. Services primarily involve engineering analysis, calculations, and design, and are not intended to alter the aesthetic aspects of the design intent of the project.

1.4 WORKMANSHIP

- A. Comply with industry standards of the region except when more restrictive tolerances or specified requirements indicate more rigid standards or more precise workmanship.
- B. Provide suitably qualified personnel to produce work of specified quality.
- C. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, and racking.
- D. Provide finishes to match approved samples.

1.5 CONTRACTOR'S CONSTRUCTION-RELATED PROFESSIONAL DESIGN SERVICES

- A. Contractor's professional design services are subject to requirements of project's Conditions for Construction Contract.



- B. Provide such engineering services as may be necessary to plan and safely conduct construction operations and execute portions of the work. Such engineering services may pertain to, but may not be limited to, temporary construction of sheeting, shoring, supports, scaffolding, bracing, falsework, temporary or permanent foundation underpinning, stairs, steps, rigging, and hoisting.

#### 1.6 CONTRACTOR'S DESIGN-RELATED PROFESSIONAL DESIGN SERVICES

- A. Contractor's professional design services are subject to requirements of project's Conditions for Construction Contract.
- B. Base design on performance and/or design criteria indicated in individual specification sections. Submit a Request for Information (RFI) to Architect if the criteria indicated are not sufficient to perform required design services.
- C. Refer to individual specification sections regarding the required scope of Contractor's design-related professional design services.

#### 1.7 MANUFACTURER'S INSTRUCTIONS

- A. Require compliance with instructions in full detail, including each step in sequence.
- B. Should instruction conflict with contract documents, request clarification from Architect/Engineer before proceeding.

#### 1.8 MANUFACTURER'S CERTIFICATES

- A. When required in individual Specifications section, submit manufacturer's certificate, in duplicate, certifying that products meet or exceed specified requirements, executed by responsible officer.

#### 1.9 MANUFACTURER'S FIELD SERVICES

- A. When required in individual Specifications section, have manufacturer or his authorized representative provide qualified representative to observe field conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment test, adjust, and balance of equipment as applicable, and to make written report of observations and recommendations to Architect.
- B. Individuals to report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.
- C. Submit report in duplicate within **30 or 10** days of observation to Architect/Engineer for review.

#### 1.10 MOCKUPS

- A. Tests will be performed under provisions of SECTION 01 45 23 - TESTING AND INSPECTION SERVICES.
- B. Assemble and erect complete, with specified attachment and anchorage devices, flashings, seals, and finishes.
- C. Acceptable mockups in place may be retained in completed work.

#### 1.11 FIELD SAMPLES

- A. Install field samples at the site as required by individual specification sections for review.
- B. Acceptable samples represent a quality level for the work.
- C. Where field sample is specified in individual sections to be removed, clear area after field sample has been accepted by Architect/Engineer.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION

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SECTION 01 45 23

TESTING AND INSPECTION SERVICES (BY OWNER)

PART 1 - GENERAL

1.1 SUMMARY

- A. Requirements Included: Owner provided materials testing laboratory services.
- B. Related Requirements:
  - 1. Document 00 31 32 - Geotechnical Data.
  - 2. Terms and Conditions: Inspections, testing, and approvals required by public authorities.
  - 3. Section 01 45 00 - Contract Quality Control: Manufacturer's certificates.
  - 4. Section 01 78 39 - Project Record Documents.
  - 5. Individual Specifications Sections: Inspections and tests required, and standards for testing.

1.2 SELECTION AND PAYMENT

- A. Owner will employ services of an independent materials testing laboratory to perform specified inspection and testing and will pay for these services directly to the testing laboratory.
- B. Employment of testing laboratory shall in no way relieve Contractor of obligation to perform work in accordance with requirements of contract documents. Contractor will pay all testing required by local authorities having jurisdiction.

1.3 QUALITY ASSURANCE

- A. Laboratory shall comply with requirements of ASTM E 329 and ASTM D 3740 and provide certifications to this effect.
- B. Laboratory shall maintain a full-time registered Engineer on staff to review specific tests required by this specification.
- C. Laboratory shall be authorized to operate in State in which project is located.
- D. Testing equipment shall be calibrated to ensure accurate results and values in order to ensure that test results are true and valid, and at intervals with devices of an accuracy traceable to either NBS Standards or accepted values of natural physical constants.

1.4 LABORATORY RESPONSIBILITIES

- A. Provide qualified personnel at site after due notice from the contractor; cooperate with Architect, Contractor, and appropriate public authorities having jurisdiction in performance of services.
- B. Perform specified inspection, sampling, and testing of products in accordance with latest, up-to-date standards.
- C. Ascertain compliance of materials and mixes with requirements of contract documents.
- D. Promptly notify Architect, appropriate consultants, Contractor, Owner, and authority having jurisdiction of observed irregularities or non-conformance of work or products.
- E. Perform additional inspections and tests required by Architect, Owner, Contractor, or authority having jurisdiction.

## 1.5 LABORATORY REPORTS

- A. After each inspection and test, promptly submit two copies of laboratory report to Architect, one to applicable consultant, one to Owner, one to Contractor, and one to City. Include: Date issued, project title and number, name of inspector, date and time of sampling or inspection, weather conditions, identification of product and specifications section, location in the project, type of inspection or test, date of test, results of tests, and specific indication of conformance, or lack of such, with contract documents. When requested by Architect/Engineer, provide interpretation of test results.

## 1.6 LIMITS ON TESTING LABORATORY AUTHORITY

- A. Laboratory may not release, revoke, alter, or enlarge on requirements of contract documents.
- B. Laboratory may not approve or accept any portion of the work.
- C. Laboratory may not assume any duties of Contractor.
- D. Laboratory has no authority to stop work.

## 1.7 CONTRACTOR RESPONSIBILITIES

- A. Deliver to laboratory at designated location adequate samples of materials proposed to be used which require testing, together with proposed mix designs.
- B. Cooperate with laboratory personnel, and ensure ready access to work and to manufacturer's facilities, if requested by testing lab.
- C. Provide incidental labor and facilities for access to work to be tested, to obtain and handle samples at the site, or at source of products to be tested, in order to facilitate tests and inspections, and for storage and curing of test samples.
- D. Notify laboratory of material sources and furnish lab-determined necessary quantities of representative samples of materials proposed for use which are required to be tested.
- E. Notify Architect and laboratory 24 hours prior to expected time for operations requiring inspection and testing services. Cancel notifications in a timely manner if items or systems are not ready for inspection as intended. Reimburse Owner for trip charges when cancellation notifications are not made in a timely fashion.
- F. Advise laboratory in a timely fashion to complete required inspection and testing prior to subsequent work being performed.
- G. Reimburse Owner for all subsequent re-testing of products or systems found to be defective or otherwise not in accordance with specification requirements, and for any overtime pay required as a result of any inspection requirements that may fall outside of normal job-site weekday work schedule. Remove rejected products or work and replace with products or work of specified quality.
- H. Notification of Source Change: The Contractor shall be responsible for notifying the Owner, Architect, Engineer, and testing laboratory when the source of any material is changed after the original tests or inspections have been made.

PART 2 - PRODUCTS – Not used.

## PART 3 - EXECUTION

### 3.1 EARTHWORK (SITE GENERAL)

- A. Make necessary soil tests (Atterberg Limit Series ASTM D 4318 and ASTM D 698 Standard Proctor) to determine moisture content and density of existing subgrade. Perform necessary soil tests (Atterberg Limit Series and ASTM D 698 Standard Proctor for each type of imported fill) to determine the moisture content and to inspect and test the placement of additional fill lifts to verify that all fill materials used are in accordance with the specifications for that use. Perform one field density test (ASTM D 2922 and ASTM D 3017) per 5,000 sq. ft. of site area in the area affected on each lift prior to placement of additional fill material.
- B. Imported Topsoil Tests: Testing for topsoil quality compliance shall be performed by the Testing Laboratory.

### 3.2 PAVING OR SPECIAL SURFACE SUBGRADE PREPARATION

- A. Perform one subgrade in-place density test per 7,500 sq. ft. of subgrade, after subgrade preparation, in accordance with ASTM D 2922 and ASTM D 3017. Perform tests within 48 hours of pavement construction.
- B. Pulverization tests on lime subgrade, TEX101E, Part III, at same frequency as density tests.

### 3.3 FORMWORK, REINFORCING STEEL AND INSERTS

- A. Make general inspection of formwork.
- B. Prior to each concrete pour, inspect fabrication and bending of bars, bar sizes, spacing, placement and tying in accordance with ACI 315.
- C. Prior to each concrete pour, inspect positioning of steel inserts and assemblies, sizes, and spacing, and inspect fusion-welded anchors and sheer connectors.

### 3.4 CAST-IN-PLACE CONCRETE

- A. Design Mixes:
  - 1. At the beginning of the work, Contractor shall submit proposed concrete mixes for review by the Architect, structural engineering consultant, and testing laboratory, including the sieve analysis of fine and coarse aggregate ASTM C 136, dry rodded weight of coarse aggregate - ASTM C 29, and the specific gravity (bulk saturated surface dry), of fine and coarse aggregates ASTM C 127 and C 128.
  - 2. The testing laboratory will submit their findings to the structural consultant, who will subsequently forward this information, with their review of the submittals, to the Architect.
  - 3. Contractor shall not mix concrete for placing in the work until confirmation laboratory reports are supplied to reflect that each proposed mix will develop the strength required. Successful past history in accordance with ACI 318 will be satisfactory.
- B. Test Cylinders: Make at least one test of each day's pouring of concrete or each 100 cubic yards, whichever is the least, on each different portion or section of the work. Mold and cure specimens in accordance with ASTM C 31, and test in accordance with ASTM C 39. Test cylinders shall be made and tested by the laboratory. Footings, walls, and floor systems constitute different sections. Each test shall consist of four specimens, one of which shall be broken at seven days, two at 28 days and one held in reserve. Determine temperature and air content for each set of test cylinders in accordance with ASTM C 231.
- C. Field Quality Control:
  - 1. Determine slump for each concrete strength test and whenever consistency of concrete varies, in accordance with ASTM C 143.
  - 2. Monitor and record addition of water to concrete and length of time concrete is allowed to remain in truck.
  - 3. Verify delivery tickets indicating class of concrete, amount of water added during initial batching, and time initial batching occurred.

4. Monitor work being performed in accordance with ACI (American Concrete Institute) recommendations as a standard of quality.
  5. Reference SECTION 03 30 00 - CAST-IN-PLACE CONCRETE for additional requirements.
- D. Source Quality Control: An independent testing laboratory representative shall periodically inspect and control concrete mixing and loading of transit mix trucks at batch plant at intervals appropriate to monitor quality of material issued on job.

### 3.5 MORTAR, GROUT, AND MASONRY REINFORCEMENT

- A. Coordinate with Owner's testing laboratory to provide periodic inspection of the following task:
1. As masonry construction begins, the following shall be verified to ensure compliance:
    - a. Proportions of site prepared mortar.
    - b. Construction of mortar joints.
    - c. Location of reinforcement and connectors.
  2. The inspection program shall verify:
    - a. Size and location of structural elements.
    - b. Type, size, and location of anchors, including other details of anchorage of masonry to structural members, frames, or other construction.
    - c. Specified size, grade, and type of reinforcement.
    - d. Protection of masonry during cold weather (temperature below 40°F.) or hot weather (temperature above 90°F.).
  3. Prior to grouting, the following shall be verified to ensure compliance:
    - a. Grout space is clean.
    - b. Placement of reinforcement and connectors.
    - c. Proportions of site-prepared grout.
    - d. Construction of mortar joints.
- B. Coordinate with Owner's testing laboratory to provide continuous inspection of the following task:
1. Grout placement shall be verified to ensure compliance with code and construction document provisions.

### 3.6 OTHER WORK REQUIRING TESTS

- A. Refer to individual sections covered under Divisions 22, 23, and 26 for other work requiring tests by independent testing laboratory.
- B. Other Tests:
1. Moisture content in face brick.

END OF SECTION

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 GENERAL

- A. Provide temporary facilities and controls needed for the work including, but not limited to those described in the Articles below.
- B. Maintain temporary facilities and controls as long as needed for safe and proper completion of the work.

1.2 ACCESS

- A. Provide adequate access to and temporary roads to the site of the building if required for the prosecution of the work.
- B. Provide and maintain access to fire hydrants, free of obstructions.
- C. Covered Walkway: Erect a structurally adequate, protective covered walkway for passage of persons entering and exiting building. Coordinate with entrance gates, other facilities and obstructions. Comply with regulations of authorities having jurisdiction.
  - 1. Construct covered walkways using scaffold or shoring framing. Provide wood plank overhead decking, protective plywood enclosure walls, handrails, barricades, warning signs, lights, safe and well-drained walkways, and similar provisions for protection and safe passage. Extend the back wall beyond the structure to complete the enclosure fence. Paint and maintain in a manner acceptable to the Owner and the Architect.

1.3 FIELD OFFICE

- A. Maintain temporary field office within existing building as coordinated with the Owner. Equip with adequate illumination; with smooth tables for perusal of drawings and specifications; and with metal legal size four-drawer filing cabinet. In addition to the above listed equipment, provide a space to accommodate the site meetings and have a layout/conference table at 28" height and chairs for 12 people. Upon completion of the project, remove offices from the premises.

1.4 TELEPHONES AND ELECTRONIC COMMUNICATION SERVICE

- A. Provide telephones/mobile phones in the field office. Telephone shall be in operation from the commencement of work until the acceptance of the building. Contractor shall pay for installation, maintenance, and removal of telephones, lines and for all use charges.
- B. Electronic Communication Service: Provide a computer, printer, high-speed data connection, and internet service as required for the Contractor to maintain internet access and e-mail correspondence.
  - 1. Contractor shall pay for installation, maintenance, and removal of high-speed data connection and for all use charges.
  - 2. The Architect's project management system is Newforma Info Exchange, which can be accessed by logging in at the following websites:  
<https://infoexchange.vlkarchitects.com/UserWeb/Login/Login.aspx?v=0> OR [www.vlkarchitects.com](http://www.vlkarchitects.com)  
Contractor shall utilize this system for all formal and informal correspondence with the Architect and Architect's Consultants, including E-Mails, Requests for Information, Proposals, Submittals, Submittal Transmittals, Meeting Minutes (for regularly scheduled meetings), and Warranty Responses (if warranty items are submitted in the system). In addition, Subcontractor Lists, Project Schedules, Schedule of Values, Pay Applications and other documents requiring submission shall be uploaded in pdf, Word, or Excel format by the Contractor to the appropriate location in Newforma Info Exchange.
  - 3. While the project management system is very user friendly and easy to learn, Architect will provide informal training for the Contractor as necessary to expedite the Contractor's familiarity with the program.



#### 1.5 TEMPORARY ELECTRICAL SERVICE

- A. Existing Building Areas:
  - 1. At all locations, the Contractor may utilize building electrical power to the extent existing power may be suitable for construction operations. The contractor shall make all tie-ins and shall maintain utility service in all occupied areas. Damage, if any, caused by the Contractor use or tie-ins shall be immediately corrected by the Contractor to as-new conditions. Owner shall pay only the energy charges.
    - a. Provide GFCI adapters since existing circuits may not be protected.
  - 2. The Contractor shall provide and maintain electrical power to points in the building convenient for and available to all trades, including mechanical and other subcontractors, so that power may be secured anywhere in the building with no more than a 100 ft. extension cord. Energy charges for power taken from existing building electrical system shall be paid by the Owner.

#### 1.6 TEMPORARY LIGHTING

- A. Provide and maintain temporary lighting inside the building for safe and adequate working conditions throughout all areas where work of any kind is being performed. Provide at least 1/2 watt of incandescent lighting for each square foot of space. Where practical, place temporary lights in the locations where the permanent lighting fixtures are to be installed.

#### 1.7 TEMPORARY HEAT

- A. Provide necessary heat during the course of construction, including equipment, fuel and attendance where required. Equipment for temporary heating shall be of a non-smudging type. The permanent heating system may be used for temporary heat, when installed. Upon completion and before acceptance of the building, Contractor shall repair all damage caused by such temporary use and shall clean all filters.
- B. When the outside temperature is below freezing, inside of the building shall be kept at or above 40°F. at all times. While painting and finishing are in progress, the temperature shall be kept at or above 60°F. Contractor shall make good all damage caused by insufficient heat.

#### 1.8 TEMPORARY VENTILATION

- A. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
- B. Utilize existing ventilation equipment. Extend and supplement equipment with temporary fan units as required to maintain clean air for construction operations.

#### 1.9 TEMPORARY WATER SERVICE

- A. Provide and maintain a temporary water supply during the course of construction and pay meter installation or "tap" fee, if any. Include necessary piping and hose connections. Take precautions to avoid spattering and spilling water in the building. Monthly water usage will be paid by the Owner.

#### 1.10 TEMPORARY SANITARY FACILITIES

- A. Provide and maintain adequate sanitary toilet facilities on the project site. The toilet facilities shall meet the requirements of the public authorities having jurisdiction and their use strictly enforced. Sanitary sewer "tap" fee and monthly use fees, if any, shall be paid by Contractor if temporary facilities are connected to city sanitary sewer.

#### 1.11 REFUSE

- A. The Contractor shall provide refuse removal service at all times.

#### 1.12 PROTECTIVE FACILITIES

- A. Provide and maintain temporary guardrails, handrails and covers for floor, roof and wall openings, vertical shafts and stairways. If movement of the protective facilities is required by a subcontractor to perform his work, it will be the responsibility of that subcontractor to give prior notification to the Contractor and to replace the protective facilities in a satisfactory manner.
- B. Provide and maintain, as per City of Klein requirements, fire lane(s) and other required fire protection at the appropriate time and sequence of construction.

#### 1.13 BARRICADES

- A. Provide and maintain lighted barricades and fences for the public protection in accordance with requirements of the local city ordinances.

#### 1.14 TEMPORARY FENCING

- A. Provide and maintain for the duration of construction a temporary fence of design and type needed to prevent entry onto the work by the public.

#### 1.15 TEMPORARY FIRE PROTECTION

- A. Contractor shall provide adequate fire extinguishers on the premises during the course of construction, of the type and size recommended to control fires, which may result from the particular work being performed in accordance with the local fire marshal and fire codes.
- B. Provide supervision of welding operations, combustion type temporary heating units, and similar sources of ignition for possible fires.
  - 1. Keep work area free of combustible material.
  - 2. A fire watch consisting of at least one man furnished by Contractor with a fire extinguisher in hand and with no other assigned duties, shall be posted to stand by and observe for potential hazards while welding or cutting is being done. Equip fire watch with suitable personal eye protection and fire extinguishers.
  - 3. At completion of work operations, immediately inspect work and adjacent area for hazards. Re-inspect work for hazards at 1/2 hour and at one hour after completion of welding and cutting operations.
- C. No smoking shall be allowed within the building or on the site. Post NO SMOKING signs in areas where work is in progress.

#### 1.16 ENCLOSURES

- A. Provide temporary weathertight closures of openings in exterior surfaces to provide acceptable working conditions and protection for materials, to allow for temporary heating, and to prevent entry of unauthorized persons. Provide doors with self-closing hardware and locks.
- B. Provide temporary partitions and ceilings as required to separate work areas from Owner occupied areas, to prevent penetration of dust and moisture into Owner occupied areas, to prevent damage to existing areas and equipment. Construction: Framing and sheet materials with closed joints and sealed edges at intersections with existing surfaces; STC rating 35 in accordance with ASTM E 90; flame spread rating of 25 in accordance with ASTM E 84; paint surfaces exposed to view in Owner occupied areas.

#### 1.17 EXISTING ROOF AND STRUCTURE PROTECTION

- A. Distribute material, debris, and equipment over the roof deck to avoid damage to the structural deck. Not more than two weeks supply of material shall be stored on a roof at any given time. Place materials and equipment to be stored on the roof as nearly direct over structural members as can be determined. Secure equipment, material, and debris on the roof to prevent movement by wind or other elements. Contractor assumes full responsibility for loading on the structural deck or roofing materials during roof replacement operations.

1.18 WATER CONTROL

- A. Grade site to drain. Maintain excavations free of water. Provide and operate pumping equipment.
- B. Protect site from puddling or running water.

1.19 CLEANING DURING CONSTRUCTION

- A. Control accumulation of waste materials and rubbish; periodically dispose of off site.
- B. Clean interior areas prior to start of finish work, maintain areas free of dust and other contaminants during finishing operations.
- C. Refer to SECTION 01 74 13 - PROGRESS CLEANING for additional cleaning requirements.

1.20 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary materials, equipment, services, and construction prior to substantial completion inspection.
- B. Clean and repair damage caused by installation or use of temporary facilities. Remove underground installations to a depth of 2'; grade site as indicated. Restore existing facilities used during construction to specified, or to original, condition.

1.21 PROJECT IDENTIFICATION SIGNS

- A. Furnish and erect a project sign, approximately 4' high x 8' long or 6' high x 6' long of 3/4" thick exterior grade plywood, in conformance with sign detail supplied by the Architect. Support on posts of framing of treated wood or steel.
- B. Erect sign within 30 days of start of construction and maintain in good condition until completion of project. Sign shall be located as directed by the Architect.
- C. No other signs or advertising of any kind, except precautionary warning signs, will be permitted.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION

SECTION 01 5639  
TEMPORARY TREE AND PLANT PROTECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Tree preservation work includes, but is not limited to:
  - 1. Protection of existing trees and all other indicated to remain in place.
  - Maintenance of protected areas.
  - 2. Clearing and grubbing activity within protected areas.
  - Damage compensation.

1.03 APPLICABLE REGULATIONS

- A. Comply with all applicable local laws and regulations concerning tree preservation as well as the specific requirements stated elsewhere in the Specifications.

PART 2 - PRODUCTS (NOT USED)

EXECUTION

3.01 PROTECTION OF EXISTING TREES TO REMAIN

- A. Tagging and Fencing
  - 1. Trees to remain shall be tagged and protective fencing installed prior to any construction, demolition, or other disturbance.  
Protective fencing shall be installed at the dripline of the tree to be protected unless otherwise noted on the Plans.
  - 2. The area inside the protective fencing will heretofore be referred to as the protected area.  
The Contractor shall verify tagged trees and fence locations in field with the Landscape Architect prior to any construction or demolition activity.

3.02 MAINTENANCE OF PROTECTED AREA

- A. No construction activity shall occur inside protected areas other than that landscape construction which is required for completion of the project.
  - 1. Construction activity includes, but is not limited to, building material storage, waste stockpiling, topsoil stockpiling, equipment storage or parking, disposal of waste materials of any kind, draining or flushing of tanks, canisters, drums, or other containers, trailer parking or storage, and demolition activity.
- B. No traffic, vehicular or pedestrian, shall encroach upon protected areas.
  - 1. This includes, but is not limited to, personal passenger vehicles, construction vehicles, grading machinery, and loading/lifting machinery.
- C. No material, machine, vehicle, or part thereof shall encroach above or below the vertical plane of the protective fencing into the protected area.  
The Contractor shall notify the Landscape Architect of any activity which might infringe or encroach upon the protected area prior to start of said activity.

3.03 ENCROACHMENT UPON PROTECTED AREA

- A. If encroachment into the protected area does occur, notify the Landscape Architect immediately.

3.04 ACTIVITY INSIDE PROTECTED AREAS END OF SECTION

- A. Clearing and Grubbing:
  - 1. Clearing of small trees, shrubs, and herbaceous plants in the protected area shall be performed by hand only.  
Bulldozers and/or drag chain operations are not permissible inside protected areas.
  - 2. Grubbing of stumps shall be performed in two (2) ways:
    - a. Under 6" diameter shall be pulled by chain.

- 1) The vehicle used for pulling shall remain outside the protected area (dripline of the tree to remain) whenever possible.  
Under no circumstance shall the pulling vehicle encroach into the protected area by more than 1/3 of the distance from the trunk of tree to remain to the nearest edge of the protected area (dripline).
  - 2) Any depressions shall be filled with topsoil and leveled to grade by hand.
  - b. Stumps over 6" diameter shall be ground out to a depth of 4" below grade.
    - 1) Stump grinder shall be trailer mounted and maneuvered by light truck or bobcat. Wood chips generated by grinding shall be removed and any depressions shall be filled with topsoil and leveled to grade.
    - 2) These operations shall be performed by hand.
  - B. Grading:
    1. Any grading which may be required inside the protected area shall be performed by hand only. No grading or earthmoving machinery shall be allowed inside the protected area.
    2. Provide grade stakes and verify grade elevations with the Landscape Architect prior to commencement of any grading activity.
  - C. Preparation of soil for seeding and/or sodding within the protected areas shall be done by hand or with a power rake and shall not disturb soil more than 2" deep to prevent damage to feeder root systems.
    1. Chemical herbicides shall be used within protected areas unless the Contractor can obtain written manufacturer's guarantee that herbicide will not harm tree health or growth and obtain written approval from the Landscape Architect.  
Contact the Landscape Architect prior to seed or sod preparation within protected areas to determine exact seed and/or sod limits.
  - D. Stake locations of all utilities which encroach protected areas.
    1. Contact the Landscape Architect prior to clearing or trenching for utilities to verify that staked location is the least obtrusive to protected area.
- 3.05 REMOVAL OF PROTECTIVE FENCING
- A. Protective fencing may be removed to facilitate landscape work in the protected area.
    1. All Work in the protected area shall be initiated within 24 hours of fence removal.
    2. If landscape work in the protected area is delayed or interrupted for more than 24 hours, then protective fencing shall be reinstalled until such time as work in the protected area is resumed.  
Protective fencing shall be reinstalled after substantial completion of work inside protected area and shall remain until substantial completion of the project or approval of the Landscape Architect, whichever is later.
- 3.06 DAMAGE COMPENSATION
- A. Any damage occurring to trees to remain or protected areas or removal of trees to remain in the protected areas caused by neglect, unauthorized encroachment and/or inadequate protection enforcement as
    1. Financial Compensation for said damage or removal shall be determined by the Landscape Architect and Owner as per the following guidelines on a per occurrence basis.

END OF SECTION

SECTION 01 62 00

PRODUCT OPTIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Administrative and procedural requirements for product options and substitutions.
- B. Related Requirements:
  - 1. Section 01 31 00 - Project Management and Coordination: Coordination of construction.
  - 2. Section 01 33 23 - Shop Drawings, Product Data, and Samples: Product data submittals.
  - 3. Section 01 42 00 - References: Applicability of specified reference standards.
  - 4. Section 01 78 23 - Operation and Maintenance Data.
  - 5. Section 01 78 39 - Project Record Documents.

1.2 PRODUCT LIST

- A. Within 30 days after date of contract, submit to the Architect a list of products and materials which are proposed for substitution per SECTION 01 33 23 - SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

1.3 CONTRACTOR'S OPTIONS

- A. For products specified only by reference standards, select any product meeting standards, by any manufacturer.
- B. For products specified by naming several products or manufacturers, followed by the words "NO SUBSTITUTIONS", select one of the products/manufacturers named.
- C. For products specified by naming only one product and manufacturer, there is no option unless a substitution is approved as specified below.
- D. For products specified by naming only one product and manufacturer, followed by the words "NO SUBSTITUTIONS", there is no option.

1.4 SUBSTITUTIONS

- A. Requests for substitution to material, products, or equipment instead of those specified will be considered if received at least 10 days prior to the bid date. Substitution request received within 10 days of the bid date will be returned without review. Refer to Substitution Request (During the Bidding Phase) form attached to this section.
- B. Within 30 days after Notice to Proceed, Architect will consider additional formal requests from the Contractor for substitutions of products in place of those specified. Refer to Substitution Request (After the Bidding Phase) form attached to this section.
- C. Submit a separate request for each substitution on a copy of the "SUBSTITUTION REQUEST" form, attached to this section. Include in request:
  - 1. Complete data substantiating compliance of proposed substitution with contract documents.
  - 2. For products:
    - a. Product identification, including manufacturer's name and address.
    - b. Manufacturer's literature, including product description, performance and test data and reference standards.
    - c. Samples, if applicable.
    - d. Name and address of similar projects on which product was used and date of installation.
  - 3. For construction methods:
    - a. Detailed written descriptions of proposed method.
    - b. Complete drawings illustrating methods or revisions.
  - 4. Itemized Comparison of qualities of proposed substitution with product or method specified.
  - 5. Changes required in other elements of work because of substitution.
  - 6. Effect on construction schedule.

- D. Request for substitution constitutes a representation that General Contractor or Construction Manager:
  - 1. Has personally investigated proposed product or method and determined that it is equal to or superior in all respects to that specified.
  - 2. Will provide same warranties for substitution as for product or method specified.
  - 3. Will coordinate installation of accepted substitution into the work, making such changes as may be required for the work to be complete in all respects.
  - 4. Waives all claims for additional cost, under his responsibility and related to substitution, which subsequently become apparent.
  
- E. Substitutions will not be considered if:
  - 1. They are indicated or implied on shop drawings or product data submittals without formal request submitted in accordance with this section.
  - 2. Acceptance will require substantial revision of contract documents.
  
- F. If substitution is not approved or accepted, Contractor shall furnish specified product or method at no additional cost to the Owner.
  
- G. Acceptance of a proposed substitution prior to the bid date will be in the form of an addendum.

#### 1.5 SUBMITTAL PROCEDURES

- A. Submit request for substitution.
  
- B. Architect will review Contractor's requests for substitutions with reasonable promptness.
  
- C. For accepted products, submit shop drawings, product data, and samples under provisions of SECTION 01 33 23 - SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

#### PART 2 - PRODUCTS

Not used.

#### PART 3 - EXECUTION

Not used.

END OF SECTION

SUBSTITUTION REQUEST  
(During the Bidding Phase)  
(Submittal must be received 10 days prior to bid/proposal date)

---

Project: \_\_\_\_\_ Substitution Request Number: \_\_\_\_\_  
\_\_\_\_\_  
From: \_\_\_\_\_  
To: \_\_\_\_\_ Date: \_\_\_\_\_  
\_\_\_\_\_  
A/E Project Number: \_\_\_\_\_  
Re: \_\_\_\_\_ Contract For: \_\_\_\_\_

---

Specification Title: \_\_\_\_\_ Description: \_\_\_\_\_  
Section: \_\_\_\_\_ Page: \_\_\_\_\_ Article/Paragraph: \_\_\_\_\_

---

Proposed Substitution: \_\_\_\_\_  
Manufacturer: \_\_\_\_\_ Address: \_\_\_\_\_ Phone: \_\_\_\_\_  
Trade Name: \_\_\_\_\_ Model No.: \_\_\_\_\_

Attached data includes product description, specifications, drawings, custom color/pre-selected color availability, photographs, and performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified.

Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

---

- The Undersigned certifies:
- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
  - Same warranty will be furnished for proposed substitution as for specified product.
  - Same maintenance service and source of replacement parts, as applicable, is available.
  - Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
  - Proposed substitution does not affect dimensions and functional clearances.
  - Payment will be made for changes to building design, including A/E/ design, detailing, and construction costs caused by the substitution.
- 

Submitted by: \_\_\_\_\_  
Signed by: \_\_\_\_\_  
Firm: \_\_\_\_\_  
Address: \_\_\_\_\_  
\_\_\_\_\_  
Telephone: \_\_\_\_\_

---

- A/E REVIEW AND ACTION
- Substitution approved - Submit bid/proposal based on accepted substitution.
  - Substitution approved as noted - Submit bid/proposal based on accepted substitution - as noted.
  - Substitution rejected - Submit bid/proposal for specified materials.
  - Substitution Request received too late - Submit bid/proposal for specified materials.

Signed by: \_\_\_\_\_ Date: \_\_\_\_\_

---

Supporting Data Attached:  Drawings  Product Data  Samples  Tests  Reports  \_\_\_\_\_

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**SUBSTITUTION REQUEST**  
(After the Bidding Phase)  
(Submittal must be received not later than 30 days after Notice to Proceed)

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Project: \_\_\_\_\_ Substitution Request Number: \_\_\_\_\_  
\_\_\_\_\_ From: \_\_\_\_\_  
To: \_\_\_\_\_ Date: \_\_\_\_\_  
\_\_\_\_\_ A/E Project Number: \_\_\_\_\_  
Re: \_\_\_\_\_ Contract For: \_\_\_\_\_

---

Specification Title: \_\_\_\_\_ Description: \_\_\_\_\_  
Section No.: \_\_\_\_\_ Page: \_\_\_\_\_ Article/Paragraph: \_\_\_\_\_

---

Proposed Substitution: \_\_\_\_\_  
Manufacturer: \_\_\_\_\_ Address: \_\_\_\_\_ Phone: \_\_\_\_\_  
Trade Name: \_\_\_\_\_ Model No.: \_\_\_\_\_

History:  New product  2-5 years old  5-10 years old  More than 10 years old

Differences between proposed substitution and specified product: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

For finish materials and pre-finished equipment, list the colors available for the specified item and the colors available for the proposed substitution.

Point-by-point comparative data attached - REQUIRED BY A/E

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Reason for not providing specified item: \_\_\_\_\_  
\_\_\_\_\_

Similar Installation:

Project: \_\_\_\_\_ Architect: \_\_\_\_\_  
Address: \_\_\_\_\_ Owner: \_\_\_\_\_  
\_\_\_\_\_ Date Installed: \_\_\_\_\_

Proposed substitution affects other parts of Work:  No  Yes; explain \_\_\_\_\_

---

Savings to Owner for accepting substitution: \_\_\_\_\_ (\$ \_\_\_\_\_).

Proposed substitution changes Contract Time:  No  Yes [Add] [Deduct] \_\_\_\_\_ days.

---

Supporting Data Attached:  Drawings  Product Data  Samples  Tests  Reports  \_\_\_\_\_

---

SUBSTITUTION REQUEST - Continued

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Cost data as stated above is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.
- Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Submitted by: \_\_\_\_\_

Signed by: \_\_\_\_\_

Firm: \_\_\_\_\_

Address: \_\_\_\_\_

Telephone: \_\_\_\_\_

Attachments: \_\_\_\_\_

A/E REVIEW AND ACTION

- Substitution approved - Make submittals in accordance with Section 01 33 23.
- Substitution approved as noted - Make submittals in accordance with Section 01 33 23.
- Substitution rejected - Use specified materials.
- Substitution Request received too late - Use specified materials.

Signed by: \_\_\_\_\_ Date \_\_\_\_\_

Additional Comments:  Contractor  Subcontractor  Supplier  Manufacturer  A/E  \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

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SECTION 01 65 00

PRODUCT DELIVERY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Requirements Included:
  - 1. Packaging, Transportation.
  - 2. Delivery and Receiving.
  - 3. Product Handling.
  
- B. Related Requirements:
  - 1. Section 01 32 16 - Construction Progress Schedules.
  - 2. Section 01 33 23 - Shop Drawings, Product Data, And Samples: Manufacturers' Instructions.
  - 3. Section 01 66 00 - Product Storage and Handling Requirements.
  - 4. Individual Sections: Specific requirements for packaging, shipping and handling.

PART 2 - PRODUCTS

NOT USED.

PART 3 - EXECUTION

3.1 PACKAGING, TRANSPORTATION

- A. Require supplier to package products in boxes or crates for protection during shipment, handling and storage. Protect sensitive products against exposure to elements and moisture.
  
- B. Protect sensitive equipment and finishes against impact, abrasion and other damage.

3.2 DELIVERY AND RECEIVING

- A. Arrange deliveries of products in accordance with construction progress schedules. Allow time for inspection prior to installation.
  
- B. Coordinate deliveries to avoid conflict with work and conditions at site; limitations on storage space; availability of personnel and handling equipment; and Owner's use of premises.
  
- C. Deliver products in undamaged, dry condition, in original unopened containers or packaging with identifying labels intact and legible.
  
- D. Clearly mark partial deliveries of component parts of equipment to identify equipment and contents to permit easy accumulation of parts and to facilitate assembly.
  
- E. Immediately on delivery, inspect shipment to assure
  - 1. Product complies with requirements of contract documents and reviewed submittals.
  - 2. Quantities are correct.
  - 3. Accessories, and installation hardware are correct.
  - 4. Containers and packages are intact and labels legible.
  - 5. Products are protected and undamaged.

### 3.3 PRODUCT HANDLING

- A. Provide equipment and personnel to handle products by methods to prevent soiling and damage.
- B. Provide additional protection during handling to prevent marring and otherwise damaging products, packaging and surrounding surfaces.
- C. Handle product by methods to avoid bending or over-stressing. Lift large and heavy components only at designated lift points.

END OF SECTION

SECTION 01 66 00

PRODUCT STORAGE AND HANDLING REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Requirements Included:

1. Storage, General.
2. Enclosed Storage.
3. Exterior Storage.
4. Maintenance of Storage.

B. Related Requirements:

1. Section 01 11 00 - Summary of Work.
2. Section 01 50 00 - Construction Facilities and Temporary Controls: Storage facilities. Protection of installed work.
3. Section 01 65 00 - Product Delivery Requirements.
4. Section 01 78 39 - Project Record Documents.

PART 2 - PRODUCTS - Not used.

PART 3 - EXECUTION

3.1 STORAGE, GENERAL

- A. Store products, immediately on delivery, in accordance with manufacturer's instructions, with seals and labels intact. Protect until installed.
- B. Arrange storage in a manner to provide access for maintenance of stored items and for inspection.

3.2 ENCLOSED STORAGE

- A. Store products, subject to damage by the elements, in substantial weathertight enclosures.
- B. Maintain temperature and humidity within ranges stated in manufacturer's instructions.
- C. Provide humidity control and ventilation for sensitive products as required by manufacturer's instructions.
- D. Store unpacked and loose products on shelves, in bins, or in neat groups of like items.

3.3 EXTERIOR STORAGE

- A. Provide substantial platforms, blocking, or skids, to support fabricated products above ground; slope to provide drainage. Protect products from soiling and staining.
- B. For products subject to discoloration or deterioration from exposure to the elements, cover with impervious sheet material. Provide ventilation to avoid condensation.
- C. Store loose granular materials on clean, solid surfaces such as pavement, or on rigid sheet materials, to prevent mixing with foreign matter.
- D. Provide surface drainage to prevent erosion and ponding of water.
- E. Prevent mixing of refuse or chemically injurious materials or liquids.

3.4 MAINTENANCE OF STORAGE

- A. Periodically inspect stored products on a scheduled basis.
- B. Verify that storage facilities comply with manufacturer's product storage requirements.
- C. Verify that manufacturer required environmental conditions are maintained continually.
- D. Verify that surfaces of products exposed to the elements are not adversely affected; that any weathering of finishes is acceptable under requirements of contract documents.

3.5 MAINTENANCE OF EQUIPMENT STORAGE

- A. For mechanical and electrical equipment in long-term storage, provide manufacturer's service instructions to accompany each item, with notice of enclosed instructions shown on exterior of package.
- B. Service equipment on a regularly scheduled basis, maintaining a log of services; submit as a record document.

END OF SECTION

SECTION 01 73 29

CUTTING AND PATCHING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Requirements and limitations for cutting and patching of work.
- B. Related Requirements:
  - 1. Section 01 11 00 - Summary of Work: Work by Owner or by separate contractors.
  - 2. Section 01 62 00 - Product Options.
  - 3. Individual Specifications Sections:
    - a. Cutting and patching incidental to work of the section.
    - b. Advance notification to other Sections of openings required in work of those sections.
    - c. Limitations on cutting structural members.

1.2 SUBMITTALS

- A. General: Submit in accordance with SECTION 01 33 23 – SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Submit written request in advance of cutting or alteration which affects
  - 1. Structural integrity of any element of the project.
  - 2. Integrity of weather-exposed or moisture-resistant element.
  - 3. Efficiency, maintenance, or safety of any operational element.
  - 4. Visual qualities of sight-exposed elements.
  - 5. Work of Owner or separate contractor.
- C. Include in request
  - 1. Identification of project.
  - 2. Location and description of affected work.
  - 3. Necessity for cutting or alteration.
  - 4. Description of proposed work and products to be used.
  - 5. Alternatives to cutting and patching.
  - 6. Effect on work of Owner or separate contractor.
  - 7. Written permission of affected separate contractor.
  - 8. Date and time work will be executed.

1.3 PAYMENT FOR COSTS

- A. Costs resulting from ill-timed or defective work, or work not conforming to contract documents, including costs for additional services of Architect or other consultants, shall be borne by the Contractor.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Products: Those required for original installation.
- B. For any change in materials, submit request for substitution under provisions of SECTION 01 62 00 - PRODUCT OPTIONS.



## PART 3 - EXECUTION

### 3.1 GENERAL

- A. Execute cutting, fitting and patching including excavation and fill, to complete work, and to
  1. Fit the several parts together, to integrate with other work.
  2. Uncover work to install ill-timed work.
  3. Remove and replace defective and non-conforming work.
  4. Remove samples of installed work for testing.
  5. Provide openings in elements of work for penetrations of mechanical and electrical work.

### 3.2 INSPECTION

- A. Inspect existing conditions, including elements subject to damage or movement during cutting and patching.
- B. After uncovering, inspect conditions affecting performance of work.
- C. Beginning of cutting or patching means acceptance of existing conditions.

### 3.3 PREPARATION

- A. Provide temporary supports to assure structural integrity of surroundings; devices and methods to protect other portions of project from damage.
- B. Provide protection from elements for areas which may be exposed by uncovering work; maintain excavations free of water.
- C. Maintain excavations free of water.

### 3.4 PERFORMANCE

- A. Execute work by methods to avoid damage to other work, and which will provide proper surfaces to receive patching and finishing.
- B. Employ original installer to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight-exposed surfaces.
- C. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
- D. Restore work with new products in accordance with requirements of contract documents.
- E. Fit work tight to pipes, sleeves, ducts, conduit and other penetrations through surfaces.
- F. At penetrations of fire-rated wall, ceiling, or floor construction, completely seal voids with fire-rated packing material, full thickness of the construction element.
- G. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for an assembly, refinish entire unit.

END OF SECTION

## SECTION 01 74 13

### CLEANING

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Work Included: Throughout the construction period, maintain the buildings and sites in a standard of cleanliness as described in this section.
- B. Related Requirements: In addition to standards described in this section, comply with requirements for cleaning as described in other pertinent sections of these specifications.

##### 1.2 QUALITY ASSURANCE

- A. Conduct a daily inspection, and more often if necessary, to verify that requirements for cleanliness are being met.

#### PART 2 - PRODUCTS

##### 2.1 CLEANING MATERIALS AND EQUIPMENT

- A. Provide required personnel, equipment, and materials needed to maintain the specified standard of cleanliness.

##### 2.2 COMPATIBILITY

- A. Use only the cleaning materials and equipment which are compatible with the surface being cleaned, as recommended by the manufacturer of the material.

#### PART 3 - EXECUTION

##### 3.1 PROGRESS CLEANING

- A. General:
  - 1. Retain stored items in an orderly arrangement allowing maximum access, not impeding traffic or drainage, and providing required protection of materials.
  - 2. Do not allow accumulation of scrap, debris waste material, and other items not required for construction of the work.
  - 3. At least twice each month, and more often if necessary, completely remove all scrap, debris, and waste material from the project sites.
  - 4. Provide adequate storage for all items awaiting removal from the project sites, observing requirements for fire protection and protection of the ecology.
- B. Sites:
  - 1. Daily, and more often if necessary, inspect the sites and pick up all scrap, debris, and waste material. Remove such items to the place designated for their storage.
  - 2. Weekly, and more often if necessary, inspect all arrangements of materials stored on the sites. Restack, tidy, or otherwise service arrangements to meet the requirements of this section.
  - 3. Maintain the sites in a neat and orderly condition at all times.
- C. Structures:
  - 1. Weekly, and more often if necessary, inspect the structures and pick up all scrap, debris, and waste material. Remove such items to the place designated for their storage.
  - 2. Weekly, and more often if necessary, sweep interior spaces clean.
    - a. "Clean", for the purpose of this subparagraph, shall be interpreted as meaning free from dust and other material capable of being removed by use of reasonable effort and a hand-held broom.
  - 3. As required preparatory to installation of succeeding materials, clean the structures or pertinent portions thereof to the degree of cleanliness recommended by the manufacturer of the succeeding material, using equipment and materials required to achieve the necessary cleanliness.

4. Following the installation of finish floor materials, clean the finish floor daily (and more often if necessary) at all times while work is being performed in the space in which finish materials are installed.
  - a. "Clean", for the purpose of this subparagraph shall be interpreted as meaning free from foreign material which, in the opinion of the Architect, may be injurious to the finish floor material.

### 3.2 FINAL CLEANING

- A. "Clean", for the purpose of this Article, and except as may be specifically provided otherwise, shall be interpreted as meaning the level of cleanliness generally provide by skilled cleaners using commercial quality building maintenance equipment and materials.
- B. Prior to completion of the work, remove from the project sites all tools, surplus materials, equipment, scrap, debris, and waste. Conduct final progress cleaning as described in this section.
- C. Sites:
  1. Unless otherwise specifically directed by Architect, broom clean paved areas on the sites and public paved areas adjacent to the sites.
  2. Completely remove resultant debris.
- D. Structures:
  1. Exterior:
    - a. Visually inspect exterior surfaces and remove all traces of soil, waste materials, smudges, and other foreign matter.
    - b. Remove all traces of splashed materials from adjacent surfaces.
    - c. If necessary to achieve a uniform degree of cleanliness, hose down the exterior of the structures.
    - d. In event of stubborn stains not removable with water, Architect may require light sandblasting or other cleaning at no additional cost to the Owner.
  2. Interior:
    - a. Visually inspect interior surfaces and remove all traces of soil, waste materials, smudges, and other foreign matter.
    - b. Remove all traces of splashed material from adjacent surfaces.
    - c. Remove paint droppings, spots, stains, and dirt from finished surfaces.
  3. Glass: Clean inside and outside.
  4. Polished Surfaces: To surfaces requiring routine application of buffed polish, apply the polish recommended by the manufacturer of the material being polished. This does not apply to resilient flooring surfaces. Reference SECTION 09 65 00 - RESILIENT FLOORING for cleaning of resilient flooring.
- E. Special floor/base final cleaning requirements:
  1. Contractor shall coordinate with the Owner's housekeeping department for preparing the surfaces for final cleaning by the Contractor and protective coatings installed by the Owner.
  2. Protection after final treatment until date of Substantial Completion shall be the responsibility of the Contractor.
  3. All repairs or re-application required as a result of damage caused by the Work shall be the responsibility of the Contractor as directed by the Owner.
- F. Schedule final cleaning, as approved by the Architect, to enable the Owner to accept a completely clean work.

### 3.3 CLEANING DURING OWNER'S OCCUPANCY

- A. Should the Owner occupy the work, or any portion thereof, prior to its completion by the Contractor and acceptance by the Owner, responsibilities for interim and final cleaning shall be as determined by the Architect in accordance with the General Conditions of the Contract for Construction.

END OF SECTION

SECTION 01 77 00

CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Administrative and procedural requirements for project closeout, including but not limited to:
  - 1. Inspection procedures.
  - 2. Project record document submittal.
  - 3. Operating and maintenance data submittal, including training sessions for equipment and systems.
  - 4. Submittal of warranties.
  - 5. Submittal of spare parts and maintenance materials.
  
- B. Related Requirements:
  - 1. Section 01 11 00 - Summary of Work: record drawings.
  - 2. Section 01 33 23 - Shop Drawings, Product Data and Samples.
  - 3. Section 01 74 13 - Progress Cleaning: final cleaning.
  - 4. Section 08 71 00 - Door Hardware: keys and keying schedule.

1.2 SUBSTANTIAL COMPLETION

- A. General: Substantial Completion is defined in Paragraph 9.8.1 (A201 and A201/CMA).
  
- B. Preliminary Procedures: Before requesting inspection for certification of substantial completion, complete the following. List exceptions in the request.
  - 1. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100% completion for the portion of the work claimed as substantially complete. Include supporting documentation for completion as indicated in these Contract Documents and a statement showing an accounting of changes to the Contract Sum.
    - a. If 100% completion cannot be shown, include a list of incomplete items, the value of incomplete construction and reasons the work is not complete.
  - 2. Advise Owner of pending insurance change-over requirements.
  - 3. Submit specific warranties, maintenance agreements, final certifications and similar documents.
  - 4. Obtain and submit releases enabling the Owner unrestricted use of the work and access to services and utilities; include occupancy permits, operating certificates and similar releases.
  - 5. Submit record drawings, maintenance manuals and similar final record information.
  - 6. Deliver tools, spare parts, extra stock and similar items.
  - 7. Make final change-over of permanent locks and transmit keys and keying schedule to the Owner. Advise the Owner's personnel of change-over in security provisions.
  - 8. Complete start-up testing of systems, and training sessions for Owner's operating and maintenance personnel. Discontinue or change over and remove temporary facilities from the site, along with construction tools, mock-ups and similar elements.
  - 9. Complete final clean-up requirements, including touch-up painting. Touch-up and otherwise repair and restore marred exposed finishes.
  
- C. Inspection Procedures: On receipt of a request for inspection, the Architect will either proceed with inspection or advise the Contractor of unfulfilled requirements. The Architect will prepare the Certificate of Substantial Completion following inspection or advise the Contractor of construction that must be completed or corrected before the certificate will be issued.
  - 1. Architect will repeat the inspection when requested and assured that the work has been substantially completed.
  
- D. Results of the completed inspection will form the basis of requirements for final acceptance.

### 1.3 FINAL ACCEPTANCE

- A. Preliminary Procedures: Before requesting final inspection for certification of final acceptance and final payment, submit the following. List exceptions in the request.
1. Final payment request with releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.
  2. Updated final statement, accounting for final additional changes to the contract sum.
  3. Certified copy of the Architect's final inspection list of items to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance, and the list has been endorsed and dated by the Architect.
  4. Consent of surety to final payment.
  5. Final Liquidated Damages settlement statement.
  6. Evidence of final, continuing insurance coverage complying with insurance requirements.
  7. Evidence of Compliance with Requirements of Governing Authorities
    - a. Certificate of Occupancy.
    - b. Certificates of Inspection required for mechanical and electrical systems.
  8. Operation and Maintenance Data: Under provisions of SECTION 01 78 23 - OPERATION AND MAINTENANCE DATA.
  9. Warranties and Bonds: Under provisions of SECTION 01 78 30 - WARRANTIES AND BONDS.
  10. Project Record Documents: Under provisions of SECTION 01 78 39 - PROJECT RECORD DOCUMENTS.
  11. Spare Parts and Maintenance Materials: Under provisions of SECTION 01 78 40 - SPARE PARTS, OVERAGES AND MAINTENANCE MATERIALS.
  12. Keys and Keying Schedule: Under provisions of SECTION 08 71 00 - DOOR HARDWARE.
  13. Evidence of Payment and Release of Liens: In accordance with General Conditions of the Contract for Construction.
  14. Evidence of Payment of Debts and Claims: In accordance with General Conditions of the Contract for Construction.
  15. Certificate of Project Compliance: Required under provisions of Texas Administrative Code (TAC), Chapter 61, 1036(c)(3)(F). Form developed by the Texas Education Agency (TEA). See form attached to the end of this Section.
  16. Certification of Asbestos and Lead Free Project: The Contractor shall submit to the Architect a letter addressed to the Owner certifying that no materials used in the construction of this project contain lead nor asbestos materials in excess of amounts allowed by local/state standards, laws, codes, rules and regulations, Federal Environmental Protection Agency (EPA) standards and the Federal Occupational Safety and Health Administration (OSHA) standards, whichever are most restrictive. Certification shall further state that should lead or asbestos fibers be found in this project in concentrations greater than the allowed amounts, that the Contractor shall be responsible for determining which materials contain the lead or asbestos fibers and shall take corrective action to remove those materials from the project at no additional cost to the Owner. Final payment shall not be made until this letter of certification has been received.
- B. Re-inspection Procedures: Architect will re-inspect the work upon receipt of notice that the work, including inspection list items from earlier inspections, has been complete, except items whose completion has been delayed because of circumstances acceptable to the Architect.
1. Upon completion of re-inspection, the Architect will advise the Contractor of work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.
  2. If necessary, re-inspection will be repeated.
- C. Re-inspection Fees: Should status of completion of work require re-inspection by Architect due to failure of work to comply with Contractor's claims on initial inspection, Owner will deduct the amount of Architect and appropriate consultants compensation for re-inspection services from final payment to Contractor. The reimbursement transaction shall be executed by change order to the contract.

#### 1.4 CLOSEOUT PROCEDURES

- A. Maintenance Manuals: Organize operating and maintenance data into suitable sets of manageable size. Bind properly indexed data in three individual heavy-duty 3-1/2", three-ring vinyl-covered binders, with identification on front and spine of each binder. Include the following types of information:
1. Emergency instructions.
  2. Spare parts list.
  3. Copies of warranties.
  4. Wiring diagrams.
  5. Recommended "turn around" cycles.
  6. Inspection procedures.
  7. Shop drawings.
  8. Fixture lamping schedule.
- B. Shop Drawings: Keep and maintain a full set of submittals throughout the construction phase to be submitted to the Architect with other close-out documents for delivery to the Owner for his permanent record. Set of submittals shall be delivered to the Architect in cardboard file boxes with string and button type closures. Organize submittals by CSI divisions, utilizing neatly labeled pressboard dividers to separate the sections. Neatly label short end of box with project name, contents and duration of construction.
- C. Operating and Maintenance Training Sessions: Prepare a written agenda of items to be covered at each training session. Attendance by Owner's operating and maintenance personnel is mandatory. Notify Owner not less than 48 hours prior to scheduled training sessions.
1. Arrange for each installer of equipment and systems that requires regular maintenance to meet with the Owner's personnel to provide instruction in proper operation and maintenance. If installers are not experienced in procedures, provide instruction by manufacturer's representatives. Include a detailed review of the following items:
    - a. Maintenance manuals.
    - b. Record documents.
    - c. Spare parts and materials.
    - d. Tools.
    - e. Lubricants.
    - f. Fuels.
    - g. Identification systems.
    - h. Control sequences.
    - i. Hazards.
    - j. Cleaning.
    - k. Warranties and bonds.
    - l. Maintenance agreements and similar continuing commitments.
  2. Training sessions shall consist of not less than five days of not less than four hours each day. A copy of maintenance manuals for equipment or system being demonstrated shall be on hand during training session. As part of instruction for operating equipment, demonstrate the following procedures:
    - a. Start-up.
    - b. Shutdown.
    - c. Emergency operations.
    - d. Noise and vibration adjustments.
    - e. Safety procedures.
    - f. Economy and efficiency adjustments.
    - g. Effective energy utilization.
    - h. Verify with Owner for the following requirement.

#### PART 2 - PRODUCTS

Not used.

#### PART 3 - EXECUTION

Not used.

END OF SECTION

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**CERTIFICATION  
OF PROJECT  
COMPLIANCE**

**Distribution to:**

District	___	Architect/Engineer	___
Contractor	___	Texas Education Agency	___
Other	___	Building Department	___

---

**1. PROJECT INFORMATION:**  
(name, address)

**ARCHITECT/ENGINEER:**

**CONTRACTOR/CM:**

**PROJECT NUMBER:**

**CONTRACT DATE:**

**DISTRICT:**

**DATE DISTRICT AUTHORIZES PROJECT:**

**BRIEF DESCRIPTION OF PROJECT:**

---

**2. CERTIFICATION OF DESIGN AND CONSTRUCTION**

The intent of this document is to assure that the school district has provided to the architect/engineer the required information and the architect/engineer has reviewed the School Facilities Standards as required by the State of Texas, and used his/her reasonable professional judgment and care in the architectural/engineering design and that the contractor has constructed the project in a quality manner in general conformance with the design requirements and that the school district certifies to project completion.

**3. The District** certifies that the enrollment projections, educational specifications and objectives of this facility along with the identified building code to be used have been provided to the architect/engineer.

**DISTRICT: BY:**

**DATE:**

**4. The Architect/Engineer** certifies the above information was received from the school district, and that the building(s) were designed in accordance with the applicable building codes. Further, the facility has been designed to meet or exceed the design criteria relating to space (minimum square footage), educational adequacy, and construction quality as contained in the School Facilities Standards as adopted by the State Board of Education, July 1992, and as provided by the district.

**ARCHITECT/ENGINEER: BY:**

**DATE:**

**5. The Contractor/CM** certifies that this project has been constructed in general conformance with the construction documents as prepared by the architect/engineer listed above.

**CONTRACTOR/CM: BY:**

**DATE:**

**6. The District** certifies completion of the project (as defined by the architect/engineer and contractor).

**DISTRICT: BY:**

**DATE:**

---



## INSTRUCTIONS FOR COMPLETION OF “CERTIFICATION OF PROJECT COMPLIANCE” FORM

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Section 1. Identify the following:

- name and address of the school facility
- the Architect/Engineer and Contractor
- the school district’s project number (if applicable)
- the date of execution of the construction contract
- name, address, and telephone number of the school district
- the date that the school district authorized the superintendent to hire an architect/engineer
- scope of the project.

---

Section 2. This section outlines the intent of the document. No action required.

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Section 3. This section is to be executed by the school district upon transmittal of the information (as listed) to the architect/engineer and is to remain in the custody of the school district throughout the entire project.

---

Section 4. This section is to be executed by the architect/engineer upon completion of the plans and specifications and in conjunction with the completion of the plan review for code compliance (ref. 19 TAC §61.104, School Facilities Standards) and returned to the school district’s files.

---

Section 5. This section is to be executed by the contractor upon substantial completion of the project and retained in the school district’s files.

---

Section 6. This section is to be executed by the school district upon acceptance and occupancy of the project.

---

NOTE: DO NOT SUBMIT THIS DOCUMENT TO THE TEXAS EDUCATION AGENCY. The school district will retain this document in their files indefinitely until review and/or submittal is required by representatives of the Texas Education Agency.

SECTION 01 78 23

OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Digital Manual Only.
  - 1. Format and content of manuals.
  - 2. Instruction of Owner's personnel.
  - 3. Schedule of submittals.
  
- B. Related Requirements:
  - 1. Section 01 33 23 - Shop Drawings, Product Data, and Samples.
  - 2. Section 01 45 00 - Quality Control: Manufacturer's instructions.
  - 3. Section 01 77 00 - Closeout Procedures.
  - 4. Section 01 78 30 - Warranties and Bonds.
  - 5. Section 01 78 39 - Project Record Documents.
  - 6. Individual Specifications Sections: Specific requirements for operation and maintenance data.

1.2 QUALITY ASSURANCE

- A. Prepare instructions and data by personnel experienced in maintenance and operation of described products.

1.3 FORMAT

- A. Submit operation and maintenance manuals on digital media acceptable to Owner and Architect. Enable reviewer comments on draft submittals.
  
- B. 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: Bookmark individual documents based on 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 Correlate data into related consistent groupings.
  
- C. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; list title of project identify subject matter of contents.
  
- D. Arrange content by systems, under section numbers and sequence of table of contents of this project manual.

1.4 SUBMITTALS

- A. Submit copy of preliminary draft or proposed formats and outlines of contents before start of work. Architect/Engineer will review draft and return with comments.
  
- B. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit documents within 10 days after acceptance.
  
- C. Submit completed files in final form 15 days prior to final inspection. Files will be returned after final inspection, with Architect/Engineer comments. Revise content of documents as required prior to final submittal.
  
- D. Submit revised volumes of data in final format within 10 days after final inspection.

## 1.5 CONTENTS, EACH VOLUME

- A. Table of Contents: Provide title of project; names, addresses, and telephone numbers of Architect/Engineer and Contractor with name of responsible parties; schedule of products and systems, indexed to content of the volume.
- B. For Each Product or System: List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.
- C. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation; delete inapplicable information.
- D. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use project record documents as maintenance drawings.
- E. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in SECTION 01 45 00 - QUALITY CONTROL.
- F. Warranties and Bonds: Bind in copy of each.

## 1.6 ELECTRONIC MANUAL FOR MATERIALS AND FINISHES

- A. Building Products, Applied Materials, and Finishes: Include product data, with catalog number, size, composition, and color and texture designations. Provide information for re-ordering custom manufactured products.
- B. Instructions for Care and Maintenance: Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- C. Moisture-protection and Weather-exposed Products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.
- D. Additional Requirements: As specified in individual specifications sections.
- E. Provide a listing in table of contents for design data, with tabbed fly sheet and space for insertion of data.

## 1.7 ELECTRONIC MANUAL FOR EQUIPMENT AND SYSTEMS

- A. Each Item of Equipment and Each System: Include description of unit or system, and component parts. Give function, normal operating characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.
- B. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications.
- C. Include as-installed color coded wiring diagrams.
- D. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
- E. Maintenance Requirements: Include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- F. Provide servicing and lubrication schedule, and list of lubricants required.
- G. Include manufacturer's printed operation and maintenance instructions.
- H. Include sequence of operation by controls manufacturer.

- I. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- J. Provide as-installed control diagrams by controls manufacturer.
- K. Provide Contractor's coordination drawings, with as-installed color coded piping diagrams.
- L. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- M. Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- N. Additional Requirements: As specified in individual specifications sections.
- O. Provide a listing in table of contents for design data, with tabbed fly sheet and space for insertion of data.

#### 1.8 INSTRUCTION OF OWNER PERSONNEL

- A. Before final inspection, instruct Owner's designated personnel in operation, adjustment, and maintenance of products, equipment, and systems, at agreed upon times. For equipment requiring seasonal operation, perform instructions for other seasons within six months.
- B. Use operation and maintenance manuals as basis of instruction. Review contents of manual with personnel in detail to explain all aspects of operation and maintenance.
- C. Prepare and insert additional data in operation and maintenance manual when need for such data becomes apparent during instruction.

#### PART 2 - PRODUCTS

Not used.

#### PART 3 - EXECUTION

Not used.

END OF SECTION

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SECTION 01 78 30

WARRANTIES AND BONDS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
  - 1. Preparation and submittal of warranties and bonds.
  - 2. Schedule of submittals.
- B. Related Requirements:
  - 1. Document 00 21 13 - Instruction to Bidders: Bid bonds.
  - 2. Document 00 21 16 - Instructions to Proposers: Proposer bonds.
  - 3. General Conditions of the Contract for Construction: Performance Bond and Labor and Material Payment Bonds, Warranty, and Correction of Work.
  - 4. Section 01 77 00 - Closeout Procedures.
  - 5. Section 01 78 23 - Operation and Maintenance Data.
  - 6. Section 01 78 39 - Project Record Documents.
  - 7. Individual Specifications Sections: Warranties and bonds required for specific products or work.

1.2 FORM OF SUBMITTALS

- A. Bind in three individual heavy-duty 8-1/2" x 11" black, three-ring binders, with hardback, cleanable, plastic covers.
- B. Label cover of each binder with typed or printed title WARRANTIES AND BONDS, with title of project; name, address and telephone number of Contractor; and name of responsible principal.
- C. Table of Contents: Neatly typed, in the sequence of the table of contents of the project manual, with each item identified with the number and title of the specification section in which specified, and the name of product or work item.
- D. Separate each warranty or bond with index tab sheets keyed to the table of contents listing. Provide full information, using separate typed sheets as necessary. List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

1.3 PREPARATION OF SUBMITTALS

- A. Obtain warranties and bonds, executed in duplicate by responsible subcontractors, suppliers, and manufacturers, within ten days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until the date of substantial completion is determined.
- B. Verify that documents are in proper form, contain full information, and are notarized.
- C. Co-execute submittals when required.
- D. Retain warranties and bonds until time specified for submittal.

1.4 TIME OF SUBMITTALS

- A. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within ten days after acceptance.
- B. Make other submittals within 10 days after date of substantial completion, prior to final application for payment.
- C. For items of work when acceptance is delayed beyond date of substantial completion, submit within ten days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION

SECTION 01 78 39

PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Maintenance and submittal of record documents and samples.
- B. Related Requirements:
  - 1. General Conditions of the Contract for Construction: Documents at the site.
  - 2. Section 01 33 23 - Shop Drawings, Product Data, and Samples.
  - 3. Section 01 77 00 - Closeout Procedures.
  - 4. Section 01 78 23 - Operation and Maintenance Data.
  - 5. Individual Specifications Sections: Manufacturer's certificates and certificates of inspection.

1.2 MAINTENANCE OF DOCUMENTS AND SAMPLES

- A. In addition to requirements in General Conditions, maintain at the site for Owner one record copy of:
  - 1. Contract drawings.
  - 2. Specifications.
  - 3. Addenda.
  - 4. Change orders and other modifications to the contract.
  - 5. Reviewed shop drawings, product data, and samples.
  - 6. Field test records.
  - 7. Inspection certificates.
  - 8. Manufacturer's certificates.
- B. Store record documents and samples in field office apart from documents used for construction. Provide files, racks, and secure storage for record documents and samples.
- C. Label and file record documents and samples in accordance with section number listings in table of contents of this project manual. Label each document "PROJECT RECORD" in neat, large, printed letters.
- D. Maintain record documents in a clean, dry and legible condition. Do not use record documents for construction purposes.
- E. Keep record documents and samples available for inspection by Architect.

1.3 RECORDING

- A. Record information on a set of opaque drawings, and in a copy of a project manual. All changes made in these drawings in connection with the final construction and installation shall be neatly made in red ink on the prints.
- B. Provide felt tip marking pens, maintaining separate colors for each major system, for recording information.
- C. Contractor shall include with the record documents, all changes and modifications made by addenda, change orders, supplementary instructions, or other forms of documentation, written or verbal, which alter the documents.
- D. Record information concurrently with construction progress. Do not conceal any work until required information is recorded.



- E. Contract drawings and shop drawings: Legibly mark each item on the drawings to record actual construction, including:
  - 1. Measured depths of elements of foundation in relation to finish first floor datum.
  - 2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
  - 3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of construction.
  - 4. Field changes of dimension and detail.
  - 5. Changes made by addenda and modifications.
  - 6. Details not on original contract drawings.
  - 7. References to related shop drawings and modifications.
  
- F. Specifications: Legibly mark each item in the specifications to record actual construction, including:
  - 1. Manufacturer, trade name, and catalog number of each product actually installed, particularly optional items and substitute items.
  - 2. Changes made by addenda and modifications.
  
- G. Other Documents: Maintain manufacturer's certifications, inspection certifications, field test records, and other documents required by individual specifications sections.
  
- H. Maintain these documents to reflect the current conditions of the work. Changes shall be reviewed on a monthly basis with the Architect's representative. The Contractor's updating of the "installed condition drawings" shall be a prerequisite to the monthly review of the Contractor's payment request by the Architect's representative.

#### 1.4 SUBMITTALS

- A. At contract closeout, deliver record documents and samples under provisions of SECTION 01 77 00 - CLOSEOUT PROCEDURES.
  
- B. Transmit with cover letter in duplicate, listing:
  - 1. Date.
  - 2. Project title and number.
  - 3. Contractor's name, address, and telephone number.
  - 4. Number and title of each record document.
  - 5. Signature of Contractor or authorized representative.

#### PART 2 - PRODUCTS

Not used.

#### PART 3 - EXECUTION

Not used.

END OF SECTION

SECTION 01 78 40

SPARE PARTS, OVERAGES AND MAINTENANCE MATERIALS

PART 1 - GENERAL

1.1 SUMMARY

- A. Requirements Includes:
  - 1. Products required.
  - 2. Storage and delivery of products.
- B. Related Requirements:
  - 1. Section 01 66 00 - Product Storage and Handling Requirements.
  - 2. Section 01 77 00 - Closeout Procedures.
  - 3. Section 01 78 23 - Operation and Maintenance Data.
  - 4. Individual Specifications Sections: Specific spare parts and materials required.

1.2 PRODUCTS REQUIRED

- A. Provide quantities of products, spare parts, maintenance tools, and maintenance materials specified in individual sections to be provided to Owner, in addition to that required for completion of work.
- B. Products: Identical to those installed in the work. Include quantities in original purchase from manufacturer to avoid variations in manufacture.

1.3 STORAGE, MAINTENANCE

- A. Store products with products to be installed in the work, under provisions of SECTION 01 66 00 - PRODUCT STORAGE AND HANDLING REQUIREMENTS.
- B. When adequate, secure storage facilities are available at site, capable of maintaining conditions required for storage and not required for contract work or storage, or for Owner's needs, spare products may be stored in available space.
- C. Maintain spare products in original containers with labels intact and legible, until delivery to Owner.

1.4 DELIVERY

- A. Coordinate with Owner: Deliver and unload spare products to Owner at Owner's maintenance facility and obtain receipt prior to final payment.
- B. For portions of project accepted and occupied by Owner prior to substantial completion, deliver a proportional part of spare products to Owner; obtain receipt.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION

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SECTION 02 4119  
SELECTIVE DEMOLITION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- B. Section Includes:
  - 1. Demolition and removal of selected portions of building or structure.
  - 2. Demolition and removal of selected site elements.
  - 3. Salvage of existing items to be reused or recycled.
- C. Related Requirements:
  - 1. Section 015639 "Temporary Tree and Plant Protection" for temporary protection of existing trees and plants that are affected by selective demolition.
  - 2. Section 311000 "Site Clearing" for site clearing and removal of above- and below-grade improvements.

1.03 DEFINITIONS

- D. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.
- E. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner for reuse.
- F. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.
- G. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.04 MATERIALS OWNERSHIP

- H. Unless otherwise indicated, demolition waste becomes property of Contractor.
- I. 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.

1.05 PREINSTALLATION MEETINGS

- J. Pre-demolition Conference: Conduct conference at Project site.
  - 1. Inspect and discuss condition of construction to be selectively demolished.
  - 2. Review structural load limitations of existing structure.
  - 3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
  - 4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
  - 5. Review areas where existing construction is to remain and requires protection.
  - 6. If needed, insert list of conference participants not mentioned in Section 013100 "Project Management and Coordination."

1.06 INFORMATIONAL SUBMITTALS

- K. Qualification Data: For refrigerant recovery technician.
- L. 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.
- M. 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 other tenants' 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.
- N. Inventory: Submit a list of items to be removed and salvaged and deliver to Owner prior to start of demolition.
- O. Pre-demolition Photographs or Video: Submit before Work begins.
- P. 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.
- Q. Warranties: Documentation indicated that existing warranties are still in effect after completion of selective demolition.

#### 1.07 CLOSEOUT SUBMITTALS

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

#### 1.08 QUALITY ASSURANCE

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

#### 1.09 FIELD CONDITIONS

- U. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- V. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- W. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- X. 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.
- Y. Hazardous Materials: Hazardous materials are present in buildings and structures to be selectively demolished. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.
1. Hazardous material remediation is specified elsewhere in the Contract Documents.
  2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
  3. Retain subparagraph below if hazardous materials are known to be present. Delete if Owner does not have, or will not provide, material safety data sheets for these materials.
  4. Owner will provide material safety data sheets for suspected hazardous materials that are known to be present in buildings and structures to be selectively demolished because of building operations or processes performed there.
- Z. Historic Areas: Demolition and hauling equipment and other materials shall be of sizes that clear surfaces within historic spaces, areas, rooms, and openings, including temporary protection, by 12 inches or more.
- AA. Storage or sale of removed items or materials on-site is not permitted.
- BB. 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.

#### 1.10 WARRANTY

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

- DD. 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.

## PART 2 - PRODUCTS

### 2.01 PERFORMANCE REQUIREMENTS

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

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Review record documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in record documents.
- C. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.
- E. Engage a professional engineer to 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.
  2. Steel Tendons: Locate tensioned steel tendons and include recommendations for de-tensioning.
- F. Survey of Existing Conditions: Record existing conditions by use of measured drawings and preconstruction photographs.
1. Comply with requirements specified in Section 013233 "Photographic Documentation."
  2. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.
  3. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

### 3.02 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- G. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
1. Comply with requirements for existing services/systems interruptions specified in Section 011000 "Summary."
- H. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
  2. Arrange to shut off indicated 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 to be removed.
    - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
    - b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
    - c. Equipment to Be Removed: Disconnect and cap services and remove equipment.

- d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
  - e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
  - f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
  - g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material.
- I. Refrigerant: Remove refrigerant from mechanical equipment to be selectively demolished according to 40 CFR 82 and regulations of authorities having jurisdiction.

### 3.03 PREPARATION

- J. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
- 1. Comply with requirements for access and protection specified in Section 015000 "Temporary Facilities and Controls."
- K. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
- 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
  - 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
  - 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
  - 4. Cover and protect furniture, furnishings, and equipment that have not been removed.
  - 5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 015000 "Temporary Facilities and Controls."
- L. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
- 1. Strengthen or add new supports when required during progress of selective demolition.

### 3.04 SELECTIVE DEMOLITION, GENERAL

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

7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
  8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
  9. Dispose of demolished items and materials promptly comply with requirements in Section 017419 "Construction Waste Management and Disposal."
- B. Work in Historic Areas: Selective demolition may be performed only in areas of the Project that are not designated as historic. In historic spaces, areas, and rooms or on historic surfaces, the terms "demolish" or "remove" shall mean historic "removal" or "dismantling" as specified in Section 013591 "Historic Treatment Procedures."
- C. Removed and Salvaged Items:
1. Clean salvaged items.
  2. Pack or crate items after cleaning. Identify contents of containers.
  3. Store items in a secure area until delivery to Owner.
  4. Transport items to Owner's storage area designated by Owner.
  5. Protect items from damage during transport and storage.
- D. 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.
- E. 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.
- 3.05 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 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, then remove concrete between saw cuts.
- C. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.
- D. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, 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.
- 3.06 DISPOSAL OF DEMOLISHED MATERIALS
- A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
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. Coordinate first subparagraph below with use of elevators, stairs, or building entries permitted by building manager.
  4. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
  5. Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."
- B. Burning: Do not burn demolished materials.
- C. Burning: Burning of demolished materials will be permitted only at designated areas on Owner's property, provided required permits are obtained. Provide full-time monitoring for burning materials until fires are extinguished.
- D. Disposal: Transport demolished materials and dispose of at designated spoil areas on Owner's property.
- E. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

### 3.07 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.

### 3.08 SELECTIVE DEMOLITION SCHEDULE

- A. Existing Items to Be Removed: See construction drawings.
- B. Existing Items to Be Removed and Salvaged: See construction drawings.
- C. Existing Items to Be Removed and Reinstalled: See construction drawings.
- D. "Existing Items to Remain" Paragraph below may be used to inform Contractor of items that are to remain, such as those that occur in, or are adjacent to, construction being demolished, but are not being removed and reinstalled. Retain paragraph if required.
- E. Existing Items to Remain: See construction drawings.

END OF SECTION

SECTION 03 11 00

CONCRETE FORMING AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Formwork with accessories for the cast-in-place concrete and permanent shoring.
- B. Related Sections:
  - 1. Section 03 30 00 - Cast-In-Place Concrete.
  - 2. Section 07 26 00 - Vapor Retarders.

1.2 SUBMITTALS

- A. Product Data: For each of the following:
  - 1. Exposed surface form-facing material.
  - 2. Concealed surface form-facing material.
  - 3. Form ties.

1.3 QUALITY ASSURANCE

- A. Standard: Formwork shall meet the requirements of ACI 347.
- B. Surface Tolerances: Allowable tolerances for formed concrete surfaces shall be  $\frac{3}{8}$ " maximum in 20 feet for vertical surfaces out of plumb and  $\frac{1}{4}$ " maximum in 20 feet for horizontal surfaces out of plane.

PART 2 - PRODUCTS

2.1 FORM MATERIALS

- A. Lumber: S2S&CM or S2S&SL No. 3 Boards or better Southern Pine not less than a nominal 1" thick.
- B. Plywood: EXT-APA grade-trademarked B-B Plyform, Class I, or High Density Overlaid Plyform, Class I. B-B Plyform shall be sanded but not mill oiled. Plywood shall be new.
- C. Expansion Joint Filler:
  - 1. Concealed: ASTM D 1751, asphalt saturated cane fiberboard.
  - 2. Exposed: ASTM D 1752, Type I, premolded, non-bituminous, closed cell sponge rubber. Color to be stone gray.

2.2 ACCESSORIES

- A. Form Ties: Form ties for exposed concrete surfaces shall be manufactured to allow a positive breakback of at least 1" inside the concrete surface. Ties shall be equipped with a plastic cone or washer not less than 1" in diameter and 1" long which will cover the hole and prevent leakage of mortar. Form ties for unexposed surfaces shall be bolt rods or patented devices having a minimum tensile strength of 3000 pounds when fully assembled. Ties shall be adjustable in length and free of lugs, cones, washers or other features which would leave a hole larger than  $\frac{7}{8}$ " in diameter, or depressions back of the exposed surface of the concrete. Ties shall be of such construction that, when the forms are removed, there will be no metal remaining within 1" of the finished surface of the concrete.
- B. Form Release Agent: Colorless material which will not stain concrete, absorb moisture or affect bond of subsequent surface finish manufactured by Nox-Crete, Symons, or approved equivalent.
- C. Dovetail Anchor Slots: 24 gage galvanized steel anchor slots with  $\frac{5}{8}$ " throat, 1" deep, furnished with foam or felt fillers to exclude grout seepage.
- D. Plastic Waterstops: Multiple rib extruded strips of PVC resin  $\frac{3}{8}$ " thick and 6" wide. Product/manufacturer; one of the following:
  - Type 5; Grace Construction Products

No. 705; Greenstreak Plastic Products

- E. Chamfer Strips: Extruded plastic triangular chamfer with  $\frac{3}{4}$ " face; Burke "CSF- $\frac{3}{4}$ ", Greenstreak Cat. No. 612.

PART 3 - EXECUTION

3.1 FORMWORK

- A. General: Construct forms in compliance with referenced standard. All forms, shores, falsework, bracing and other temporary supports shall be engineered by the Contractor to support all loads imposed during construction, including weight of construction equipment, allowance for live loads and lateral forces due to wind and temporary imbalance of discontinuity of building components.
- B. Construction: Construct forms to the dimensions and shapes of the concrete members as detailed and scheduled; and to obtain accurate alignment, location, grades, level and plumb work in finished structures. Set, assemble and brace forms to withstand wet concrete construction loads without deflection, movement, or leakage. Provide access for placing and adjusting reinforcement and cleaning forms.
1. Exposed Surfaces: Form with plywood the non-wearing concrete surfaces exposed to view. On these surfaces locate the form ties in uniform patterns. The joints shall be tight and flush. Plywood may be re-used only with the specific approval of the Architect. Chamfer exposed outside corners.
  2. Concealed Surfaces: Form with wood or metal forms the concealed vertical surfaces of grade beams and walls below grade. --- OR --- [Form with wax impregnated liner board the concealed vertical surfaces of grade beams and walls below grade when earth forms are permitted.]
  3. Soffits: Form the soffits of grade beams and walls bearing on piers using rectangular fiberboard set forms.
  4. Metal Anchors: Install dovetail anchor slots in concrete for anchoring masonry facing and partitions to concrete. On concrete wall and beam surfaces which are faced more than 12" high with masonry, place slots vertically and on 24" centers. On concrete columns faced with masonry and where a masonry partition abuts such a column, place a continuous vertical slot in each face of the column as required to secure the masonry.
  5. Recesses and Chases: Form for and provide in their proper locations all slots, chases and recesses indicated or implied by the drawings and not formed by sleeves, frames, and other equipment furnished under other sections. The trades requiring such recesses and openings in concrete shall furnish the necessary information for their correct location and placement.
  6. Joint Waterstops: Provide continuous waterstops for joints in the concrete walls below grade and in other concrete joints where detailed. Install waterstops with one-half the width encased in the concrete on the first pour and the other half in the second pour. Make end points watertight by fusing with a hot iron. Prefabrication of corners and whole frames is recommended where this is practical.
- C. Inserts and Fasteners: Provide for the installation of inserts, conduits, sleeves, drains, hangers, nosings, metal reglets, nailing strips, and like items required for the attachment of other work and furnished by other trades. Properly locate in cooperation with other trades and secure in position before concrete is placed.
- D. Provide bracing to ensure stability of formwork. Strengthen formwork liable to be overstressed by construction loads.
- E. Provide temporary ports in formwork to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain. Close ports with tight fitting panels, flush with inside face of forms, neatly fitted so that joints will not be apparent in exposed concrete surfaces.
- F. Installing Shoring: Before backfilling, install permanent shoring along the bottom of concrete grade beams around areas of suspended floor construction to prevent caving of backfill material into the under floor areas. Provide shoring where the under floor grade at a beam is below the beam soffit.
1. Dig the shoring at least 5" into the soil at the bottom and lap it approximately 3" up over the outside face of the beam or wall.
  2. Cut the panels to fit snugly at piers, footings, corners, and other irregularities.

3.2 EARTH FORMS

- A. Earth forms are not permitted.

### 3.3 REMOVAL OF FORMS

- A. Remove forms with sufficient care to avoid scarring exposed surfaces. Prying against face of concrete will not be permitted. Remove forms completely so that no wood form material is left in contact with concrete. Only fiberboard soffit forms may be left in place.
  - 1. General: Formwork for walls, sides of beams, and other parts not supporting the weight of the concrete may be removed as soon as the concrete has hardened sufficiently to resist damage from removal operations, but in no event before concrete is 24 hours old. Formwork for beam soffits and other parts that support the weight of concrete shall remain in place until the concrete has reached its specified 28-day strength unless otherwise permitted. When shores and other vertical supports are so arranged that the form facing material may be removed without loosening or disturbing the shores and supports, the facing material only may be removed at an age of 24 hours. Whenever the formwork is removed during the curing period, the exposed concrete shall be cured.

### 3.4 FIELD QUALITY CONTROL

- A. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and that supports, fastenings, wedges, ties, and items are secure.
- B. Do not reuse wood formwork more than three times for concrete surfaces to be exposed to view. Do not patch formwork.

### 3.5 FORMWORK TOLERANCES

- A. Construct formwork to maintain tolerances required by ACI 301.

END OF SECTION

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SECTION 03 20 00

CONCRETE REINFORCING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
  - 1. Reinforcement with accessories for the cast-in-place concrete.
  - 2. Reinforcing steel bars and welded steel wire fabric for cast-in-place concrete.
  - 3. Support chairs, bolsters, and spacers, for supporting reinforcement.
  
- B. Related Sections:
  - 1. Section 03 11 00 - Concrete Forming and Accessories.
  - 2. Section 03 30 00 - Cast-in-Place Concrete.
  - 3. Section 04 20 00 - Masonry Units: Reinforcement for masonry.
  - 4. Section 07 95 00 - Expansion Control: Expansion joint cover assemblies.
  - 5. Section 31 63 29 - Drilled Concrete Piers.

1.2 SUBMITTALS

- A. Shop Drawings: Submit in accordance with SECTION 01 33 23 - SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES. Drawings shall show the size, length, form and position of bar reinforcing and accessories.
  
- B. Certification: Submit a letter certifying that reinforcing bars comply with specified standard for grade.

1.3 QUALITY ASSURANCE

- A. Standard: Reinforcement shall meet the requirements of ACI 318 Building Code Requirements for Structural Concrete.

1.4 DELIVERY AND STORAGE

- A. Stack reinforcing steel in tiers and mark so that each length, size, shape and location can be readily determined. Exercise care to maintain reinforcement free of dirt, mud, paint or rust.
  
- B. Store materials and accessories on dunnage and under protective sheeting.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Reinforcing Bars: ASTM A 615, Grade 60 deformed billet steel.
  
- B. Reinforcing Fabric: ASTM A 1064, welded steel wire fabric in flat sheets.
  
- C. Tie Wire: 16 gage annealed steel wire.
  
- D. Accessories: Anchors, dowels, spacers, chairs, bolsters and other devices for supporting and fastening reinforcement and normally considered as accessories to the concrete work.

2.2 FABRICATION

- A. Fabricate reinforcing bars to conform to the required shapes and dimensions, with fabrication tolerances complying with the CRSI Manual.
  
- B. In case of fabricating errors, do not straighten or re-bend reinforcement in a manner that will weaken or injure the material.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

#### A. Placing Steel:

1. Place reinforcement in accordance with CRSI "Placing Reinforcing Bars" and ACI 318, with provisions of ACI 318 governing.
2. Assemble reinforcing steel in the forms, wired and fastened securely. Bending shall be done cold. Bars with kinks or bends not detailed shall be rejected.
3. Clean reinforcing steel of loose rust, mill scale, grease, dirt and other coatings which will reduce or destroy bond with the concrete. A thin film of tight rust will not be objectionable.
4. Position, support, and secure reinforcement to resist displacement by formwork, construction, and concrete placing operations.
5. Locate and support reinforcement by metal chairs, runners, bolsters, spacers, and hangers.
6. Place reinforcement to obtain minimum coverages for concrete protection.
7. Arrange, space, and securely tie bars and bar supports together with the specified tie wire.
8. Set wire ties so twisted ends are directed away from exposed concrete surfaces.
9. Support reinforcement and fasten together to prevent displacement by construction loads of placing concrete. Use No. 16 gauge black annealed wire at all joints and crosses to accurately position reinforcement in place.
10. Over formwork, use metal or plastic bar chairs and spacers to support reinforcement.
11. Where concrete surface will be exposed to weather in finished structure, use non-corrosive or corrosion protected accessories within ½" of concrete surface.
12. Where successive mats of reinforcing fabric are continuous, overlap welded wire fabric so that overlap measured between outermost cross wires of each fabric sheet is not less than spacing of cross wires plus 2".
13. Bars having splices not shown on shop drawings will be subject to rejections.
14. Do not bend reinforcement after being embedded in hardened concrete.
15. Do not allow bars to be in contact with dissimilar materials.

### 3.2 FIELD QUALITY CONTROL

- A. Inspection and Evaluation: The testing and inspection laboratory shall inspect placement of all reinforcing steel to confirm compliance with the contract documents.
- B. Concrete shall not be poured without inspection approval as noted above.

END OF SECTION

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Cast-in-place concrete, including mixing, placing, and finishing.
- B. Related Sections:
  - 1. Section 01 45 23 - Testing and Inspection Services.
  - 2. Section 03 11 00 - Concrete Forming and Accessories.
  - 3. Section 03 20 00 - Concrete Reinforcing.
  - 4. Section 03 35 35 - Sandblasting.
  - 5. Section 07 26 00 - Vapor Retarders.

1.2 SUBMITTALS

- A. General: Submit in accordance with SECTION 01 33 23 – SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Product Data:
  - 1. Submit product data for admixture, bonding compound, curing compound, grout, and sealer.
- C. Design Mixes:
  - 1. At the beginning of the work, Contractor shall submit proposed concrete mix designs for review by the Architect, structural engineering consultant, and testing laboratory per SECTION 01 33 23 - SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.
    - a. Include the sieve analysis of fine and coarse aggregate ASTM C 136, dry rodded weight of coarse aggregate - ASTM C 29, and the specific gravity (bulk saturated surface dry), of fine and coarse aggregates ASTM C 127 and C 128.
    - b. State admixture used and project conditions required for specific admixtures.
    - c. Proposed concrete mix design shall also include the results of compressive tests.
  - 2. Contractor shall not mix concrete for placing in the work until confirmation laboratory reports are supplied to reflect that each proposed mix will develop the strength and slump required. Successful past history in accordance with ACI 318 will be satisfactory.

1.3 QUALITY ASSURANCE

- A. Standard: Concrete shall meet the requirements of ASTM C 94.
- B. Perform work in accordance with ACI 301, 304, 305, 306, and 309.
- C. Obtain materials from same source throughout the work.
- D. Batch plant shall be able to show a minimum of five-years' experience in batching concrete. If required, they shall furnish a list of similar sized jobs or special condition jobs performed during the last two-years.
- E. Surface Tolerances: For all finished concrete wearing surfaces, the variation from level or from elevations indicated shall not exceed ¼" in 16'. If variations exceed those as set forth then the wearing surface shall be filled or ground down as required to meet the stated tolerances.



## 1.4 PROJECT CONDITIONS

- A. Environmental Requirements:
1. Cold Weather Placing: Do not place concrete when the temperature is below 40°F. or is expected to fall below 40°F. within 24 hours after placing concrete; unless either favorable weather is forecast or adequate arrangements for protection and heating have been made in accordance with ACI 306.
  2. Hot Weather Placing: Do not place concrete when hot weather conditions exist that would impair the quality and strength of concrete, i.e. any combination of high air temperature, low relative humidity, and wind velocity, unless adequate arrangements for protection have been made in accordance with ACI 305.
- B. Coordination: Notify other trades and contractors well in advance of placing concrete to allow them sufficient time in which to install work which is to be built-in or cast into the concrete.

## PART 2 - PRODUCTS

### 2.1 CONCRETE MATERIALS

- A. Portland Cements: ASTM C 150, Type I, domestic manufacture.
- B. Fine Aggregate: ASTM C 33, washed sand with a fineness modulus of between 2.50 and 3.00.
- C. Coarse Aggregate: ASTM C 33, clean crushed stone or washed gravel. The nominal maximum particle size shall not exceed 1/5 of the narrowest dimension between forms or 3/4 of the minimum clear spacing between reinforcing bars.
- D. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
1. Water-Reducing Admixture: ASTM C 494, Type A.
  2. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.
- E. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures, equal to Master Builders "MasterAir AE 200", Master Builders Solutions, a brand of MBCC Group.
- F. Fly Ash - ASTM C 618, Type C or Type F, Fly ash may be used at contractor's option. Limit fly ash content to not-to-exceed 20% of cement content by weight.
- G. Water: ASTM C 1602; Clean and potable.

### 2.2 CONCRETE TREATMENT PRODUCTS

- A. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements. Product/manufacturer; one of the following:  
Sikadur 32, Hi-Mod; Sika Chemical  
Sealtight Rezi-Weld 1000; W.R. Meadows, Inc.  
MasterInject 1000; Master Builders Solutions, a brand of MBCC Group.
- B. Curing Compound: ASTM C 309, Type 1, Class B, 18 to 25 percent solids, clear, acrylic copolymer based liquid for curing and sealing concrete. Product/manufacturer; one of the following:  
Safe-Cure Clear; ChemMasters ClearDR  
Diamond Clear VOX; Euclid Chemical Co.  
Cure & Seal 1315 LVOC; Symons Corp., a Dayton Superior Co.  
Vocomp-20; W.R. Meadows, Inc.
- C. Concrete Sealer at Interior Exposed Concrete: Provide Sealtight Vocomp-25 Acrylic Concrete Sealer as manufactured by W.R. Meadows, Inc., Fort Worth, Texas (phone 817.834.1969).

- D. Non-metallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, non-metallic aggregate grout, non-corrosive, non-staining, mixed with water to consistency suitable for application and 30-minute working time. Product/manufacturer; one of the following:  
NS Grout; Euclid Chemical Co.  
Sealtight 588 Precision Grout; W.R. Meadows, Inc.  
SonogROUT® 10K; Master Builders, a BASF Chemical Company
- E. Re-surfacing and/or Self-Leveling Underlayment Material: Provide Ardex K-15 as distributed by Ardex, Inc. (phone 888.512.7339, www.ardex.com) or Super Flo-Top as manufactured by The Euclid Chemical Co.

## 2.3 SELECTING PROPORTIONS FOR CONCRETE

- A. Strength: Select proportions for a mix designed to produce concrete with a minimum 28-day compressive strength of 3000 psi, unless noted otherwise.
- B. Admixture:
1. Use admixture in all concrete. Select the type (normal, retarder, or high early) best suited for the temperature conditions at the time the concrete is placed and finished.
  2. Use water reducing admixture only with the permission of the Engineer. Do not use water reducing admixture and air entrainment together with any slabs to receive a hard trowelled finish. Use air entrainment in all concrete to be pumped (5%).
- C. Use air-entraining admixture in all exterior concrete, including pavement and flatwork. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having total air content by volume with a tolerance of plus or minus 1½ percent within the following limits:
1. 3 to 6 percent, 1½" max. aggregate.
  2. 3.5 to 6.5 percent, 1" max. aggregate.
  3. 4 to 8 percent, ¾" max. aggregate.
  4. 5 to 9 percent, ½" max. aggregate.
- D. Calcium chloride shall not be used.
- E. Slump: Select proportions to produce concrete with the following maximum allowable slumps. The slump limits given shall apply after inclusion of the admixture.
- |                                |           |
|--------------------------------|-----------|
| Reinforced piers, footings     | 5" +/- 1" |
| Reinforced walls, beams, slabs | 5" +/- 1" |
| Pavement, flatwork             | 4" +/- 1" |

## 2.4 MIXING AND DELIVERY

- A. Measurement of concrete materials, mixing, and delivery of fresh concrete to the project shall meet the requirements of ASTM C 94. Transit-mixed concrete supplier shall have a plant with sufficient capacity and transportation facilities to assure continuous delivery at the rate required.
- B. Mix concrete in accordance with ASTM C 94, Alternative No. 2, or ACI 304.
- C. Deliver concrete in accordance with ASTM C 94.
- D. Select proportions for normal weight concrete in accordance with ACI 301 Method 1. Mix not less than one minute after materials are in mixer.
- E. Do not transport or use concrete after 90 minutes has expired from time of initial mixing.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Before any concrete is placed, the forms and reinforcement shall be inspected by the Contractor and the Owner's testing laboratory. Notify the Owner's testing laboratory not less than one working day before concrete is scheduled to be placed. Bucks, sleeves, anchors and other fixtures to be embedded in concrete shall be properly positioned and anchored. Wash down form surfaces to remove foreign substances. Provide elevated runways clearing steel and other embedded work.

- B. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent. Apply bonding agent in accordance with manufacturer's instructions.
- C. At locations where new concrete is doweled to existing work, drill over-sized holes in existing concrete, insert steel dowels, and pack solid with non-shrink grout.

### 3.2 CONVEYING CONCRETE

- A. Convey concrete to the place of final deposit by methods which will prevent the separation or loss of the ingredients. Equipment for chuting, pumping, and pneumatically conveying concrete shall be such as to assure a continuous flow of concrete at the delivery end without separation. The use of aluminum chutes or pipes for transporting concrete will not be permitted.

### 3.3 PLACING CONCRETE

- A. Notify Architect and testing laboratory a minimum of 24 hours prior to commencement of concreting operations.
- B. General: Place concrete in continuous horizontal lifts no deeper than 24". Avoid inclined lifts and inclined construction joints and do not cause or allow concrete to flow horizontally in the forms. Keep conveying equipment clean and free of hardened concrete. Use tremies or suitable chutes for placing concrete in high narrow walls so that concrete will not have a free vertical fall in excess of 3'.
- C. Place concrete in accordance with ACI 301 and as specified below:
  - 1. Unless protection is provided, do not place concrete in rain, sleet, or snow.
  - 2. Regulate rate of placement so concrete remains plastic and flows into position.
  - 3. Deposit concrete continuously until panel or section is completed. Place as near as possible to its final location; do not rehandle.
  - 4. Do not place concrete, under any circumstances, except in presence of testing laboratory.
  - 5. When placing concrete in masonry, exercise extreme care to prevent concrete from staining face of masonry.
  - 6. Consolidation
    - a. Comply with requirements of ACI 309.
    - b. Use mechanical vibrating equipment for consolidation.
    - c. Do not use vibrators to transport concrete in forms.
    - d. Use vibrators with sufficient speed and amplitude to consolidate effectively.
    - e. Keep a spare vibrator on site during all concrete pours.
    - f. Thoroughly consolidate concrete and work around reinforcement, embedded items and into corners of forms. Thoroughly consolidate layers of concrete with previous layers.
  - 7. Expansion Joint Fillers: Place pre-molded expansion joint fillers at locations as detailed and whenever required to separate site paving from building slabs. Refer to Drawings for required joint dimensions. Reference SECTION 03 10 00 - CONCRETE FORMING AND ACCESSORIES for joint filler products.
  - 8. Bonding: Before depositing any new concrete on or against previously deposited concrete which has partially or entirely set, thoroughly roughen and clean the surfaces of the latter of all foreign matter, scum, and laitance. Re-tighten forms and re-coat the surface of the previously deposited concrete with specified bonding agent per manufacturer's directions.
- D. Ensure reinforcement, inserts, embedded parts, and formed joints are not disturbed during concrete placement.
- E. Place concrete continuously between predetermined construction and control joints. Do not break or interrupt successive pours such that cold joints occur.
- F. Saw cut control joints at an optimum time after finishing. Use 3/16" thick blade, cutting 1/3 into depth of slab thickness.
- G. Separate exterior slabs on fill from vertical surfaces with joint filler. Extend joint filler from bottom of slab to within 1/4" of finished slab surface.
- H. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify Architect/Engineer upon discovery.

- I. Maintain record of concrete placement. Record date, location, quantity, air temperature and test samples taken.
- J. Beams and Walls: Place beams and walls continuously where possible. Start placing at ends of section and progress toward the center. Do not place concrete in beams and walls supported on piers until the concrete in the piers is no longer plastic.
- K. Slabs: Place each slab in one continuous operation without joints within the area established for a continuous pour. Start placing at the far end of the area and place each load of concrete against previously placed concrete, not away from it.
- L. Drains: Check the setting of floor drains so that they will finish flush with floor surfaces without varying the intended elevations and slopes. Slope surfaces down to drains at least  $\frac{1}{8}$ " per foot or as shown.
- M. Compaction: Compact concrete with ramming and spading tools during placing to work the coarse aggregate away from the forms and to produce a dense mass without air pockets. Work concrete through and around reinforcing steel. Do not disturb any embedded work.
- N. Consolidation: Use high frequency mechanical vibrators to consolidate concrete and eliminate lift lines in walls exposed to view. Vibrators shall be operated by skilled mechanics under close supervision. Insert and withdraw the vibrator heads at points from 18" to 30" apart for short periods. Do not allow heads to touch the forms.
- O. Leveling: Level and grade the top surface of slabs with straight edges over gauge strips. Level the top of foundations for the reception of subsequent work. Level and line steps in like manner over strips or forms. Remove wood spreaders, block, and screeds as the concrete is placed and before it sets.
- P. Construction Joints: Generally, locate construction joints in beams and suspended slabs in the middle third of the span. Form each construction joint with a vertical bulkhead. Remove the bulkhead as soon as the concrete has attained its initial set and leave the surface rough. Before placing fresh concrete against the surface, coat the surface with bonding compound applied in conformance with the manufacturer's instructions.
- Q. Loading: Do not shake or move the forms and reinforcement nor place any strain on projecting metal after the concrete has taken its initial set. Do not permit loading or traffic of any kind on the construction until the concrete has fully hardened.
- R. Hot Weather Placement: Take special care to prevent high temperatures in the fresh concrete during hot weather. Use a set-retarding type admixture to assure that concrete remains workable and lift lines will not be visible. For flatwork use a spray-on evaporation retardant as needed during finishing operations.
- S. Mechanical equipment pads required in mechanical yard shall be 6" thick with #4 @12" o.c. each way in mid-slab. Pour pad 6" larger than equipment all around. Additionally provide a continuous poured-down edge beam around the pad 18" deep by 10" wide reinforced with 2-#5 continuous in bottom of beam with #3 ties @ 24" o.c. Add intermediate beams, same size and reinforcing, if pad exceeds 12'-0" in either direction and every 12'-0" thereafter. Provide 4" thick sand bed under slab. Top of slab elevation shall be 3" above finish grade around pad.

### 3.4 CORRECTING DEFECTIVE CONCRETE

- A. Examine concrete for defects as the forms are removed. Concrete out of alignment or with defective surfaces shall be considered as not conforming to the intent of these specifications. Such concrete shall be removed from the project site unless the Architect grants permission to patch the defective area.
- B. Concrete that does not attain the specified 28-day strength shall be removed from the project site at the contractor's expense.
- C. Formed surfaces exposed to view shall not have fins, offsets, voids, and bulges. Minor grain marks will not be objectionable, but the texture shall be uniform. Leave corners and other details sharply defined and surfaces straight and true.

- D. Repair honeycomb, pour joints, stone pockets, and like imperfections by wetting and pointing with mortar to match adjacent concrete. Where unacceptable surface blemishes occur on concrete exposed to view, rub the entire surface to produce a uniform appearance throughout.

### 3.5 FILLING TIE ROD AND BOLT HOLES

- A. Fill solidly with stiff cement grout the holes in concrete resulting from the removal of bolts and rods. Strike off flush any excess mortar at the faces of the holes. In concrete exposed to view, holes shall be patched with mortar to match adjacent concrete.

### 3.6 CONCRETE TOPPING

- A. Concrete Toppings: Proportion normal-weight concrete mixture as follows:
  - 1. Minimum Compressive Strength: 3000 psi at 28 days.
  - 2. Minimum Cementitious Materials Content: 540 lb/cu. yd.
  - 3. Slump Limits: 5 inches, plus or minus 1 inch.
  - 4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch nominal maximum aggregate size.
- B. Over entrances provide concrete topping as detailed, at minimum thickness of 2 inches. Before the topping is placed, remove loose dirt and sand particles with a stiff broom. Brush in a bonding coat of neat cement just ahead of the topping. Screed, tamp, and float the topping to the lines and slopes indicated. Finish as specified below.
- C. Delay installation of concrete toppings at entrances to insure that finished surfaces will not be stained nor damaged by subsequent construction activities. Remove and re-installed stained or damaged concrete toppings at entrances as directed by Architect.

### 3.7 CONCRETE FINISHING

- A. Rubbed Concrete Finish
  - 1. Exposed non-wearing concrete surfaces noted to be "Rubbed Concrete" shall be given a rubbed finish.
    - a. Remove the forms as soon as possible and while the concrete is still "green". Level offsets and fins, and repair surfaces.
    - b. Wet surfaces and rub with a carborundum brick or other suitable abrasive to obtain a uniformly textured and colored finish. Flush the surfaces with clean water to remove slurry and loose particles.
    - c. After the rough work on the building has been completed, again rub the surfaces with a carborundum brick. For this rubbing use a slurry made from a patching and repairing compound equal to "Pave-Crete." Apply the slurry and rub it thoroughly into the concrete to provide the desired finish. Remove surplus slurry with burlap before it hardens.
    - d. The finished work shall be free of holes and other unsightly defects and shall be uniform in texture and color. Leave corners sharply defined and surfaces straight and true.

### 3.8 CONCRETE FLOOR, SLAB, AND TOPPING FINISHES

- A. Steel Trowel: For concrete floor surfaces to be left exposed, to receive resilient tile, or carpet, provide a standard integral trowel finish. This finish is required on all concrete wearing surfaces for which other specific finishes are not indicated or scheduled.
  - 1. Strike the surface at the finish floor elevation, and roll and tamp the concrete to force aggregate away from the surface. Screed to a true, level surface except where slopes are specifically indicated, and float when hard enough to support knee boards.
  - 2. Bring the surface to a true grade by cutting down high spots and filling low spots with fresh concrete. Test with a 16 ft. straight edge, or shorter in restricted areas, and limit surface variations to not more than 1/4" in 16'.
  - 3. Finish the floor with a steel trowel to a smooth dense surface. When hard enough to ring under the trowel, burnish the surface to the final polished finish.
- B. Smooth: Concrete slab surfaces to be covered with thinset ceramic tile shall receive steel trowel finish, except that the second burnish troweling shall be omitted. Leave surfaces with some "tooth" for a bond.

- C. Rough: Concrete slab surfaces to be covered with quarry and ceramic tile shall be roughened for bond by scrubbing with stiff brooms to exposed the aggregate before laitance has hardened. Sweep the surfaces to remove loose material.
- D. Brush: Provide a texture finish for exterior concrete except where scheduled otherwise. After floating and an initial troweling, go over the surfaces with a soft bristle brush or broom to produce a fine textured non-slip finish. Exposed vertical surfaces and corners shall be tooled and troweled smooth.
- E. Float: Concrete slab surfaces to be covered with membrane waterproofing and with insulation board, or slabs with sloped surfaces, shall be screeded and floated to a true, relatively smooth finish without sharp projections, offsets and other irregularities.

### 3.9 CURING

- A. Cure all concrete at least 7 days. All curing procedures shall prevent evaporation of moisture from the concrete for the full curing period. Protect surfaces from traffic damage until the curing is complete.
- B. Keep exposed vertical surfaces and the tops of beams and walls moist by spraying with water or covering with saturated burlap, starting as soon as the surfaces will resist erosion.
- C. Concrete surfaces to be covered with thinset flooring materials (ceramic tile, vinyl composition tile, etc.), shall be cured by covering with reinforced 2-ply paper or 4 mil thick polyethylene sheeting laid with joints lapped 3" and sealed with tape. Do not use curing compound on these surfaces.
- D. Coat other concrete wearing surfaces with the curing and sealing compound, using at least 1 gallon per 300 sq. ft. Areas damaged by traffic or subsequent construction operations shall be re-coated.

### 3.10 FIELD QUALITY CONTROL

- A. Acceptance Tests:
  - 1. Samples for strength tests of concrete shall be taken from each 75 cu. yds., or fraction thereof, of each mix design of concrete placed in any one day.
  - 2. Sampling procedures shall meet the requirements of ASTM C 172. If concrete is being pumped, take concrete samples for testing at the point of placement and not at the mixer discharge.
  - 3. Make and record a slump test on each sample. The method of test shall meet the requirements of ASTM C 143.
  - 4. Make 4 cylinders from each sample for strength tests, 1 for 7-day, 2 for 28-day test, and 1 in reserve. The cylinders shall be made on the project site by an Independent Testing Laboratory and shall be cured and tested in conformance with the requirements of ASTM C 31 and C 39.
  - 5. Samples for 3-day strength tests may be taken at the Contractor's discretion and at the Contractor's expense.
  - 6. Samples for temperature and slump tests of concrete shall be taken from each truck, of each mix design of concrete placed in any one day.
  - 7. Testing lab representative shall be on site at all times during concrete pours.
  - 8. No water shall be added to concrete mix on project site without approval from Owner's Testing Laboratory.
  - 9. Concrete delivery tickets for all trucks shall be given to General Contractor for later submission to Owner. Delivery tickets shall record time truck left plant, time truck arrived at site and mix design number being delivered. A maximum of 90 minutes will be allowed from mixing of concrete to delivery.
- B. Evaluation of Test Results:
  - 1. Each strength test result shall be the average of 2 cylinders from the same sample tested at 28 days.
  - 2. Strength of each concrete mixture will be satisfactory if the average of any 3 consecutive compressive-strength tests equals or exceeds the specified compressive strength and no individual strength test value falls below specified compressive strength by more than 500 psi.
  - 3. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that compressive strengths or other requirements have not been met. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work.
- C. The cost of testing service shall be per SECTION 01 45 23 - TESTING AND INSPECTION SERVICES.

### 3.11 GROUTING

- A. Grout base plates and other structural members. Pea gravel may be added to the grout if the space to be grouted is 1" thick or more. Do not add sand to the grout.

### 3.12 BASE PLATE ANCHOR BOLTS

- A. Set the anchor bolts for steel base plates. Use templates.

### 3.13 PATCHING

- A. Patch and repair existing concrete to restore smooth, uniform surfaces.
- B. Prepare the surfaces by removing loose and faulty material down to firm concrete. Edges of concrete exposed to view shall be saw-cut straight and square. Brush the surfaces free of dirt and debris and flush down with clean water. After the surfaces are dry, coat them with bonding compound used in conformance with the manufacturer's instructions.
- C. Major patching and deep fills shall be done with a mixture of 1 part Portland cement, 1½ parts sand, and 1½ parts pea gravel. Work and tamp the fill into place, screed the surface and float and trowel to a smooth finish. Cure as specified above.
- D. Minor patching and re-surfacing of concrete to be covered with tile and carpet shall be done using a suitable re-surfacing material such as Ardex K-15 or Super Flo-Top, which can be carried to a feather edge. Mix and apply in conformance with the manufacturer's instructions and finish to a smooth surface.

### 3.14 SEALING EXPOSED CONCRETE FLOORS

- A. Immediately prior to completion of the building, clean exposed concrete floors to remove dirt, stains, paint, oil and grease. Coat the clean, dry surfaces with sealing compound. Application shall conform to the manufacturer's instructions. Do not allow to puddle.

### 3.15 PROTECTION AND CLEAN UP

- A. Floor Protection: All concrete floors which will be exposed to view in the completed building shall be covered with reinforced paper with joints lapped and sealed. Maintain the protective covering until all wet work in the building (masonry, plaster, and tile) is completed.
- B. Clean Up: Excess concrete and wash water from concrete truck drums shall not be dumped anywhere on the site or on adjoining streets, but shall be disposed of away from the premises.

END OF SECTION

SECTION 04 20 00

MASONRY UNITS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Unit masonry construction.
- B. Related Requirements:
  - 1. Section 01 45 23 - Testing and Inspection Services.
  - 2. Section 03 11 00 - Concrete Forming and Accessories: dovetail anchor slots.
  - 3. Section 05 50 00 - Metal Fabrications: steel lintels.
  - 4. Section 06 16 56 - Air- and Water-Resistive Sheathing Board System
  - 5. Section 07 65 00 - Flexible Flashing: through-wall flashing for masonry walls.
  - 6. Section 07 27 26 - Fluid-Applied Membrane Air Barriers.
  - 7. Section 07 92 00 - Joint Sealants.

1.2 SUBMITTALS

- A. General: Submit in accordance with SECTION 01 33 23 - SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Product Data: Submit for each type of product indicated.
  - 1. Include statements of material properties indicating compliance with requirements including compliance with standards and type designations within standards.
- C. Samples: Within 60 days after the contract has been awarded, submit manufacturer's standard sample panel showing full range of color, approximately 12" x 24" for each color and size of brick required.
- D. Test Reports: Manufacturer of the concrete masonry units shall submit:
  - 1. Certified test reports showing that the units to be furnished meet the requirements of ASTM C 90 and C 129, and have the required minimum compressive strengths.
  - 2. Reports certifying concrete masonry units meet or exceed each of the fire-resistive ratings.
- E. Provide a diagram of proposed control joints and expansion joints.
- F. Submit steel reinforcing shop drawings for load-bearing concrete masonry unit walls, including elevations showing reinforcing, control joints, bond beams, dimensions and details.
- G. Mortar Mixture Proportions: ASTM C 270, Submit copies of each proposed mix design for review prior to starting masonry work.
- H. Grout Mixture Proportions: ASTM C 476, Submit copies of each proposed mix design for review prior to grout placement.
  - 1. Include recent historical grout cylinder strength test reports for each mix design.

1.3 QUALITY ASSURANCE

- A. Manufacturer: Manufacturer shall have a minimum of five years' experience manufacturing the specified product.
- B. Installer: Masonry contractor shall have a minimum of five years' experience in similar types of work and be able to furnish a list of previous jobs and references if requested by the Architect.
- C. Pre-installation Conference: Contractor shall schedule pre-installation conference at the project site with Architect/Engineer and Owner's Testing Lab. Conference shall be held prior to proceeding with masonry work and shall comply with requirements in Division 01 Section "Project Management and Coordination".



- D. Expansion Joints (Control Joints): Provide expansion joints as shown on the Drawings or if not shown, install at frequency and in accordance with details as recommended by the N.C.M.A. or B.I.A. Confirm locations and frequency with Architect before beginning work. Refer to expansion joint Paragraph in the Installation portion of this specification section.
- E. Mock-up: Construct a sample wall panel at the site using brick veneer and concrete masonry units, mortar, and masonry backup proposed for the project. The panel shall duplicate the typical building wall construction (coursing, bonding, joint treatment, sealant, cleaning methods and materials as required in SECTION 07 92 00 - JOINT SEALANTS). Sample panel shall be fully acceptable to the Architect prior to ordering of materials. Install one vertical 3/8" control joint for full height of panel. Panel shall be not less than 4 ft. by 3 ft. Construct panel on a wood pallet, providing portability around the project site. Do not alter nor destroy mock-up until attainment of Substantial Completion. Approved mock-up panel shall be the standard of comparison for workmanship and materials.
- F. Fire-resistance Ratings: Where indicated, provide materials and construction identical to those of assemblies with fire-resistance ratings determined per ASTM E 119 by a testing and inspecting agency, by equivalent concrete masonry thickness, or by another means, as acceptable to authorities having jurisdiction.

#### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Brick Delivery: Do not lay face brick until at least 50% of the brick for the project has been delivered. As brick work progresses, make additional deliveries of brick so that at all times at least 50% of the remaining brick requirements are on the project site. Serve masons brick intermixed from the various storage piles to assure blending of brick.
- B. Store face brick and masonry units above ground on wood pallets which allow air circulation under the stacked units.

#### 1.5 PROJECT CONDITIONS

- A. Refer to "Protection" Paragraph for daily activities.
- B. Cold Weather Construction: Do no masonry work when freezing weather is expected. If Contractor elects to lay masonry when air temperature falls or is expected to fall below 40°F., provide construction means and protection of completed masonry as described in BIA Technical Note 1 - Cold and Hot Weather Construction -- Construction and Protection Recommendations.
  - 1. The use of admixtures or antifreezes to lower the freezing point of mortar shall not be permitted.
- C. In hot weather (above 99°F. with less than 50% relative humidity) protect masonry construction from direct exposure to sun and wind.
- D. Temporary Bracing: Take adequate precautions to prevent damage to walls during erection by high winds or other forces. Where necessary, provide temporary bracing until the designed lateral strength is reached.

### PART 2 - PRODUCTS

#### 2.1 MASONRY MATERIALS

- A. Brick Veneer: ASTM C 216 face brick or ASTM C 652 hollow brick.
  - 1. Face Brick: ASTM C 216, Grade SW, Type FBS, face brick.
  - 2. Hollow Brick: ASTM C 652, Grade SW, Class H40V, Type HBS, hollow brick with 3/4" minimum shell thickness on outer face shell, inner face shell, and end webs.
  - 3. Brick Veneer: Modular size face brick or hollow brick with actual dimensions of 3-5/8"D x 2-1/4"H x 7-5/8"L. Provide brick(s) to match existing masonry as selected by Architect.
  - 4. Substitutions: Requests for substitutions will be considered in accordance with provisions of SECTION 01 62 00 - PRODUCT OPTIONS.

- B. Special Brick Shapes: Provide special shapes and sizes of face brick and glazed brick as required for a complete project. Exposed surfaces to match the face brick in color, texture, and blend. Special shapes and sizes shall include, but not be limited to, the following:
1. Solid bricks at soldier bond corners
  2. Two-faced brick at corners, windows, and doors.
  3. Solid bricks at windowsills.
- C. Common Brick: ASTM C 62, Grade MW, hard-burned stiff mud or dry-pressed brick. Use common brick where concealed brick is required.
- D. Concrete Masonry Units: ASTM C 90, Grade N-I, moisture controlled, for load-bearing units; ASTM C 129, moisture controlled, Type I, for non-load-bearing units. Provide hollow units made from Portland cement and lightweight mineral aggregate.
1. All units shall be from the same manufacturing plant and shall have the same surface texture.
  2. Use load-bearing units for exterior wall backup and load-bearing partitions, non-load-bearing units elsewhere.
  3. Provide 1" bullnose units at exposed outside corners and jambs and as noted on drawings.
    - a. Provide square edge starter course corners at all rubber base conditions where preformed base corners are specified to be provided.
    - b. Provide square edges at all furred units and units to be covered with ceramic tile.
  4. Provide sash block control joints at concrete block walls with pre-molded rubber control joint filler.
  5. Provide 5" starter blocks where required.
  6. Nominal Size: 8" x 16" face.
  7. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2000 psi.
  8. Provide "equivalent concrete masonry thickness" required for fire-rated assemblies where required.
- E. Smooth-face Concrete Masonry Units: Provide Featherlite smooth-faced concrete masonry units, color as selected by Architect, 3 5/8" x 3 5/8" x 15 5/8" and 3 5/8" x 7 5/8" x 15 5/8" units. All exposed edges shall match face. Smooth-face concrete masonry units shall be manufactured with Dry-Block admixture as manufactured by W.R. Grace & Co. Equivalent products by Best Block will be acceptable.
1. Provide factory-applied clear satin gloss acrylic finish on exposed faces.
- F. Related Materials:
1. Bond Breaker: ASTM D 226, Type I (No. 15), non-perforated asphalt-saturated felt.

## 2.2 REINFORCING AND TIES

- A. Wall Ties: ASTM A153
1. For Brick Veneer at CFS: Provide adjustable veneer anchors consisting of 14 gage, ASTM A580, stainless steel screw-on backplates and holes at top and bottom with legs in length as required to accommodate insulation thickness as shown on drawings and specified in Section 07 2100 - Building Insulation. Also provide polymer-coated screws and stainless steel ties/pintles of 3/16" diameter, with pintle length as required. Product/manufacturer; one of the following:  
213 with 282; Heckman Building Products, Inc.  
HB-213 with 2X Hook; Hohmann & Barnard, Inc.  
2401 (RJ-711) with 242 Hook; Wire-Bond (Masonry Reinforcing Corp. of America)
  2. For Brick Veneer at CMU: Provide adjustable veneer anchors consisting of 14 gage, ASTM A580, stainless steel screw-on backplates and holes at top and bottom with legs in length as required to accommodate insulation thickness as shown on drawings and specified in SECTION 07 2100 - BUILDING INSULATION. Also provide polymer-coated Tapcon screws and stainless steel ties/pintles of 3/16" diameter, with pintle length as required. Product/manufacturer; one of the following:  
213 with 282; Heckman Building Products, Inc.  
HB-213 with 2X Hook; Hohmann & Barnard, Inc.  
2401 (RJ-711) with 242 Hook; Wire-Bond (Masonry Reinforcing Corp. of America)
  3. Wall Ties at ICF: Provide hot-dip galvanized at interior conditions and Type 304 stainless at exterior conditions. Product/manufacturer, or approved equivalent:  
Thermal Concrete 2-Seal Wing Nut Anchor w/ 2X Hook; Hohmann & Barnard, Inc.  
Contractor Option at Interior Locations Only:  
Blok-Lok ICF Masonry Anchor (through-form) with Flex-O-Lok tie; Hohmann & Barnard, Inc.
  4. For solid masonry, ties shall be 16 gage hot dip galvanized corrugated steel straps 7/8" wide x 7" long.
  5. For glazed facing tile, ties shall be 10 gage hot dip galvanized steel wire loops or 18 gage galvanized corrugated steel straps.

- B. Triangular Ties and Column Anchors: ASTM A 82 hot dip galvanized steel wire, 3/16" diameter ties and 1/4" diameter anchors, for tying masonry walls to steel columns.
- C. Dovetail Anchors: 16 gage hot dip galvanized corrugated steel ties 1" wide x 4 1/2" long.
- D. Joint Reinforcement at Single-wythe Concrete Masonry Unit: Provide ladder type with continuous 9 gage ladder side and cross rods spaced not more than 16" o.c. and welded, unless smaller spacing is shown on the drawings. Product/manufacture; one of the following:
  - #220 Ladder-Mesh; Hohmann & Barnard, Inc.
  - Series 200 Ladder Mesh; Wire-Bond
  1. Finish shall be Class 1 mill galvanized.
  2. Corners and tees shall be prefabricated.
- E. Wall Ties for CMU Veneer at CMU Backup: Provide adjustable veneer anchors consisting of 14 gage, ASTM A580, stainless steel screw-on backplates and holes at top and bottom with legs in length as required to accommodate insulation thickness as shown on drawings and specified in SECTION 07 2100 - BUILDING INSULATION. Also provide polymer-coated screws and stainless steel ties/pintles of 3/16" diameter, with pintle length as required. Product/manufacture; one of the following:
  - 213 with 282; Heckman Building Products, Inc.
  - HB-213 with 2X Hook; Hohmann & Barnard, Inc.
  - 2401 (RJ-711) with 242 Hook; Wire-Bond (Masonry Reinforcing Corp. of America)
- A. Joint Reinforcement at Multi-wythe Concrete Masonry Unit: Provide ladder type with continuous 9 gage side and cross rods spaced not more than 16" o.c. and welded, unless smaller spacing is shown on the drawings. Product/manufacture; one of the following:
  - #270-2X Ladder Eye-Wire; Hohmann & Barnard, Inc.
  - Series 800 Ladder; Wire-Bond
  1. Finish shall be hot-dip galvanized.
  2. Corners and tees shall be prefabricated.
- B. Joint Reinforcement for Masonry Veneer Not Laid in Running Bond: Provide ASTM A580, single 9 gage diameter (W1.7) AISI Type 304 stainless steel continuous wire with rigid polyvinyl chloride seismic clip connector attached to masonry veneer wall tie/pintle. Provide seismic clip connector as manufactured by the following manufacturer or approved equivalent:
  - "Seismiclip Interlock System" #187; Hohmann & Barnard, Inc.
- C. Reinforcing Steel: ASTM A 615, Grade 60, deformed billet steel.

### 2.3 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C 150, domestic manufacture.
  1. Provide white Portland cement for colored mortar and mortar used in laying glazed structural facing tile and glazed brick.
  2. Provide natural Portland cement for other masonry.
- B. Lime: ASTM C 207, Type S, with not more than 8% unhydrated oxides.
- C. Aggregate for Mortar; Sand: ASTM C 144, well-graded natural sand. Provide white or light color sand for colored mortar and white mortar.
- D. Aggregate for Grout: ASTM C 404.
- E. Coloring Pigment: Custom blended mortar color(s) as selected by Architect to match existing mortar color. Provide coloring pigment as manufactured by Lambert Southwest, Inc., (phone 903.657.4680 web site: [www.lambertsw.com](http://www.lambertsw.com)) or Solomon Colors (phone 800.624.0261 web site [www.solomoncolors.com](http://www.solomoncolors.com)).
- F. Water: Clean and free of deleterious amounts of acids, alkalis, or organic materials.
- G. Water-repellent Admixture: Provide same integral liquid polymeric water repellent admixture used in split-faced and burnished concrete masonry units for mortar used in laying split-faced and burnished concrete masonry units.

## 2.4 MORTAR; FIELD PREPARED

- A. Mix proportions: ASTM C 270, mortar proportions by volume:
1. Type N Mortar - Exterior and Interior at masonry veneer construction:
    - 1 part Portland cement
    - 1 part lime
    - 6 parts sandColoring Pigment: Add coloring pigment at manufacturer's recommended rate to obtain custom blended colors as selected by Architect. No mortar color is required at concealed or painted masonry.
  2. Type M Mortar - Exterior masonry veneer construction below grade or in contact with earth:
    - 1 part Portland cement
    - 1/4 part lime
    - 3-3/4 parts sand
  3. Type S Mortar - Exterior and Interior at load-bearing and non-load-bearing concrete masonry unit walls:
    - 1 part Portland cement
    - 1/2 part lime
    - 4-1/2 parts sandColoring Pigment: Add coloring pigment at manufacturer's recommended rate to obtain custom blended colors as selected by Architect. No mortar color is required at concealed or painted masonry.
  4. Bedding Mortar:
    - 1 part Portland cement
    - 1/7 part lime
    - 3 parts sand
- B. Mixing:
1. All dry material shall be accurately measured in a leak-proof batching box. Contractor shall have the option of using a pre-manufactured cubic foot batching box or fabricating a wood box for measuring dry materials by volume. Box may be a convenient size, but shall be not less than 12" x 12" x 12" inside dimensions. The use of shovels for measuring dry materials is strictly prohibited.
  2. Proportion mortar accurately and mix thoroughly with the maximum amount of water to produce a workable consistency for at least 5 minutes in a mechanical batch mixer. Keep tools and mixing equipment clean.
  3. Do not use mortar which has begun to set, or if more than 2½ hours have elapsed since initial mixing. Do not re-temper mortar.
  4. Mortar for Split-face, Smooth-face, and Burnished Concrete Masonry Units: Add water repellent admixture at manufacturer's recommended rates to ensure mortar will be permanently water repellent.
- C. Use: Lay exterior and interior masonry veneer construction using Type N mortar. Lay exterior masonry veneer below grade or in contact with earth using Type M mortar. Lay exterior and interior load-bearing masonry using Type S mortar. Where required use bedding mortar to set and fill hollow metal frames.
- D. Masonry cement is not acceptable for mortar.
- E. Do not use calcium chloride in mortar.
- F. Pre-mix, dry or wet, is not acceptable for mortar, except as listed below; i.e. no other pre-mix mortars are acceptable.

## 2.5 GROUT; FIELD PREPARED

- A. Grout shall conform to ASTM C 476. Provide grout for bond beams, masonry lintels, and reinforced masonry.
1. Fine Grout Proportions:
    - 1 part Portland cement
    - 1/10 part lime
    - 3 parts fine aggregate
  2. Coarse Grout Proportions:
    - 1 part Portland cement
    - 1/10 part lime
    - 3 parts fine aggregate
    - 2 parts coarse aggregate
- B. When placing grout in masonry, exercise extreme care to prevent grout from staining face of masonry.

## 2.6 BRICK CLEANERS AND SEALERS

- A. Use "Sure-Klean Vana Trol" as manufactured by ProSoCo, Inc., or an approved equivalent inorganic commercial masonry surface cleaner. "Sure Klean 600" may be used at concrete masonry units which are not adjacent to colored mortar and concrete masonry units which are scheduled to be painted.

## 2.7 ACCESSORIES

- A. Control Joints: Preformed rubber material; RS Series Rubber Control Joint as manufactured by Hohmann & Barnard, Inc. or comparable products by Heckman. Width slightly less than wall thickness to allow for sealant material.
- B. Cellular Plastic Weeps:
  - 1. One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of head joint and depth 1/8" less than depth of outer wythe.
  - 2. Color shall be selected by Architect from full range of color samples.
  - 3. Product/manufacturer; one of the following:
    - Mortar Maze weep vent; Advanced Building Products Inc.
    - No. 85 Cell Vent; Heckmann Building Products Inc.
    - Quadro-Vent; Hohmann & Barnard, Inc.
    - Cell Vent; Wire-Bond
- C. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the cavity. Provide strips, full-depth of cavity, 10 inches high, with dovetail shaped notches 7 inches deep that prevent mesh from being clogged with mortar droppings. Product/manufacturer; Mortar Net™ with Insect Barrier, Mortar Net USA, Ltd. (phone 800.664.6638 web site: [www.mortarnet.com](http://www.mortarnet.com)).
  - 1. 0.4" thick Mortar Net between back of brick and steel lintels, cut down to required height.
  - 2. Provide single thickness 2" material at 1-3/4" to 2-1/4" wide masonry cavities.
- D. Cavity Drainage Material: Free-draining nonabsorbent polymer mesh, made from 100% recycled plastic products. Product/manufacturer; CavClear Masonry Mat (phone 888.436.2620 web site: [www.cavclear.com](http://www.cavclear.com)).
- E. Provide "BlockFlash" as manufactured by Mortar Net USA, Ltd. CMU cell flashing pans with built-in adjoining bridge made from recycled polypropylene with chemical stabilizers that prevent UV degradation. Flashing pans have a sloped design to direct moisture to the integrated weep spout. Designed to be built into mortar bed joints to expel moisture (unimpeded by mortar droppings) to the exterior of CMU walls.
- F. Rebar Positioners: Size and type required to accurately place reinforcing steel in bond beams, concrete masonry unit lintels, and vertically in walls.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Wetting of Face Brick:
  - 1. Draw a 1" circle with wax crayon on the bed surface of dry brick. Using medicine dropper, place 20 drops of water inside circle and measure time required for absorption of water.
  - 2. If water is absorbed in less than 1-1/2 minutes, brick must be wet before being laid.
  - 3. Brick shall have no visible moisture when laid.
- B. Cleaning: Beams, slabs, and lintels on which masonry walls and partitions are to be laid shall be brushed thoroughly to remove loose dirt and laitance.

## 3.2 INSTALLATION

- A. Installation Tolerances:
1. Maximum Variation from Plumb:
    - a. Vertical lines and surfaces of columns and walls:
      - 1) 1/4" in 10'-0".
      - 2) 3/8" in any story or 20'-0" maximum.
      - 3) 1/2" in 40'-0".
    - b. External Corners or Control Joints:
      - 1) 1/4" in any one story or 20'-0" maximum.
      - 2) 1/2" in 40'-0".
  2. Maximum Variation from Unit to Adjacent Unit: 1/32" maximum. Maximum variation is mandatory on walls where only one surface is exposed. Where two surfaces are exposed to view, the more prominent face, per Architect, is to have maximum variation maintained, with the less prominent face allowed to exceed the maximum tolerance.
  3. Maximum Variation from Level or Grades for Exposed Lintels, Sill, Parapets, or Horizontal Grooves:
    - a. 1/4" in any bay or 20'-0" maximum.
    - b. 1/2" in 40'-0".
  4. Maximum Variation from Plan Location or Linear Building Line or Related Portions of Columns, Walls, and Partitions:
    - a. 1/2" in any bay or 20'-0" maximum.
    - b. 3/4" in 40'-0".
  5. Maximum Variation in Cross-sectional Dimension of Columns and Thickness of Walls:  $\pm 1/4$ .
  6. Maximum Variation in Mortar Joint Thickness:
    - a. Bed Joint:  $\pm 1/8$ ".
    - b. Head Joint:  $\pm 1/8$ ".
- B. Dimensions are based on modular units except for special details. If units other than modular units are used, there shall be no change in story heights or other main dimensions of partition centerlines, and connecting work shall be adjusted to changes in unit sizes.
- C. Laying Brick: Lay brick level, plumb, straight, and true to line within tolerances specified above. Spread the mortar bed full width and relatively smooth. Do not furrow. Butter the end of each brick with mortar and shove into place to completely fill the head joint. Do not feather the brick with excess mortar cut from the bed.
1. At concrete foundations and beams, install bond breaker between first course of brick veneer and concrete bearing. Gaskets at bottom of cavity walls shall not be used as bond breakers unless gasket occurs under the first course of brick.
  2. Cut masonry units with motor-driven saw designed to cut masonry with clean, sharp, unchipped edges. Cut units to provide patterns shown and to fit adjoining work neatly. Use full units without cutting wherever possible. Remove cut misfits and replace with properly cut units.
  3. Lay brick with special coursing and jointing as detailed. Lay rowlock and soldier courses with uniform joints approximately 3/8" wide. Use uncured brick for the exposed ends of such courses and wherever the holes would be exposed.
  4. When laying walls, keep the air space free and clear of mortar droppings and debris.
  5. Unless shown otherwise, provide vertical control joints every 40'.
  6. Refer to Expansion Joint Paragraph for Expansion Joints (Control Joints).
- D. Laying Concrete Masonry Units: Spread mortar beds smooth and full to cover bearing areas. Do not furrow. Butter head joints and shove units into place. Head joints shall be staggered except where stack bond is specifically indicated. Make back joints full against the backing materials as each course is laid.
1. Leave pipe spaces open on one full side until pipe work has been completed and inspected.
  2. Lay concrete masonry walls and partitions level, plumb, straight, and true to line within tolerances specified above.
  3. Fill the cells of exposed concrete masonry units with grout for a width of 8" at the jambs of openings in exterior walls.
  4. Exposed ends of units at external corners shall be solid.
  5. Units shown to be laid in stack bond shall be laid with such accuracy that a plumb line centered on a vertical joint in an upper course will be entirely within the width of the corresponding vertical joint in every lower course.
  6. Unless shown otherwise, provide vertical control joints every 40'.
  7. At sound absorbing concrete masonry units, provide slip-set stabilizer at 16" o.c., vertically,
  8. Maximum pour of grout in vertical cells shall be limited to 5'-0" unless cleanouts are provided at each cell.

- E. Reinforcing Masonry Joints: Reinforce the bed joints of concrete masonry unit walls and partitions with continuous joint reinforcement strips.
1. Furnish strips in long lengths. Width of strips shall be 2" less than nominal overall width of the wall or partition.
  2. Lap strip ends 12" and bed side rods in mortar for complete cover and bond.
  3. Install strips in bed joints spaced 16" o.c. for exterior walls and 24" o.c. for interior partitions, unless a smaller spacing is shown in the drawings. Reinforcement shall extend into and bond the facing wythe in walls. Reinforcement shall not occur in the same joint course as the masonry veneer anchors.
  4. Install strips in bed joints of concrete masonry unit veneer spaced 16" o.c. vertically.
  5. At concrete masonry unit veneer, discontinue horizontal joint reinforcement across control joints and reinforcement shall not occur in the same joint course as the masonry veneer anchors.
  6. At exterior masonry walls, discontinue horizontal joint reinforcement across control joints.
  7. At interior masonry walls and intersection of interior/exterior masonry walls, continue horizontal joint reinforcement across control joints.
- F. Reinforcing Masonry Joints at Masonry Veneer Not Laid in Running Bond: Reinforce the bed joints of masonry veneer with continuous wire reinforcement.
1. Install entire length of longitudinal wire in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.
  2. Connect seismic clip to every masonry veneer wall tie/pintel and to the continuous wire reinforcement.
  3. Space reinforcement not more than 18 inches o.c. vertically.
  4. Extend reinforcement a minimum of 8" into adjacent running bond masonry veneer.
  5. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.
  6. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, column fireproofing, pipe enclosures, and other special conditions.
- G. Bonding: Tie together masonry unit construction within walls and at intersections of walls by masonry bond and staggered vertical joints. Toothing will not be permitted except where specifically authorized by the Architect. Where walls must be built in advance of adjacent walls, form the stop-off by racking back.
1. Lay brick facing wythe in standard running bond with staggered head joints except where special coursing is indicated. Tie multiple wythe construction together with horizontal joint reinforcement and tab ties.
  2. Where bond with joint reinforcement cannot be made, use wall ties spaced not more than 16" o.c. horizontally and vertically. Ties shall be laid in the joints, not shoved into wet mortar after setting the next course of masonry.
  3. Tie brick veneer back to steel stud curtain walls and concrete unit masonry with metal ties spaced 16" o.c. horizontally and 16" o.c. vertically. Around the perimeter of openings, edges, and tops and bottoms of walls, additional ties/anchors shall be installed at a maximum of 3 ft. o.c. within 12" of the opening. Secure ties through the sheathing to the studs with two screws and insert ties.
    - a. Secure wall tie backplates with fasteners that are wet-set with sealant compatible with the air- and water-resistant barrier system.
  4. Tie masonry to structural steel columns by welding anchors to columns at 16" o.c. and inserting triangular ties. Ties shall be of the size required to extend a minimum of 1-1/2" into brick veneer, with a minimum mortar cover of 5/8" to the outside face of the veneer.
  5. Where concrete is faced more than 12" high with masonry, bond masonry to concrete with anchors set into dovetail anchor slots cast into the concrete. Provide the anchors. Spacing shall be as specified above for wall ties.
  6. Bond interior masonry walls and the intersection of interior/exterior masonry walls by forming control joints and reinforce with horizontal reinforcing at 16" o.c.
  7. Partitions between rooms without suspended ceilings, and 4" thick partitions with an unsupported length of more than 12 ft. shall be extended to the floor or roof above and wedged and sealed against it. Extend other partitions above the highest adjacent ceiling, unless indicated to extend up to floor or roof above.
- H. Joints shall be 3/8" wide. Joints shall be straight and uniform.
1. Tool and work exposed joints to a hard, dense surface with a sled runner and leave without shrinkage cracks. Delay tooling until the mortar has set thumbprint hard. Tool the joints in masonry walls behind chalkboards and tackboards.
  2. Rake out the joints to be caulked and keep them free of mortar as the work progresses.
  3. Provide control joints at inside corners with backer rod and sealant.
  4. Mortar color changes: Location of mortar color changes in relation to masonry color changes shall be as directed by Architect. Contractor shall rake and point mortar joints or otherwise alter standard masonry procedures to satisfy this requirement.

- I. Masonry Bearings: Provide bearings of common brick under framing members which bear on masonry walls unless the members bear directly on concrete-filled bond beams.
- J. Chases: Form chases and recesses to the required dimensions and lines, strike joints flush and remove excess mortar. Before closing chases and similar inaccessible spaces with masonry, remove rubbish and sweep out the area.
- K. Lintels and Beams: Provide lintels and beams for openings in masonry walls. This includes lintels at masonry openings for ducts. Verify duct layouts on the mechanical drawings.
  - 1. Reinforced Masonry Lintels: Construct and reinforce masonry lintels where shown.
    - a. Make concrete masonry lintel units of the same material and by the same process as the other concrete masonry units used in the building.
    - b. Use trough-type units, not regular units with the web knocked out. Fill the troughs with grout.
    - c. Build lintels in place where possible and cure at least 14 days before subjecting them to load. Provide at least 8" bearing at each jamb.
    - d. Where reinforcing is not specifically called out for masonry lintels, use not less than a #4 bar top and bottom of 8" high masonry units for each 4" thickness of wall.
  - 2. Bond Beams: Provide bond beams in masonry walls. Bond beams shall be continuous where possible. Provide rebar positioners to accurately position reinforcing steel.
  - 3. Steel Lintels: Build steel lintels into the masonry walls. Where reinforcing or steel shapes are not specifically called out for lintels in brick walls, use one steel angle for each 4" thickness of brick in the wall.
- L. Flashing:
  - 1. Build in flashings which enter the masonry, using the materials and following the instructions of the pertinent sections of the specifications.
  - 2. Create end dams at ends of window heads, at edges of storefronts, and other vertical elements to channel water to nearest weep hole away from window mullions and other items which might allow water to travel vertically.
- M. Weeps: Install weep holes in veneer at 24" o.c. horizontally for clay masonry and 32" o.c. for 16" long concrete masonry, above through-wall flashing, above shelf angles, and at top and bottom of walls. Install plastic weeps in strict accordance with manufacturer's written instructions and recommendations.
- N. Cavity Drainage Material: Install cavity drainage material in cavities to comply with manufacturer's written instructions and recommendations. Provide single thickness 2" material at 1-3/4" to 2" wide masonry cavities. Provide one or more thicknesses as required to fill cavity width at other conditions. Install cavity drainage material with fabric facing to the exterior of the wall.
- O. Expansion Joints (Control Joints):
  - 1. At exterior masonry walls, discontinue horizontal joint reinforcement across control joints.
  - 2. At concrete masonry unit veneer, discontinue horizontal joint reinforcement across control.
  - 3. Provide resilient continuous lengths of control joint material in concrete masonry unit sash blocks. Solvent weld butt and corner joints, in accordance with manufacturer's instructions.
  - 4. Size control joints in accordance with SECTION 07 92 00 - JOINT SEALANTS, for sealant performance, but in no case larger than adjacent mortar joints in exposed face brick.
  - 5. Reference SECTION 07 95 00 - EXPANSION CONTROL for Preformed, Foam Joint Seals PJS-1.
  - 6. Interior control joints are not required to align with exterior control joints.
  - 7. Provide vertical expansion joints in masonry (concrete masonry unit and brick), as follows:
    - a. Where shown on drawings.
    - b. Horizontal expanse:
      - 1) Brick:
        - a) 25'-0" max. spacing at walls without openings. Spacing includes the sum of the distance around outside corners.
        - b) 20'-0" max. spacing at walls with openings. Spacing includes the sum of the distance around outside corners.
      - 2) Concrete Masonry Units: Not to exceed a length to height ratio of 1-1/2 : 1 or 25 ft., whichever is less.
    - c. Within 2'-0" of outside corners.
    - d. At all inside corners.
    - e. Change of substrate including but not limited to the following:
      - 1) Concrete masonry unit to metal stud back-up.
      - 2) In masonry wall at intersection of concrete beam supported masonry and structural steel supported masonry.
    - f. As recommended by referenced standards.



8. Control joints shall extend continuous through bond beam although concrete and reinforcement for bond beam shall extend continuous through control joint.
- P. Built-in Work:
  1. As work progresses, build-in metal door frames, fabricated metal frames, window frames, wood nailing strips, anchor bolts, plates, and other items to be built in the work supplied by other sections.
  2. Build-in items plumb and level.
  3. Bed anchors of metal door and glazed frames in mortar joints. Fill frame voids solid with mortar. Fill masonry cores with mortar minimum 8" from framed openings.
  4. Do not build-in organic materials subject to deterioration.
- Q. Cutting and Fitting:
  1. Cut and fit for chases, pipes, conduit, sleeves, and grounds. Cooperate with other sections of work to provide correct size, shape, and location.
  2. Obtain approval prior to cutting or fitting an area not indicated or where appearance or strength of masonry work may be impaired.
- R. Miscellaneous Work:
  1. Cooperate with other trades in installing their work in masonry. Furnish bedding mortar and set loose lintels. Cooperate in setting bucks and frames, maintain them in position and build them in with anchors properly placed. Do not distort frames by crowding.
  2. Cut and form openings for recessed items and for electrical and plumbing installations so that wall plates and escutcheons will completely cover the openings. Cut edges shall be clean, sharp and straight.
  3. Fill solid with mortar the spaces around and behind metal door frames.
  4. Point with mortar the openings around flush-mounted electrical outlet boxes.
- S. Curing: In dry weather, masonry exposed to wind and sun shall be wet with a fine water spray several times each day for at least 6 days, starting as soon as the mortar has set sufficiently to resist erosion.
- T. Building Expansion Joints: Discontinue horizontal joint reinforcement across building expansion joints.
- U. Non-load-bearing Concrete Masonry Unit Partitions: Partitions which extend up to structure above for fire, acoustical, or security reasons, shall terminate within 2" of structural deck, joists or beams to allow for deflection. Fill 2" gap with sealant and fire safing to achieve proper rating.

### 3.3 PROTECTION

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
- B. Maintain protective boards at exposed external corners which may be damaged by construction activities.
- C. Provide protection without damaging completed work.
- D. At the end of each day's work, cover the tops of masonry walls, window sills and jambs, door jambs, and other unfinished exposed cavity wall opening with plastic sheeting or other suitable material. Cover shall extend a minimum of 2' down both sides of walls and shall be held securely in place with Hohmann & Barnard, Inc. Masonry Wall Clamp No. HB3000.
- E. Keep expansion joint voids clear of mortar.

### 3.4 POINT AND CLEAN

- A. Pointing: Upon completion of the masonry work, fill and neatly point line nail holes and other defects. Remove mortar droppings from projecting surfaces.

- B. Cleaning:
  - 1. Clean face brick with a commercial cleaner. Test the cleaner on an inconspicuous area of face brick to insure that it performs as intended without leaving scum or residue. Before the solution is applied, soak the brick surface with clean water. Apply the cleaner in accordance with the manufacturer's instructions and rinse the surface thoroughly with clean water to remove traces of the cleaner. Protect metal and concrete surfaces from contact with the cleaner.
  - 2. Clean glazed facing tile with brushes and clean water. Use no acids or abrasives.
  - 3. Clean exposed concrete masonry units by dry brushing at the end of each day's work and after final pointing to remove mortar spots and droppings.
  
- C. Cleaning Existing Exterior Masonry:
  - 1. Where existing masonry is scheduled to be cleaned, use high pressure water cleaning equipment with nozzle pressures between 400 psi and 700 psi and a flow rate of 3 to 8 gallons per minute.
  - 2. Select and test recommended cleaning solution on a sample area.
  - 3. Protect metal, glass, and wood by masking or other methods, as approved by Architect.
  - 4. Presoak or saturate area to be cleaned by flushing with clean water from the top down.
  - 5. Apply cleaning solution to wall.
  - 6. Starting at the top of the wall, flush the wall down.
  - 7. Repeat process as required for proper cleaning.

### 3.5 FIELD QUALITY CONTROL

- A. General: Owner will employ services of an independent materials testing laboratory to perform specified inspections and testing.
  
- B. Coordinate with Owner's testing laboratory to provide PERIODIC inspection of the following tasks:
  - 1. As masonry construction begins, and every 5000 sq. ft. during construction, the following shall be verified to ensure compliance:
    - a. Proportions of site prepared mortar.
    - b. Construction of mortar joints.
    - c. Location of reinforcement and connectors.
  - 2. During construction, the inspection program shall verify:
    - a. Size and location of structural elements.
    - b. Type, size, and location of anchors, including other details of anchorage of masonry to structural members, frames, or other construction.
    - c. Specified size, grade, and type of reinforcement and anchor bolts.
    - d. Protection of masonry during cold weather (temperature below 40°F.) or hot weather (temperature above 90°F.).
  
- C. Coordinate with Owner's testing laboratory to provide CONTINUOUS inspection of the following tasks:
  - 1. Prior to grouting at masonry walls shown on the Structural Drawings, the following shall be continuously verified to ensure compliance:
    - a. Grout space is clean.
    - b. Placement of reinforcement and connectors.
    - c. Proportions of site-prepared grout.
    - d. Construction of mortar joints.
    - e. Grout placement shall be verified to ensure compliance with code and construction document provisions.

END OF SECTION

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SECTION 04 72 00

CAST STONE MASONRY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
  - 1. Labor, materials and equipment to provide the cast stone as indicated on the drawings and specified herein.
  - 2. The manufacturer shall furnish and deliver all cast stone covered by this specification.
  - 3. Contractor shall unload, store and set all cast stone covered by this specification and shall provide and install all anchors for same.
- B. Related Sections:
  - 1. Section 04 20 00 - Masonry Units.
  - 2. Section 07 92 00 - Joint Sealants.

1.2 SUBMITTALS

- A. General: Submit in accordance with SECTION 01 33 23 - SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Samples:
  - 1. Initial Selection:
    - a. Submit samples for color selection by Architect.
    - b. Submit samples for colored mortar, showing the full range of colors available.
  - 2. Following color selection by Architect, re-submit 3 samples approximately 8" x 8", finished to show the variation in color and texture which will occur in the material delivered to the project site.
- C. Product data:
  - 1. Provide construction details, material descriptions, dimensions of individual components and profiles, and finishes for cast stone units.
  - 2. Test results of cast stone stone previously made by the manufacturer.
  - 3. Qualification Data: Provide lists of completed projects with project names and addresses, names and address of architects and owners, and other information necessary.
- D. Shop Drawings:
  - 1. Drawings shall show the sizes, profiles, cross-sections, and dimensions of stone, the arrangement of joints, bonding, connections to adjoining walls or materials, anchoring methods, anchors, reinforcing, method of installation and anchoring.
  - 2. Provide suitable wash on all exterior sills, copings, projecting courses and pieces with exposed top surfaces.
  - 3. Window sills, when provided, shall have raised fillets at the back.
  - 4. All projecting pieces and soffit stones shall have drips under the outer edge.
  - 5. The shop drawings shall show the setting mark of each stone and its location on the structure. The stone when delivered shall bear the same corresponding setting mark on an unexposed surface.

1.3 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
  - 1. Firm with not less than five years of continuous operation, having successful experience, adequate facilities, and capacity to furnish the quality, sizes, and quantity of cast stone required without delaying the progress of work.
  - 2. Manufacturer shall be responsible for reinforcement and anchorage design.
  - 3. Firm shall be a current producer member of the Cast Stone Institute.
- B. The average water absorption of cast stone shall not exceed 6% by dry weight when tested in accordance with the requirements of ASTM C 642 or ASTM C 1195.

#### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. All cast stone shall be carefully loaded and packed for transportation exercising customary and reasonable precaution against damage while in transit.
- B. All cast stone shall be received and unloaded at the project site by competent workmen with the necessary care and handling to avoid damage and soiling.
- C. Cast stone units delivered to the site shall be inspected for damage, unloaded, and stored with a minimum of handling. Damaged stone will be rejected and shall be removed from the project site.
- D. Protect cast stone during storage and construction against wetting, soiling, staining, and damage.
- E. The cast stone material shall be stored clear of the ground on non-staining planking or pallets in such a manner as to be protected from damage while in storage. Should cast stone be stored for an extended period, cover with polyethylene or other non-staining waterproof material.

#### 1.5 PROJECT CONDITIONS

- A. Environmental Requirements: No stone shall be set when freezing weather is expected.

### PART 2 - PRODUCTS

#### 2.1 ACCEPTABLE MANUFACTURERS

- A. Provide cast stone units as manufactured by one of the following:
  - Advanced Architectural Stone; Fort Worth, Texas
  - CSCS/Stone Legends; Dallas, Texas
  - Dallas Cast Stone, Inc.; Dallas, Texas

#### 2.2 CAST STONE MATERIALS

- A. Raw Materials:
  - 1. Portland Cement: ASTM C 150, Type I or Type III, white, domestic manufacture.
  - 2. Fine Aggregate: Carefully graded and washed natural sands, or manufactured granite, quartz or limestone sands meeting ASTM C 33 except that gradation may vary to achieve desired finish and texture.
  - 3. Coarse Aggregate: Carefully graded and washed natural gravels, or crushed, graded stone such as granite, quartz, limestone or other durable stone meeting ASTM C 33 except that gradation may vary to achieve desired finish and texture.
  - 4. Color and Finish:
    - a. Color shall be as selected by Architect.
    - b. Coloring Agent: Inorganic (natural or synthetic) iron oxide pigments complying with ASTM C 979, excluding the use of a cement grade of carbon black pigment, and shall be guaranteed by the pigment manufacturer to be non-fading and limeproof. The amount of pigment shall not exceed 10% by weight of the cement used.
    - c. The samples shall be approved by the Architect before the manufacturer shall be permitted to proceed with the work.
    - d. Match sample on file in Architect's office. Color and texture of cast stone shall be generally equal to the approved sample when viewed in direct daylight at a 10-foot distance.
    - e. Exposed surfaces, unless shown otherwise, shall exhibit a fine grained texture similar to natural stone. No bug holes or air voids will be permitted.
    - f. Variation: Must match color and finish of approved sample subjected to similar aging and weathering conditions when viewed in direct daylight at a 10 foot distance.
  - 5. Admixtures - ASTM C 494.
  - 6. Water: Clean, potable and free of deleterious amounts of acids, alkalies, or organic materials.

- B. Physical Properties:
  - 1. Cast stone shall have a minimum compressive strength of 6,500 psi at 28 days when tested in accordance with ASTM C 1194.
  - 2. Multiply requirements of field cut or core drilled specimens by 80% to determine minimum compressive strength requirements.
- C. Curing and Finishing:
  - 1. Cure units in a warm, moist curing chamber at 95% relative humidity for 24 hours, or yard cure for 350 degree-days (i.e. 7 days @ 50°F. or 5 days @ 70°F.) prior to shipment.
  - 2. Acid-etch exposed surfaces to remove cement film prior to packaging for shipment.

### 2.3 REINFORCING AND ANCHORS

- A. Reinforcing Bars: ASTM A 615, Grade 60. Bars shall be hot-dipped zinc coated after fabrication in accordance with ASTM A 123.
- B. Reinforcing Mesh: ASTM A 185, No. 3 gage zinc-coated wire rods electrically welded on 4" centers each way.
- C. Anchors, inserts, and dowels shall be corrosive resistant, galvanized, brass or stainless steel Type 304.
- D. Cast stone panels shall be reinforced as may be required for handling, and to allow for temperature changes and structural stress.
- E. There shall be a minimum steel reinforcement amounting to ¼ percent of the cross-section area of the panel and should the panel be greater than 12" in any sectional dimension, the temperature steel shall be placed in both directions.
- F. Reinforcement shall be galvanized or epoxy coating when covered with less than 1-1/2" of material.

### 2.4 MORTAR MATERIALS

- A. Portland Cement: ASTM C 150, white, domestic manufacture.
- B. Lime: ASTM C 207, Type S.
- C. Sand: ASTM C 144, clean, washed, masonry natural sand.
- D. Color: ASTM C979, Non-fading, iron oxide, limeproof pigment to produce mortar custom color as selected by Architect to match cast stone. The Architect shall approve the actual color sample of mortar before proceeding with grouting or pointing.
- E. Water: Clean and free of deleterious amounts of acids, alkalies, or organic materials.

### 2.5 MORTAR MIXES

- A. Setting Mortar: Proportions by volume:
  - 1 part Portland cement
  - 1 part lime
  - 6 parts white silica sand
- B. Pointing Mortar: Proportions by volume:
  - 1 part Portland cement
  - 1 part lime
  - 6 parts white silica sand
- C. Coloring agent as required to provide consistent custom color.

## 2.6 FABRICATION

- A. General: Cast stone shall be Type I complying with ASTM C 1364, color as selected by Architect. Cast units shall be free from defects such as cracks, loose aggregate, broken edges, and marred finish surfaces which may affect appearance or serviceability. All units shall be equal in color and surface texture to approved samples.
- B. The manufacturer shall be responsible to design a mix which achieves both the strength and the surface finish desired.
- C. The average water absorption of cast stone shall not exceed 6% by dry weight when tested in accordance with the requirements of this specification.
- D. All casting shall be done in accurate molds designed to withstand high frequency vibration. Steel reinforcement units shall be accurately placed. Vibration shall be continuous during the casting process until full specified thickness is reached and all excess water brought to the surface.
- E. Curing: No cast stone shall be shipped to the project site until after it has been properly cured at the manufacturer's plant as specified.
- F. Fabrication Tolerances: Comply with Cast Stone Institute Technical Manual (current edition).
  - 1. Height and Width: Plus 1/16", minus 1/8"
  - 2. Length:
    - a. Up to 2'-0": Plus 1/16", minus 1/8"
    - b. 2'-0" to 5'-0": Plus 1/8", minus 1/8"
    - c. 5'-0" to 10'-0": Plus 1/8", minus 3/16"
  - 3. Setting tolerances: Plus or minus 1/8" allowable out of plane from adjacent unit.
  - 4. Joints: +1/16", -1/8".

## PART 3 - EXECUTION

### 3.1 JOINTING

- A. Joint Size:
  - 1. At stone/brick joints - 3/8".
  - 2. At stone/stone joints in vertical position - 1/4"
  - 3. Stone/stone joints exposed on top side - 3/8".
- B. Joint Material:
  - 1. Use a full bed of mortar at all bed joints.
  - 2. Sealant: Head joints in copings, and joints at column covers, cornices, platforms, soffits, window sills, and in general, all stone sections with projecting profiles, exposed top joints or rigid suspension connections to the supporting structure should be set with unfilled joints. After setting, prime the ends of stones, insert properly sized foam back-up rod to proper depth, and gun-in sealant.
  - 3. Mortar: Masonry-bound trim such as belt courses, lintels, window surrounds, date stones, inscription blocks, quoins, keystones, similar applications, and vertical joints shall be mortar joints.
  - 4. Rake all mortar joints 3/4" for either **pointing mortar or sealant as selected by Architect**.
- C. Location of joints:
  - 1. As shown on approved shop drawings.
  - 2. Unless otherwise shown, at control and expansion joints per plan.

### 3.2 ERECTION

- A. Stone shall be clean. Before setting, sponge or drench with clean water.
- B. Set stone units level, square, and true with uniform mortar joints as specified.
- C. All cast stone shall be set by experienced masons, accurately and in accordance with the shop and setting drawings.
- D. Unless otherwise noted, every stone shall be set in a full bed of mortar.

- E. Reference "Joint Materials" paragraph in the "Jointing" Article above for direction on erection/installation at the different joint areas.
- F. All anchors and dowels shall be firmly placed and all anchor holes and dowel holes and similar holes filled completely with mortar or non-shrink grout.
- G. All anchors, dowels and other anchoring devices shall be furnished by the setting contractor as shown on approved shop drawings using, whenever possible, standard building stone anchors commercially available in a non-corrosive material such as galvanized steel, brass or Type 304 stainless steel.
- H. When setting with mortar, all stones not thoroughly wet shall be drenched with clear water just prior to setting.
- I. After each stone has been set, all joints shall be raked to a depth of 3/4" from the face for pointing. The face of each stone shall then be sponged off to remove any splashed mortar or mortar smears.
- J. Only the ends of lugged sills and similar stones shall be embedded in mortar. The balance of joint to be left open until pointing of stone work, than tuck points on face only to a depth of 3/4". Tuck point stone joints to a slight concave.
- K. All stone shall be protected from splashing mortar or damage by other trades.
- L. Form weep holes at the bottom of every vertical joint. Form weep holes with 1/4" oiled sash cord or plastic tubing and remove when the mortar has set.
- M. Installation tolerances shall be in accordance with requirements of SECTION 04 20 00 - MASONRY UNITS.

### 3.3 TESTING

- A. Testing shall be performed in accordance with ASTM C 31, ASTM C 39, ASTM C 642, and ASTM C 1194, except that 2" cube specimens shall be used, oven-dried in accordance with ASTM C 97.
- B. Test three specimens per 500 cubic feet at random from plant production in accordance with referenced standards.
- C. The results of compression tests shall be divided by a factor of 0.8 when saw-cut or core-drilled specimens are used.

### 3.4 PATCHING AND CLEANING

- A. The repair of chipped or damaged cast stone shall be done only by mechanics skilled in this class of work, with materials furnished by the manufacturer and according to this direction.
- B. Before pointing, the face of all cast stone shall be scrubbed with a fibre brush, using soap powder and water and shall then be thoroughly rinsed with clean running water. Any mortar on the face of the cast stone shall be removed. No acids or prepared cleaners shall be used without the approval of the cast stone manufacturer.

### 3.5 POINTING AND CAULKING

- A. When ready for pointing, the joints shall be dampened and carefully pointed to a slight concave unless otherwise specified by the Architect. No pointing shall be done in freezing weather nor in locations exposed to hot sun, unless properly protected. The Architect shall approve color of pointing mortar before proceeding with pointing.
- B. Head joints in copings and similar stones shall be caulked with a joint sealant used in accordance with the manufacturer's instructions.



### 3.6 INSPECTION AND ACCEPTANCE

- A. Applicable standards for inspection and quality control shall be ACI Committee 311 Manual of Concrete Inspection and PCI MNL-117 Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products.
- B. Cast stone shall show no obvious repairs or imperfections other than minimal color variations when viewed with the unaided eye at a 20 ft. distance in good typical daylight illumination.

### 3.7 PROTECTION

- A. Cast stone shall be protected after erection and until final cleaning by non-staining rosin sized paper or polyethylene film of not less than 4-mil thickness.
- B. Cast stone at entrances shall be protected until substantial completion is achieved.

END OF SECTION

SECTION 07 21 00

BUILDING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Thermal, acoustical, and fire safing building insulations.
- B. Related Sections:
  - 1. Section 04 20 00 - Masonry Units.
  - 2. Section 06 16 56 - Air- and Water-Resistive Sheathing Board System
  - 3. Section 07 27 26 - Fluid-Applied Membrane Air Barriers
  - 4. Section 07 65 00 - Flexible Flashing

1.2 SUBMITTALS

- A. General: Submit following items under provisions of SECTION 01 33 23 - SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Product Data: Including performance specifications, composition and applicable standards.
- C. Samples: Submit 12" x 12" size samples of each type insulation proposed for use.
- D. Manufacturer's Instructions: Written installation instructions, including attachment recommendations.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: (See Articles below for specific products)
  - CertainTeed Architectural
  - Dow Chemical Company
  - Johns Manville, A Berkshire Hathaway Co., Denver, CO
  - Knauf Insulation
  - Owens Corning, Toledo, OH
  - Rockwool
  - Thermafiber, Inc. (Owens Corning)
  - U.S. Gypsum Co.

2.2 BATT THERMAL INSULATION

- A. Glass fiber composition, unfaced, minimum one lb./c.f. density, meeting following standards:
  - 1. ASTM E 84: FHC 25/50 maximum.
  - 2. ASTM C 518: R value of 3.2 per inch of thickness.
  - 3. ASTM C 665: Type I and Type III, Class A.
- B. Following products are acceptable:
  - 1. Unfaced Thermal Batts by Owens Corning Fiberglas Corp.
  - 2. Unfaced Building Insulation by CertainTeed Architectural
  - 3. Unfaced Building Insulation by Johns Manville Corp.
  - 4. Unfaced EcoBatt Insulation by Knauf Insulation

2.3 MINERAL-WOOL BLANKET INSULATION

- A. Mineral-Wool Blanket Insulation, Unfaced: ASTM C665, Type I (blankets without membrane facing); consisting of fibers; passing ASTM E136 for combustion characteristics.
  - 1. Flame-Spread Index: Not more than 25 when tested in accordance with ASTM E84.
  - 2. Smoke-Developed Index: Not more than 50 when tested in accordance with ASTM E84.
  - 3. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches and wider in width.

- B. Following products are acceptable:
  - 1. TempControl Mineral Wool Batts; Johns Manville Corp.
  - 2. Thermafiber Ultrabatt Mineral Wool Insulation; Owens Corning
  - 3. Comfortbatt; Rockwool

#### 2.4 SEMI-RIGID INSULATION

- A. Continuous Insulation Basis of Design: Provide Thermafiber RainBarrier Insulation as manufactured by Owens Corning.
  - 1. Acceptable Products/Manufacturers:
    - JM CladStone 60 Water & Fire Block; Johns Manville
    - Thermafiber RainBarrier; Owens Corning
    - Cavityrock; Rockwool
  - 2. Description: Non-combustible, semi-rigid mineral wool insulation board that is water repellent and meets ASTM C 612, IA and IB; passing ASTM E136 for combustion characteristics.
  - 3. Thickness: As noted on contract drawings.
  - 4. Paint flat black behind joints at open joint panel assemblies.
  - 5. Type:
    - a. R-value of min. 4.3 per inch.
    - b. Facing: Unfaced.
    - c. Density: 6.0 pcf.
    - d. Surface Burning Characteristics: Unfaced-Flame Spread 0 and Smoke Developed 0
    - e. Moisture Resistance: Absorbs less than 0.03% by volume, ASTM C 1104.
    - f. Non-corrosive, ASTM C 665.
    - g. Recycled Content for Standard Mineral Wool Products.....70%

#### 2.5 BATT ACOUSTICAL INSULATION

- A. Unfaced glass fiber composition, 3½" thick, minimum one lb./c.f. density, meeting following standards:
  - 1. ASTM E 84: FHC 25/50 maximum.
  - 2. ASTM C 518: R value of 3.2 per inch of thickness.
  - 3. ASTM C 665: Type I, Class A.
- B. Following products are acceptable
  - 1. Sound Control Batts by CertainTeed Architectural
  - 2. EcoTouch Sonobatts by Owens Corning Insulating Systems, LLC
  - 3. Unfaced Building Insulation by Johns Manville Corp.
  - 4. EcoBatt Insulation by Knauf Insulation

#### 2.6 FIRE SAFING INSULATION

- A. Mineral fiber composition, 4" thick, 4.0 pcf density, meeting following standards
  - 1. ASTM E 84: FHC 15/10 maximum.
  - 2. ASTM C 665: Type I, Class A
  - 3. ASTM E 119: Testing Procedures.
  - 4. FS HH-I-558B: Class 1 and 2.
- B. Following products are acceptable
  - 1. Thermafiber Safing Insulation by Owens Corning.
  - 2. Mineral Wool Safing Insulation by Johns Manville.
    - a. Smoke Development: ≤5
  - 3. ASTM C 665: Type III, Class A, Category 1
  - 4. ASTM E 96: 0.02 perms, max.
- C. Following products are acceptable
  - 1. Thermafiber FireSpan 90 Insulation by Owens Corning.
  - 2. MinWool Curtainwall 80 (CW8) Insulation by Johns Manville.

## 2.7 ACCESSORIES

- A. Joint Tape: Pressure sensitive type, recommended by insulation manufacturer.
- B. Insulation Adhesive: Type recommended by insulation manufacturer.
- C. Stick Clips
  - 1. Galvanized sheet metal with impaling pins and retainer washers.
  - 2. Size and type to suit application and insulation thickness.
  - 3. Approved by manufacturer of insulation for intended use.
- D. Stick Clip Adhesive
  - 1. High strength, resilient adhesive, having drying time of 0 to 30 minutes (rapid initial set), and 24 hours final set.
  - 2. Compatible with insulation adhesive, insulation and substrate.
  - 3. Non-corrosive to galvanized steel.
- E. Supportive Wire Mesh: Hexagonal design, woven mesh "chicken wire" style.
- F. Tie wire: Minimum 18 ga. annealed wire.

## PART 3 - EXECUTION

### 3.1 INSPECTION

- A. Examine areas to receive insulation for conditions that will adversely affect the execution and quality of the work. Do not start this work until unsatisfactory conditions are corrected.

### 3.2 INSTALLATION

- A. Fit insulation tight within stud spaces, above soffits, behind fascias, and tight to and behind mechanical and electric services within plane of insulation, leaving no gaps or voids. Butt insulation tightly. Cut and fit tightly around items penetrating insulation. Stagger and butt joints, or cavity of a cavity wall system.
- B. Install in conformance with the manufacturer's recommendations. Cut material to fit closely around obstructions and projections.
  - 1. Walls: Secure insulation by mechanical means to hold it in place without sagging or slumping. Install insulation with edges and joints butted tight to leave no gaps.
  - 2. Soffits: Insulation shall be laid between wire hangers on back of cement plaster and over cross runners. Sides and ends of adjacent batts shall be tightly butted together.
  - 3. Acoustical Insulation:
    - a. Install acoustical insulation between the studs in those gypsum drywall partitions so detailed and noted on the drawings. Staple blankets to the gypsum board or otherwise fasten in place as recommended by the manufacturer of the blankets. Fill all voids.
    - b. Where indicated at suspended gypsum board ceilings, lay sound attenuation blankets between wire hangers on back of gypsum board and over cross runners. Do not install on top of or within 3" of light fixtures.
- C. Applying Semi-Rigid Insulation: Install board insulation between the wythes in exterior masonry walls.
  - 1. In masonry walls place boards over the fluid-applied membrane air barrier on the face of the backup masonry before the face brick wythe is laid.
  - 2. Securely fasten the board to the backup with mastic and suitable mechanical anchors to hold it firmly in place.
  - 3. In framed construction, apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
  - 4. Cut the material to fit snugly around obstructions and projections. Joints shall be tight.
  - 5. Seal joints between units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.

- D. Safing Insulation: Compress and install insulation on wire hangers or clips in spaces between floor slabs and curtain walls. Also, in openings in floor slabs to seal around telephone cables, piping, ducts and other utilities per SECTION 07 84 00 - FIRESTOPPING.

### 3.3 SCHEDULES

- A. Provide R values for thermal insulation as indicated on the drawings.
- B. Provide acoustical insulation in thickness and locations as follows:
  - 1. Walls: 3½" (or as shown on drawings)
  - 2. Above Ceilings: 3½" (or as shown on drawings)

END OF SECTION

SECTION 07 27 26

FLUID-APPLIED MEMBRANE AIR BARRIERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
  - 1. Vapor-permeable, fluid-applied air barriers, which also function as water-resistive barriers.
- B. Related Requirements:
  - 1. Section 01 45 00 - Quality Control: for general mockup requirements.
  - 2. Section 04 20 00 - Masonry Units; concrete unit masonry treatment.
  - 3. Section 06 16 56 - Air and Water-Resistive Sheathing Board System: for vapor-permeable air- and water-resistive wall sheathing and associated site-fluid-applied air barrier flashing.

1.2 DEFINITIONS

- A. Air-Barrier Material (AB): A primary element that provides a continuous barrier to the movement of air.
- B. Air-Barrier Accessory: A transitional component of the air barrier that provides continuity.
- C. Air-Barrier Assembly: The collection of air-barrier materials and accessories applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.
- D. Water-Resistive Barrier (WRB): Water-shedding barrier made of material that is moisture-resistant, and installed to shed water, with sealed joints and penetrations, and with terminations sealed to adjacent surfaces.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
  - 1. Review air-barrier requirements and installation, special details, mockups, air-leakage and bond testing, air-barrier protection, and work scheduling that covers air barriers.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include manufacturer's written instructions for evaluating, preparing, and treating each substrate; technical data; dry film thickness; and tested physical and performance properties of products.
- B. Shop Drawings: For air-barrier assemblies.
  - 1. Show locations and extent of air-barrier materials, accessories, and assemblies specific to Project conditions.
  - 2. Include details for substrate joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
  - 3. Include details of interfaces with other materials that form part of air barrier.
  - 4. Consult air barrier manufacturer for additional installation guidelines and illustrations to assist with meeting shop drawing requirements.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Certificates: From air-barrier manufacturer, certifying compatibility of air barriers and accessory materials with Project materials that connect to or that come in contact with the barrier.
  - 1. Certification shall include statement that materials proposed for use are permanently chemically compatible and adhesively compatible with adjacent materials proposed for use.
  - 2. Certification shall include statement that cleaning materials used during installation are chemically compatible with adjacent materials proposed for use.
- C. Product Test Reports: For each air-barrier assembly, for tests performed by a qualified testing agency.

- D. Field quality-control reports.

## 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. Mockups: Build mockups to set quality standards for materials and execution and for preconstruction testing.

## 1.7 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on field mockups.
- B. Mockup Testing: Air-barrier assemblies shall comply with performance requirements indicated, as evidenced by reports based on mockup testing by a qualified testing agency.
  - 1. Air-Leakage-Location Testing: Mockups will be tested for evidence of air leakage according to ASTM E 1186, chamber pressurization or depressurization with smoke tracers.
  - 2. Air-Leakage-Volume Testing: Mockups will be tested for air-leakage rate according to ASTM E 783 or ASTM E 2357.
  - 3. Water Penetration Testing: Mockups will be tested for water penetration according to ASTM E 1105.
  - 4. Adhesion Testing: Mockups will be tested for required air-barrier adhesion to substrate according to ASTM D 4541 (modified).
    - a. Use a type II pull tester, except that the membrane shall be cut through to separate the material attached to the disc from the surrounding material.
    - b. Perform test after curing period recommended by the material manufacturer.
    - c. Record mode of failure and area where the material failed in accordance with ASTM D4541.
    - d. The inspection report shall indicate whether the specified adhesion requirement has been met.
  - 5. Compatibility Determinations: Mockups will be inspected for visual signs of decay, chemical attack, or degradation of any kind. Suspect instances shall be reported to the corresponding manufacturer who shall provide a letter that approves moving forward with the project or rejects the use of the product or rejects the method or circumstances of installation with an appropriate explanation of the position taken.
  - 6. Notify Architect seven days in advance of the dates and times when mockups will be tested.
  - 7. Perform the air leakage test and water penetration test of mockups prior to installation of cladding and trim but after installation of all fasteners for cladding and trim, and after installation of other penetrating elements.

## 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Remove and replace liquid materials that cannot be applied within their stated shelf life.
- B. Protect stored materials from direct sunlight.
- C. Deliver materials to Project site in original packages with seals unbroken, labeled with material Manufacturer's name, product, date of manufacture, and directions for storage.
- D. Store materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by material manufacturer.
- E. Handle materials in accordance with material manufacturer's recommendations.

## 1.9 FIELD CONDITIONS

- A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended in writing by air-barrier manufacturer.
  - 1. Protect substrates from environmental conditions that affect air-barrier performance.
  - 2. Do not apply air barrier to a damp or wet substrate or during snow, rain, fog, or mist.
- B. Sequencing. Do not install air barrier material before the roof assembly has been sufficiently installed to prevent a buildup of water in the interior of the building.
- C. Compatibility. Do not allow air barrier materials to come in contact with chemically incompatible materials.

- D. Ultra-violet Exposure. Do not expose air barrier materials to sunlight longer than as recommended by the material manufacturer.

## 1.10 WARRANTY

- A. Manufacturer's Warranty: Manufacturer's standard form in which air barrier manufacturer agrees to furnish and install air barrier material to repair or replace those materials installed according to manufacturer's written instructions that exhibit material defects or otherwise fail to perform as specified under normal use within warranty period specified.
  - 1. Manufacturer's Warranty Period: Five (5) years from Date of Substantial Completion.
- B. Installer's Warranty: Provide installer's installation warranty, including all accessories and materials of the air barrier assembly, against failures including loss of airtight seal, loss of watertight seal, loss of attachment, loss of adhesion and failure to cure properly.
  - 1. Installer's Warranty Period: Two (2) years from Date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Source Limitations: Obtain primary air-barrier materials and air-barrier accessories from single source from single manufacturer.
  - 1. If the materials in this section are adjacent to the materials specified in Section 06 16 56 Air- and Water-Resistive Sheathing Board System, all materials in this section shall be compatible with the materials and products specified in that section and shall be approved by the air- and water-resistive sheathing board system manufacturer.

### 2.2 PERFORMANCE REQUIREMENTS

- A. Air-Barrier Performance: Air-barrier assembly and seals with adjacent construction shall be capable of performing as a continuous air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air-barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, tie-ins to installed waterproofing, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.
- B. Air-Barrier Assembly Air Leakage: Maximum 0.04 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft., when tested according to ASTM E 2357.

### 2.3 MEDIUM-BUILD AIR BARRIERS, VAPOR PERMEABLE

- A. Medium-Build, Vapor-Permeable Air Barrier: Synthetic polymer material with an installed dry film thickness, according to manufacturer's written instructions, of 17 to 30 mils (0.4 to 0.8 mm) over smooth, void-free substrates.
  - 1. Basis of Design Product: Subject to compliance with requirements, provide Prosoco, Inc.; R-Guard Spray Wrap MVP (at medium-build thickness) or a comparable acrylic product by one of the following:
    - Tremco, Inc.
    - 3M Industrial Adhesives and Tapes Division.
    - DuPont Safety & Construction.
    - GE Construction Sealants; Momentive Performance Materials Inc.
    - Hohmann & Barnard, Inc.
    - W.R. Meadows, Inc.
  - 2. Physical and Performance Properties:
    - a. Air Permeance: Maximum 0.004 cfm/sq. ft. of surface area at 1.57-lbf/sq. ft. pressure difference; ASTM E 2178.
    - b. Vapor Permeance: Minimum 10 perms; ASTM E 96/E 96M, Desiccant Method, Procedure A.
    - c. Ultimate Elongation: Minimum 250 percent; ASTM D 412, Die C.
    - d. Adhesion to Substrate: Minimum 16 lbf/sq. in. when tested according to ASTM D 4541.
    - e. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
    - f. UV Resistance: Can be exposed to sunlight for 120 days according to manufacturer's written instructions.
    - g. Fastener Sealability: No water infiltration when tested in accordance with ASTM D 1970.



## 2.4 ACCESSORY MATERIALS

- A. Requirement: Provide primers, transition strips, termination strips, joint reinforcing fabric and strips, joint sealants, counterflashing strips, flashing sheets and metal termination bars, termination mastic, substrate patching materials, adhesives, tapes, foam sealants, lap sealants, and other accessory materials that are recommended in writing by air-barrier manufacturer to produce a complete air-barrier assembly and that are compatible with primary air-barrier material and adjacent construction to which they may seal.
- B. Primer: Liquid waterborne primer recommended for substrate by air-barrier material manufacturer.
- C. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, 0.0187 inch thick, and Series 300 stainless-steel fasteners.
- D. Preformed Silicone Extrusion: Manufacturer's standard system consisting of cured low-modulus silicone extrusion, sized to fit opening widths, with a single-component, neutral-curing, Class 100/50 (low-modulus) silicone sealant for bonding extrusions to substrates.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Dow Corning Corporation.
    - b. GE Construction Sealants; Momentive Performance Materials Inc.
    - c. Pecora Corporation.
    - d. Prosoco, Inc.
    - e. Tremco Incorporated.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
  - 1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.
  - 2. Verify that substrates have cured and aged for minimum time recommended in writing by air-barrier manufacturer.
  - 3. Verify that substrates are visibly dry and free of moisture. Test concrete substrates for capillary moisture by plastic sheet method according to ASTM D 4263.
  - 4. Verify that masonry joints are flush and completely filled with mortar.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 SURFACE PREPARATION

- A. Clean, prepare, treat, fill, and seal substrate and joints and cracks in substrate according to manufacturer's written instructions and details. Provide clean, dust-free, and dry substrate for air-barrier application.
- B. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.
- C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
- D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate-patching material.
- E. Remove excess mortar from masonry ties, shelf angles, and other obstructions.
- F. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.
- G. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless-steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.
- H. Bridge isolation joints, expansion joints and discontinuous wall-to-wall, deck-to-wall, and deck-to-deck joints with air-barrier accessory material that accommodates joint movement according to manufacturer's written instructions and details.

### 3.3 ACCESSORIES INSTALLATION

- A. Install accessory materials according to air-barrier manufacturer's written instructions and details to form a seal with adjacent construction and ensure continuity of air and water barrier.
  - 1. Coordinate the installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
  - 2. Install transition strip on roofing membrane or base flashing so that a minimum of 3 inches (75 mm) of coverage is achieved over each substrate.
  - 3. Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow it to dry.
  - 4. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by air-barrier material on same day. Reprime areas exposed for more than 24 hours.
- B. Connect and seal exterior wall air-barrier material continuously to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.
- C. At end of each working day, seal top edge of strips and transition strips to substrate with termination mastic.
- D. Apply joint sealants forming part of air-barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- E. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply transition strip so that a minimum of 3 inches of coverage is achieved over each substrate. Maintain 3 inches of full contact over firm bearing to perimeter frames, with not less than 1 inch of full contact.
  - 1. Transition Strip: Roll firmly to enhance adhesion.
- F. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, and doors, and miscellaneous penetrations of air-barrier material with foam sealant.
- G. Seal strips and transition strips around masonry reinforcing or ties and penetrations with termination mastic.
- H. Seal top of through-wall flashings to air barrier with an additional 6-inch-wide, transition strip.
- I. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.
- J. Repair punctures, voids, and deficient lapped seams in strips and transition strips. Slit and flatten fishmouths and blisters. Patch with transition strips extending 6 inches beyond repaired areas in strip direction.

### 3.4 PRIMARY AIR-BARRIER MATERIAL INSTALLATION

- A. Apply air-barrier material to form a seal with strips and transition strips and to achieve a continuous air barrier according to air-barrier manufacturer's written instructions and details. Apply air-barrier material within manufacturer's recommended application temperature ranges.
  - 1. Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow it to dry.
  - 2. Limit priming to areas that will be covered by air-barrier material on same day. Reprime areas exposed for more than 24 hours.
  - 3. Where multiple prime coats are needed to achieve required bond or thickness, allow adequate drying time between coats.
- B. Medium-Build Air Barriers: Apply continuous unbroken air-barrier material to substrates according to the following thickness. Apply an increased thickness of air-barrier material in full contact around protrusions such as masonry ties.
  - 1. Vapor-Permeable, Medium-Build Air Barrier: Total dry film thickness as recommended in writing by manufacturer to comply with performance requirements, but not less than 17 mils, applied in two equal coats. Apply additional material as needed to achieve void- and pinhole-free surface, but do not exceed thickness on which required vapor permeability is based.
    - a. Second coat shall be back rolled in accordance with manufacturer's written instructions.
- C. Do not cover air barrier until it has been tested and inspected by testing agency.

- D. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air-barrier components.

### 3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Inspections: Air-barrier materials, accessories, and installation are subject to inspection for compliance with requirements. Inspections may include the following:
  - 1. Continuity of air-barrier system has been achieved throughout the building envelope with no gaps or holes.
  - 2. Air-barrier dry film thickness.
  - 3. Continuous structural support of air-barrier system has been provided.
  - 4. Masonry and concrete surfaces are smooth, clean, and free of cavities, protrusions, and mortar droppings.
  - 5. Site conditions for application temperature and dryness of substrates have been maintained.
  - 6. Maximum exposure time of materials to UV deterioration has not been exceeded.
  - 7. Surfaces have been primed, if applicable.
  - 8. Laps in strips and transition strips have complied with minimum requirements and have been shingled in the correct direction (or mastic has been applied on exposed edges), with no fishmouths.
  - 9. Termination mastic has been applied on cut edges.
  - 10. Strips and transition strips have been firmly adhered to substrate.
  - 11. Compatible materials have been used.
  - 12. Transitions at changes in direction and structural support at gaps have been provided.
  - 13. Connections between assemblies (air-barrier and sealants) have complied with requirements for cleanliness, surface preparation and priming, structural support, integrity, and continuity of seal.
  - 14. All penetrations have been sealed.
- C. Tests: As determined by testing agency from among the following tests:
  - 1. Air-Leakage-Location Testing: Air-barrier assemblies will be tested for evidence of air leakage according to ASTM E 1186, chamber pressurization or depressurization with smoke tracers.
  - 2. Air-Leakage-Volume Testing: Air-barrier assemblies will be tested for air-leakage rate according to ASTM E 783 or ASTM E 2357.
  - 3. Adhesion Testing: Air-barrier assemblies will be tested for required adhesion to substrate according to ASTM D 4541 for each 600 sq. ft. of installed air barrier or part thereof.
- D. Air barriers will be considered defective if they do not pass tests and inspections.
  - 1. Apply additional air-barrier material, according to manufacturer's written instructions, where inspection results indicate insufficient thickness.
  - 2. Remove and replace deficient air-barrier components for retesting as specified above.
- E. Repair damage to air barriers caused by testing; follow manufacturer's written instructions.
- F. Prepare test and inspection reports.

### 3.6 CLEANING AND PROTECTION

- A. Protect air-barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.
  - 1. Protect air barrier from exposure to UV light and harmful weather exposure as recommended in writing by manufacturer. If exposed to these conditions for longer than recommended, remove and replace air barrier or install additional, full-thickness, air-barrier application after repairing and preparing the overexposed materials according to air-barrier manufacturer's written instructions.
  - 2. Protect air barrier from contact with incompatible materials and sealants not approved by air-barrier manufacturer.
- B. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended in writing by manufacturer of affected construction.
- C. Remove masking materials after installation.

END OF SECTION

SECTION 07 42 13  
METAL WALL PANELS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Preformed metal wall and soffit panels, including related flashing and trim installed on the building.
- B. Related Sections:
  - 1. Section 04 20 00 – Masonry Units
  - 2. Section 07 46 00 - Preformed Siding; parapets and metal panel fence.
  - 3. Section 09 21 16 - Gypsum Board Assemblies; sheathing.

1.2 SUBMITTALS

- A. Shop Drawings: Submit in accordance with SECTION 01 33 23 - SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES. Drawings shall indicate type of wall panels, gage of metal, finish, and shape and size of flashing and accessories.

1.3 QUALITY ASSURANCE

- A. Applicator Qualifications: This work shall be preformed by an experienced applicator who has successfully installed the materials under similar conditions over a period of at least 10 years.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver preformed metal wall panels and trim items to the project site with no dents, scratches, or abraded areas. Deliver in manufacturer's standard bundles, securely bound, and store at the project site raised above slab or ground level on pallets.

1.5 WARRANTY

- A. Submit manufacturer's standard 20-year warranty against fading or visible (noticeable) chalking, checking, crazing or peeling of the exterior finish when exposed to natural sunlight for a period of 20 years.
- B. Submit applicator's 2-year weathertightness warranty.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Wall and Soffit Panels:
  - 1. Metal wall panels shall be Flush Panel as manufactured by Petersen Aluminum. Panels shall be 11" wide with concealed anchors. Panels shall be 22 gauge.
- B. Finish:
  - 1. Buildings: Metal wall and soffit panels and all exposed trim items shall receive fluorocarbon polymeric coating containing 70% Kynar 500 or Hylar 5000 finish with a dry film thickness of 0.7 to 0.8 mil exclusive of the primer. Custom metallic color as selected by Architect to match the roof panels (Petersen Aluminum - Zinc.)
- C. Flashing, gutters, downspouts, and all trim items which are contiguous to wall panels shall be of the same metal and finish as wall panels. Color(s) as selected by Architect.
- D. Fasteners: Screws holding anchor clips to the structure shall be stainless steel cadmium plated self-tapping screws into predrilled holes.
  - 1. Exposed fasteners shall match the finish of the panel system and shall be aluminum or stainless steel with separate washers with hot-bonded neoprene faces; pop rivets are not acceptable.

- E. Building Paper: ASTM D 226, No. 30 asphalt saturated organic felt.
- F. Sealant:
  - 1. Concealed Sealant: Non-curing, non-skinning butyl, polyisobutylene or polybutane tape of sufficient thickness to make full contact with both surfaces.
  - 2. Exposed Sealant: Curing type, manufacturer's standard. Color shall be as selected by Architect.

## 2.2 FABRICATION

- A. Comply with dimensions, profile, gages, and fabrication details shown and if not shown, provide manufacturer's standard product fabrication.

## PART 3 - EXECUTION

### 3.1 INSPECTION

- A. Examine supporting members and areas to receive preformed metal wall panels, flashing, and trim items for conditions that will adversely affect the execution and quality of work. Do not start this work until unsatisfactory conditions are corrected.

### 3.2 INSTALLATION

- A. General: Install preformed metal wall panels and related items in strict compliance with manufacturer's recommendations.
- B. Full length pans shall be fabricated by roll forming in power equipment capable of producing metal wall pans to the required lengths.
- C. Anchor components parts of the preformed wall panels securely in place, providing for necessary thermal and structural movement.
- D. Install and securely anchor metal flashing, trim and related items to provide a weathertight enclosure.
- E. Provide a concealed fasteners installation system with no fasteners exposed on the exterior face of the work.
- F. Seal preformed panels as required for weathertightness.
- G. When used in rainscreen, windscreen or fence location, panels must be fastened (stitched) through side joints.

### 3.3 TOUCH-UP AND CLEAN

- A. Touch-up:
  - 1. Defective materials shall be replaced with new materials.
  - 2. Field touch-up of scratches or defaced finish will be permitted only if approved by Architect.
- B. Cleaning: Clean exposed surfaces; leave free of soil and imperfections.

END OF SECTION

SECTION 07 48 00

RAINSCREEN ATTACHMENT SYSTEM (MFI)

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide a thermally broken, rainscreen attachment system for attachment of exterior cladding including metal wall panels, preformed siding, fiber cement siding and wall panels, aluminum faced composite panel system and stucco assemblies installed over exterior mineral fiber insulation.
- B. Related Sections:
  - 1. Section 01 45 00 - Quality Control: for general mockup requirements.
  - 2. Section 05 40 00 - Cold-formed Metal Framing: for cold-formed steel exterior wall studs and furring.
  - 3. Section 06 16 56 - Air and Water-Resistive Sheathing Board System: for vapor-permeable air- and water-resistive wall sheathing and associated site-fluid-applied air barrier flashing.
  - 4. Section 07 21 00 - Building Insulation: for mineral wool board insulation.
  - 5. Section 07 27 26 - Fluid-Applied Membrane Air Barriers: for vapor-permeable fluid-applied air barriers, which also function as water-resistive barriers.
  - 6. Section 07 42 13 - Metal Wall Panels.
  - 7. Section 07 21 00 - Building Insulation: for mineral wool board insulation.

1.2 SYSTEM DESCRIPTION

- A. System assembly shall include the following components from the substrate out:
  - 1. Substrate: Wall framing assembly and sheathing, concrete masonry unit wall, or concrete wall.
  - 2. Weather Resistant/Air Barrier over substrate.
  - 3. Mineral fiber insulation (mineral wool board insulation).
  - 4. Thermally broken rainscreen attachment system.
  - 5. Exterior cladding.
- B. Design Requirements:
  - 1. Manufacturer is responsible for designing system, including anchorage to structural system and necessary modifications to meet specified requirements and maintain visual design concepts.
  - 2. Employ registered professional engineer, licensed to practice engineering in jurisdiction where Project is located, to engineer each component of rainscreen attachment system.
  - 3. Structural Design: Exterior-insulated rainscreen wall assembly capable of withstanding effects of load and stresses from dead loads, wind loads, ice loads (if applicable) as indicated on Structural General Notes on Structural Drawings, and normal thermal movement without evidence of permanent defects of assemblies or components.
    - a. Thermal Movements: Provide assemblies that allow for thermal movements resulting from the following maximum ambient temperatures by preventing overstressing of components and other detrimental effects:
      - 1) Temperature Change (range): 120 degrees Fahrenheit, ambient:
  - 4. Support Framing/Attachment System:
    - a. Frequency and spacing of brackets as indicated by manufacture in project specific engineering package.
- C. Performance Requirements:
  - 1. Rainscreen Attachment System Performance: Comply with ANSI/ASHRAE 90.1-2013 maximum U-Value for walls.
  - 2. Thermal Performance:
    - a. Full constructed exterior assembly must have a minimum 90% EFFECTIVE R-value when compared to the exterior insulation's rated R-Value.
    - b. Continuous framing profiles (including C- or Z-shaped sections or furring) penetrating insulation not allowed.
    - c. Perform effective R-Value calculation or modeling in accordance with ASHRAE guidelines.
  - 3. Structural Performance:
    - a. Framing Members:
      - 1) Test framing components to AAMA TIR- A8-[04] – Section 7.2 to determine structural performance and effective moment of inertia for each perforated component. Minimum Effective Moment of Inertia for Primary Rail: 0.0134 in<sup>4</sup>.

RAINSCREEN ATTACHMENT SYSTEM (MFI)

- 2) Localized bending stress for eccentrically loaded framing members must be evaluated with the maximum effective length of resisting element not more than 12 inches.
- b. Fasteners:
  - 1) Tension shall be taken as sum of direct tension plus tension due to prying for eccentrically loaded connections. Prying may be reduced or eliminated if proven via engineering analysis or testing.
  - 2) Minimum Safety Factor of 3 for both tension and shear values.
  - 3) Combined tension and shear shall be evaluated according to an interaction formula. Sum of terms shall not exceed 1.0.

### 1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's product literature and descriptions of testing performed on system components to indicate meeting or exceeding specified performance.
- B. Shop Drawings:
  1. Submit connection details to the cladding manufacturer, showing interface of rainscreen attachment system to substrate and panels with adjacent construction, signed and sealed by Professional Engineer, licensed to practice engineering in jurisdiction where Project is located.
  2. Show system installation and attachment, including fastener size and spacing.
- C. Structural Calculations:
  1. Submit rainscreen attachment manufacturer's comprehensive Structural Design analysis signed and sealed by a Professional Engineer, licensed to practice engineering in jurisdiction where Project is located.
- D. Samples: Submit following material samples for verification:
  1. Wall Brackets: Two (2) samples.
  2. Horizontal and Vertical Rails: Two (2) 12-inch long samples.
- E. Test Reports:
  1. Test to the following standards and provide written test reports by a third party:
    - a. AAMA TIR-A8-**[04]**: Structural Performance of Composite Thermal Barrier Framing Systems – Section 7.2.
  2. Comprehensive three-dimensional thermal modeling report indicating framing systems impact on exterior insulation rated R-value.

### 1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
  1. Minimum 5 years' experience specializing in the manufacturing of façade attachment/support framing similar to those specified.
  2. Ability to demonstrate conformance to testing requirements.
- B. Installer Qualifications:
  1. Minimum of 3 years' documented experience or minimum of 5 completed projects of equivalent scope and quality and recommended by manufacturer to perform work of this Section.
  2. Onsite superintendent or foreman overseeing installation on site during entire work of this Section with experience equivalent to installer and in good standing with the manufacturer.
- C. Engineer Qualifications: Registered professional engineer experienced in the design of curtain wall systems, anchors, fasteners and licensed to practice engineering in the jurisdiction where Project is located.
- D. Pre-Installation Meeting:
  1. Discuss sequence and scheduling of work and interface with other trades.
  2. Review metal wall framing assemblies for potential interference and conflicts and coordinate layout and support provisions for interfacing work.
  3. Review and document methods, procedures and manufacturer's installation guidelines and safety procedures for exterior wall assembly.
- E. Mock-Ups: Coordinate mock-up materials and requirements with mock-up specified in Division 01 and exterior cladding specifications.

## 1.5 QUALITY CONTROL

- A. Single source responsibility:
  - 1. Furnish engineered rainscreen attachment system components under direct responsibility of single manufacturer.
- B. Field Measurements: Verify actual supporting and adjoining construction before fabrication.
- C. Record field measurements on project record shop drawings.
- D. Established Dimensions: Where field measurements cannot be made without delaying work, guarantee dimensions and proceed with fabrication of rainscreen attachment system corresponding to established dimensions.

## 1.6 DELIVERY, STORAGE AND HANDLING

- A. Delivery: Deliver materials and components in manufacturers' original, unopened and undamaged containers or bundles, fully identified. Exercise care to avoid damage during unloading, storing and installation.
- B. Store, protect and handle materials and components in accordance with manufacturer recommendations to prevent damage, contamination and deterioration. Keep materials clean, dry, and free of dirt and other foreign matter, and protect from damage due to weather or construction activities.

## 1.7 SEQUENCING

- A. Ordering: Comply with manufacturers' ordering instructions and lead time requirements to avoid construction delays.
- B. Coordinate construction to ensure that assemblies fit properly to supporting and adjoining construction; coordinate schedule with construction in progress to avoid delaying work.

## 1.8 WARRANTY

- A. Manufacturer Warranties:
  - 1. Attachment System: Ten (10) year Limited Warranty.
    - a. Covers components of the attachment system, including structural failure of components when all the materials and components are supplied and installed per manufacturer's requirements.
    - b. Includes labor and material for removal and replacement of defective material.
    - c. Includes labor to remove and reinstall façade finish panels, finish closures and façade finish accessories necessary to access defective material.
- B. Contractor's Warranties: 2-year labor warranty, starting from date of Substantial Completion, to cover repair of materials found to be defective as a result of installation errors.

## 1.9 MAINTENANCE

- A. Extra Materials: For use by Owner in building maintenance and repair, provide **3 percent** additional rainscreen attachment components in new, unopened cartons, packaged with protective covering for storage and identified with appropriate labels.

## PART 2 - PRODUCTS

### 2.1 RAINSCREEN ATTACHMENT/SUPPORT FRAMING SYSTEM

- A. Comply with ANSI/ASHRAE 90.1-2013.
- B. Coating Material: ASTM A1046, Zinc-Aluminum-Magnesium, minimum thickness ZM40.
  - 1. ASTM A653 Galvanized steel is not acceptable.
- C. Steel Classification: Structural Steel (SS), Grade 50, 50 ksi Yield.



- D. Spacing: Comply with manufacturer's Professional Engineer's project specific calculations.
- E. Wall Brackets:
  - 1. Basis of Design Product: ThermaBracket-S by Knight Wall Systems or approved equal.
  - 2. Minimum 0.074 inch thick (14 gauge) sheet steel.
  - 3. Dimensions:
    - a. Bracket Base: Minimum 3.125 inch high by 2.125 inch wide.
    - b. Offset Brackets: 2-inch or 3-inch depth, as indicated on drawings.
      - 1) Align offsets to differing wall planes as shown on Drawings.
  - 4. Pre-Punched Holes: Two wall anchors per bracket.
- F. Primary Rail (horizontal or vertical per cladding requirements):
  - 1. Basis of Design Product: S-Rail by Knight Wall Systems or approved equivalent.
  - 2. Minimum 0.054-inch thick (16 gauge) cold-formed steel.
  - 3. Profile: C channel, two flanges of equal length and one web.
  - 4. Nominal Dimensions: Minimum 1.0 inch flange for attaching to wall bracket and 1.625 inch at web.
  - 5. Pre-Punched Attachment Holes: 1.0 inch on center along length of track and oversized allowing for thermal contraction and expansion of rail without placing stress on brackets.
  - 6. Finish: Painted flat black at open joint panel assemblies.
- G. Thermal Isolation:
  - 1. Material: Injection molded Polyoxymethylene copolymer (POM), non-fiber reinforced.
  - 2. Tensile Yield Strength: 9.57 ksi per ISO 527.
  - 3. Melting Temperature: 329 degrees Fahrenheit per ISO 3146.
  - 4. Components:
    - a. Basis of Design Product: ThermaStop™ Isolators by Knight Wall Systems or approved equivalent.
    - b. Wall Anchor Isolation Washer: minimum 0.125 inch thick.
    - c. Support Wall Substrate Isolation: Minimum 0.375-inch thick at each wall bracket.
    - d. Rail to Bracket Isolation: Minimum 0.125 inch thick at each connection.
    - e. Bracket Shim: Match support wall substrate isolator profile; available in 0.125-inch thickness and does not decrease thermal or structural performance of system.
- H. Fasteners:
  - 1. Sufficient length to provide solid attachment to structure as required by manufacturer.
  - 2. Thermally isolated.
  - 3. Framed substrate with sheathing: Self-drill hex-washer-head stainless steel with 1,000 hour salt-spray rated thermoset polyester coating.
    - a. Embedment depth: 0.625 inches or three full threads minimum, whichever is greater.
    - b. Minimum ultimate pull-out capacity from 18 gauge steel: 450 pounds.
  - 4. Concrete and concrete masonry units substrate:
    - a. Embedment depth: 1.25 inches minimum.
    - b. Minimum ultimate pull-out capacity from substrate material: 450 pounds.
    - c. Acceptable Products:
      - 1) 1/4 inch Kwik-Con II+ by Hilti
      - 2) 1/4 inch Tapcon by Buildex
      - 3) 1/4 inch UltraCon by Elco Industries
      - 4) Or approved equal.
  - 5. For primary to secondary rail connection: Self-drill hex-washer-head stainless steel with 1,000 hour salt-spray rated thermoset polyester coating.
    - a. Embedment depth: 0.625 inches or three full threads minimum, whichever is greater.
    - b. Minimum ultimate pull-out capacity from 18 gauge steel: 450 pounds.
- I. Accessories:
  - 1. Bracing, Furring, Bridging, Plates, Gussets, and Clips: Formed sheet steel, thickness as necessary to meet structural requirements for special conditions encountered.
  - 2. Galvanic Protection: Utilize tapes and other methods as necessary to separate and prevent contact between dissimilar metals.

## 2.2 MINERAL FIBER INSULATION

- A. Refer to Section 07 21 00 – Building Insulation.

## 2.3 SIDING/CLADDING PANEL

- A. Refer to Division 07 for cladding materials.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and conditions for compliance with manufacturer requirements for installation conditions affecting performance of the work.
  - 1. Do not proceed with installation until unsatisfactory conditions have been corrected.
  - 2. Ensure air barrier/weather-resistant barrier (AB/WRB) is installed prior to installing rainscreen attachment system.
  - 3. Ensure fenestration, transitions, discontinuities, sills, and ledgers are flashed and sealed to move moisture to the exterior of the building.
- B. Field verify architectural details and mechanical and electrical requirements prior to commencing installation.
- C. Commencement of installation constitutes acceptance of existing conditions and acceptance of responsibility for satisfactory performance.

### 3.2 RAINSCREEN ATTACHMENT SYSTEM INSTALLATION

- A. Preparation: Review areas of potential interference and conflicts and coordinate layout and support provisions for interfacing work.
- B. Installation: Install in strict accordance with manufacturer's installation instructions.
- C. Wall Brackets and Primary Rail:
  - 1. Mount wall brackets at 16-inches on center horizontally on support wall (at each stud location).
    - a. Brackets must be laid out at 0.5 inch increments vertically or horizontally.
    - b. Secure brackets with fasteners that are wet-set with sealant compatible with the air- and water-resistive barrier system. After installation, apply sealant along top edge of brackets to shed water.
    - c. Tighten screws to substructure to a snug tight condition and not stripped. Do not over-torque beyond manufacturer's recommendation. If installed using hand tools, verify for each installer at beginning of project using snug-tight criteria. Do not use stripped holes.
  - 2. Thermally isolate wall bracket attachments by sandwiching thermal break material between metal bracket and support wall substrate.
  - 3. Thermally isolate screw fastener washers using material to thermally isolate fastener heads from metal bracket.
  - 4. Mineral Fiber Insulation: Install to expand into and friction fit between wall brackets as specified by Section 07 21 00 prior to installing primary rails.
  - 5. Attach primary rail to wall bracket stem by use of a self-tapping screw fastener through the pre-punched holes in the rail and into the pre-punched pilot holes on the bracket.
  - 6. Isolate primary rail from bracket by sandwiching a thermal break material between rail and bracket stem.
  - 7. Attach primary rail at proper pre-punched pilot holes on bracket stem to align plumb and true. Account for irregularities in support wall.
  - 8. Establish and re-establish and restart vertical bracket locations using laser or chalk-line at fenestrations and other obstructions to establish horizontal alignments.
- D. Touch-up shop-applied protective coatings damaged during handling and installation.
- E. Use shearing instruments (i.e. snips, nibbler, etc.) for cutting metal framing components. Saws are not recommended, as the sparks produced during cutting will damage the anti-corrosion coating. If sparks are generated during cutting, be sure the portion of the component to be installed on the building is protected from sparks and that any stockpile near the cutting station is also protected.
- F. The systems components should not be cut while installed on the building, unless using a shearing instrument.
- G. Replace thermal isolator pieces that break during installation.

- H. Provide a 3/8" – 1/2" gap between girts for expansion when multiple lengths of rail are installed.
- I. Minimum length of installed cut primary rail is 12" and must be attached to at least two separate wall brackets to prevent rotation of rail. Unsupported cantilever must not exceed 6" unless specified differently by manufacturer's engineer.

### 3.3 ERECTION TOLERANCES

- A. Maximum Framing Member Variation from True Position: 1/4 inch.
- B. Maximum Framing Member Variation from Plane:
  - 1. Individual Framing Members: Do not exceed 1/4 inch in 10 foot.
  - 2. Accumulative Over-all Variation for Wall and Floor System: Do not exceed 1/4 inch.

### 3.4 FIELD QUALITY CONTROL

- A. Manufacturer's Field Technical Service: Make intermittent and final inspection to verify installation in conformance to manufacturer instructions and suitable as framing assembly for subsequent metal panels, acrylic plastering, and other cladding installations.
  - 1. Confirm snug tight and fastener sizing.
  - 2. Confirm framing members installed in correct orientation.

### 3.5 ADJUSTING

- A. Inspect and adjust after installation. Replace or repair defective work.
- B. Adjust, and reconfigure as necessary to accommodate cladding systems for installations over work of this Section. Do not reuse pre-drilled holes unless fastener size is increased.

### 3.6 SIDING/CLADDING PANEL INSTALLATION

- A. The cavity must be clear and free from air flow and drainage obstructions.

END OF SECTION

SECTION 07 59 00

ROOFING REPAIR

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: repair work as a result of penetrations made or damage occurring to the roof membrane and flashings as part of the work of this contract.
  - 1. In order to maintain the existing warranty where new roofing will be tied into existing roofing, the Contractor shall obtain written approval from the existing roof manufacturer.
- B. Related Sections:
  - 1. Section 07 62 00 - Sheet Metal Flashing and Trim.

1.2 SYSTEM PERFORMANCE

- A. Flash, seal, counterflash and otherwise make watertight all roof membrane penetrations and repair all damages leaving membrane and flashings in a watertight condition.

1.3 SUBMITTALS

- A. General: Submit under provisions of SECTION 01 33 23 - SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.
- B. Shop Drawings: Indicate layout, details, dimensions and interface with adjoining work.
- C. Product Data:
  - 1. Submit all data concerning each roof to be repaired.
  - 2. Submit written approval from the existing roof manufacturer that warranty shall be maintained.

1.4 QUALITY ASSURANCE

- A. Installer: Company specializing in roofing flashing and repair work with minimum 3 years experience. Use recommended detailing as indicated in NRCA Roofing Manual.

1.5 ENVIRONMENTAL REQUIREMENTS

- A. Do not apply materials during inclement weather or when temperatures are below 40°F.

1.6 COORDINATION

- A. Coordinate placement of curbs for roof mounted equipment with new openings cut into roof structure.

1.7 WARRANTY

- A. Maintain existing warranties.
- B. Provide a 2-year watertightness warranty from date of substantial completion for work of this section.

PART 2 - PRODUCTS

2.1 MANUFACTURERS AND PRODUCTS

- A. Utilize identical sheet, fluid-applied and bituminous materials, flashings, roof surfacing, fasteners, adhesives and accessories as original installation. On pipe penetrations, use flashing materials and techniques as recommended by NRCA utilizing portals mounted to curbs.

### PART 3 - EXECUTION

#### 3.1 PROTECTION

- A. Protect existing building surfaces against damage from roofing installation.

#### 3.2 PREPARATION

- A. Prepare roof surfaces as recommended by manufacturer of original installation.

#### 3.3 FLASHING AND REPAIR WORK

- A. General: Fabricate, assemble, and install sheet metal work in conformance with referenced standard.
  - 1. Make adequate provision for metal expansion and contraction without buckling or splitting. Use cleats and watertight slip and expansion joints.
  - 2. Nails and screws shall be of the same metal as the member on which used. Nails through exposed wash surfaces will not be permitted.
  - 3. When soldering, use flux and wash off surplus flux after soldering has been completed.
  - 4. Set sheet metal with horizontal lines straight and level. Surfaces shall be flat without wrinkles and waves. Profiles shall align at joints with no offsets.
  - 5. Conform to drawing details included in manuals published by SMACNA and NRCA.
  - 6. Edge Securement for Low-Slope Roofs: Design in accordance with ANSI/SPRI ES-1 for basic wind speed zone with 3-second gusts.
  - 7. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.
  - 8. Seal metal joints watertight.
  - 9. Provide electrolytic separation between dissimilar metals with protective back paint.
- B. General: Coordinate repair work with 07 62 00 – Sheet Metal Flashing and Trim.

END OF SECTION

SECTION 07 62 00

SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Sheet metal flashing and trim.
- B. Related Sections:
  - 1. Section 07 42 13 - Metal Wall Panels.
  - 2. Section 07 59 00 – Roofing Repair.
  - 3. Section 07 92 00 - Joint Sealants.
  - 4. Section 09 91 00 - Painting.

1.2 SUBMITTALS

- A. Samples:
  - 1. Submit in accordance with SECTION 01 33 23 - SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
  - 2. Submit for approval samples of parapet coping cover expansion joint and soldered joint.
- B. Product Certificates: Showing that each type of coping and roof edge flashing is ANSI/SPRI/FM 4435/ES-1 tested.
- C. Evaluation Reports: For copings and roof edge flashing, from an agency acceptable to authority having jurisdiction showing compliance with ANSI/SPRI/FM 4435/ES-1.

1.3 QUALITY ASSURANCE

- A. Standard: Comply with the requirements of the Architectural Sheet Metal Manual published by SMACNA.
- B. Installer Qualifications: Company specializing in sheet metal flashing work with three years minimum experience in similar sized installations

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, handle and protect products under provisions of SECTION 01 65 00 - PRODUCT DELIVERY REQUIREMENTS and SECTION 01 66 00 - PRODUCT STORAGE AND HANDLING REQUIREMENTS.
- B. Stack pre-formed material to prevent twisting, bending, and abrasions, and to provide ventilation.
- C. Prevent contact with materials which may cause discoloration or staining.

1.5 WARRANTY

- A. Furnish to the Owner a written warranty providing the following without cost to the Owner.
  - 1. Sheet metal roof flashings shall be maintained in normal repair and free of leaks for a period of 2 years from the date of acceptance of the roof.
  - 2. At end of 2-year period, Owner and Contractor shall make final inspection of flashing work. Holes, breaks and other defects shall be promptly repaired at the Contractor's expense.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Sheet Metal: ASTM A 653, Steel Sheet, Zinc-Coated (Galvanized)
  - 1. Roof top accessories, including but not limited to, expansion joint covers, flanges, and concealed counterflashings not visible from ground level shall be Coating Designation G90 Paint Grip, zinc coated (galvanized) copper-bearing steel sheet, mill-phosphatized ready to receive field finishing in accordance with SECTION 09 91 00 - PAINTING

2. Areas which can be seen from the ground level, including but not limited to, coping, edging, gutters, conductor heads, downspouts, and expansion joint terminations shall be zinc coated (galvanized) copper-bearing steel sheet prefinished with fluorocarbon coating containing 70% Kynar 500. Colors shall be selected by Architect from Fluoropon Standard colors as manufactured by Valspar.
- B. Reglet: Two piece snaplock receiver, Per Figure 4-4C, SMACNA Manual, 8th Edition, of 24 gauge galvanized steel.
- C. Underlayment: ASTM D 226, 30 lb/100 s.f. weight felt containing no additives corrosive to sheet metals.
- D. Solder: ASTM B 32, made from block tin and pig lead (50/50) with no antimony.
- E. Solder for Stainless Steel: ASTM B 32, Grade Sn60, with an acid flux of type recommended by stainless-steel sheet manufacturer.
- F. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
- G. Sealant: Two component polyurethane, non-sagging, sealant as specified in SECTION 07 92 00 - JOINT SEALANTS.
- H. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.
- I. Miscellaneous items such as nails and mastic shall be furnished as required by the conditions of use and must be of the best grade available.

## 2.2 FABRICATION

- A. Form sections true to shape, accurate in size, square, free from distortion and defects, to profiles indicated in accordance with SMACNA Architectural Sheet Metal Manual.
- B. Fabricate cleats and starter strips of same material as sheet, interlockable with sheet.
- C. Form pieces in longest practical lengths.
- D. Hem exposed flashings on underside  $\frac{1}{2}$ "; miter and seam corners.
- E. Solder and seal metal joints except those indicated or required to be expansive type joints. After soldering, remove flux. Wipe and wash solder joints clean.
- F. Fabricate corners from one place with minimum 18" long legs; solder for rigidity; seal with sealant.
- G. Fabricate vertical faces with bottom edge formed outward  $\frac{1}{4}$ " and hemmed to form drip.
- H. Fabricate flashings to allow toe to extend minimum 2" over wall surfaces.
- I. Fabricate as much as possible in shop with machinery to eliminate as much hand tooling on the job as possible. Shop fabricate to allow for adjustments in the field for proper anchoring and joining.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify that surfaces and conditions are ready to receive work of this section. Notify Architect of any existing conditions which will adversely affect execution. Beginning of execution will constitute acceptance of existing conditions.
- B. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, cant strips and reglets in place, and nailing strips located.
- C. Verify membrane termination and base flashings are in place, sealed, and secure.

### 3.2 PREPARATION

- A. Field measure site conditions prior to fabricating work.
- B. Install starter and edge strips, and cleats before starting installation.
- C. Install surface mounted reglets true to lines and levels. Seal top of reglets with sealant.
- D. Install one layer of underlayment prior to installing copings.

### 3.3 INSTALLATION

- A. General: Fabricate, assemble, and install sheet metal work in conformance with referenced standard.
  - 1. Make adequate provision for metal expansion and contraction without buckling or splitting. Use cleats and watertight slip and expansion joints.
  - 2. Nails and screws shall be of the same metal as the member on which used. Nails through exposed wash surfaces will not be permitted.
  - 3. When soldering, use flux and wash off surplus flux after soldering has been completed.
  - 4. Set sheet metal with horizontal lines straight and level. Surfaces shall be flat without wrinkles and waves. Profiles shall align at joints with no offsets.
  - 5. Conform to drawing details included in manuals published by SMACNA and NRCA.
  - 6. Edge Securement for Low-Slope Roofs: Design in accordance with ANSI/SPRI ES-1 for basic wind speed zone with 3-second gusts.
  - 7. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.
  - 8. Seal metal joints watertight.
  - 9. Provide electrolytic separation between dissimilar metals with protective back paint.
- B. Reglet: Install surface mounted reglets on walls.
  - 1. Clean surface of oil, grease and loose particles.
  - 2. Place sealant bead on back in groove and on lap.
  - 3. Secure reglet in precise alignment to wall with power driven pins spaced 12" o.c.
  - 4. Lap joints 3" and bed in sealant. Miter and seal corners.
- C. Reglet Counterflashing: Counterflashing for reglet shall be formed of 24 gage metal to fit the reglet in conformance with the manufacturer's instructions.
  - 1. Lap counterflashing down over flashing strip approximately 4" and form lower edge with a spring bend against the base flashing.
  - 2. After roofing and flashing strip have been installed, snap counter-flashing up into reglet so that it is held securely in place without screws or clips.
  - 3. Lap end joints 3" and bed in sealant. Miter and seal corners.
- D. Downspout: Form and install downspouts of 24 gage metal.
  - 1. Install with the top slipped up over the outlet sleeve and anchor to the wall with 2" wide by 18 gage metal straps fastened with galvanized bolts into metal expansion shields.
  - 2. For each downspout, set the straps at the top, bottom and at intermediate points spaced not more than 8' apart.
- E. Gutter: Form and install hung molded gutters of 26 gage metal at roof eaves.
  - 1. Provide watertight lap or butt type expansion joints at intervals of 50 ft. and not more than 16 ft. from inside and outside corners.
  - 2. Support molded outside edge with 1" wide 18 gage strap hangers at 36" centers and weld to gutter as detailed.
  - 3. Form downspout outlet sleeves and rivet and solder sleeves to gutter. Fit each sleeve with a removable, galvanized wire basket strainer.
- F. Roof-Edge Fascia: Manufactured, two-piece, roof-edge fascia consisting of snap-on metal fascia cover in section lengths not exceeding 12 feet and a continuous metal receiver with integral drip-edge cleat to engage fascia cover and secure modified roof membrane. Provide matching corner units.
  - 1. Metallic-Coated Steel Sheet Fascia Covers: Zinc-coated (galvanized) steel, nominal thickness as required to meet performance SPRI ES-1 requirements.
    - a. Surface: Smooth, flat finish.



- b. Finish coping covers with a fluorocarbon coating containing 70% Kynar 500. Color shall be selected by Architect from Fluoropon Standard colors as manufactured by Valspar.
- G. Fascia/Scupper: Form and install fascia/scupper of 24 gage metal at roof edge where shown.
1. Make up fascia/scupper in 10' lengths with scupper continuously soldered.
  2. Install over the single-ply roofing membrane on flashing tape and nail flange with nails spaced in staggered pattern 6" on centers near the back edge.
  3. Bend outside bottom edge to form drip and lock to continuous heavy gauge cleat secured to wood blocking with nails.
  4. Strip the horizontal flange with another layer of single-ply roofing membrane.
  5. Lap end joints 8" and bed in roof cement (roof cement must be approved by single-ply membrane manufacturer). Miter and seam solder the joints at corners before installing them on single-ply membrane.
- H. Fascia/Gutter: Form and install fascia/gutter of 24 gage metal at roof edge where shown.
1. Make up fascia/gutter in 10' lengths with scupper continuously soldered.
  2. Install over the single-ply roofing membrane on flashing tape and nail flange with nails spaced in staggered pattern 6" on centers near the back edge.
  3. Strip the horizontal flange with another layer of single-ply roofing membrane.
  4. Lap end joints 8" and bed in roof cement (roof cement must be approved by single-ply membrane manufacturer). Miter and seam solder the joints at corners before installing them on single-ply membrane.
- I. Conductor Head: Provide conductor heads of 22 gage metal, riveted and soldered watertight.
1. outlet sleeve to fit downspout, rivet and solder sleeve into downspout.
  2. Solder ¼" mesh galvanized wire screen over conductor head top.
  3. Attach conductor head to wall with masonry fasteners.
  4. Loose lock conductor head to scupper and solder watertight.
  5. Provide overflow 1" below level of scupper.
- J. Splash Pans: Provide 24 gage galvanized metal splash pans where downspouts discharge onto roofs. Install pans in mastic (mastic must be approved by membrane manufacturer) to set flat on the roof and secure to downspouts by riveting and soldering.
- K. Miscellaneous flashings and other items of sheet metal roof work shall be provided as required for a weathertight job.

END OF SECTION

SECTION 07 65 00

FLEXIBLE FLASHING

PART 1 - GENERAL

1.1 SUMMARY

- A. Flexible stainless steel self-adhering flashing.
- B. Related Sections:
  - 1. Section 04 20 00 - Masonry Units.
  - 2. Section 07 62 00 - Sheet Metal Flashing and Trim.

1.2 REFERENCES

- A. Standards of the following as a reference:
  - 1. ASTM.
  - 2. Brick Industry Association (BIA).
  - 3. Recycled content & Recyclability.
- B. Federal Government Publications: [www.epa.gov/nscep](http://www.epa.gov/nscep).
  - 1. 40 CFR 59, Subpart D-200 - National Volatile Organic Compound Emission Standards for Architectural Coatings.
- C. National Fire Protection Association (NFPA): [www.nfpa.org](http://www.nfpa.org).
  - 1. NFPA 285 – Standard Fire Test Method For Evaluation Of Fire Propagation Characteristics Of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components.
- D. American Architectural Manufacturers Association (AAMA): [www.aamanet.org](http://www.aamanet.org).
  - 1. AAMA 711-20 Voluntary Specification for Self-Adhering Flashing Use for Installation of Exterior Wall Fenestration Products.
- E. Sealant, Waterproofing, and Restoration Institute (SWRI): [www.swrionline.org](http://www.swrionline.org).
  - 1. SWRI Validation Program.
- F. Industry standards:
  - 1. BIA Technical Notes on Brick Construction No. 7, Water Penetration Resistance- Design and Detailing, November 2017.
  - 2. BIA Technical Notes on Brick Construction No. 28B, Brick Veneer/Steel Stud Walls, December 2005.

1.3 DEFINITIONS

- A. Terms:
  - 1. Cavity wall flashing: Same as flexible flashing.
  - 2. Foundation sill flashing: Same as flexible flashing.
  - 3. Flexible flashing: Water-proof material typically used in cavity wall construction to contain and assist in the proper water drainage that may penetrate the wall system veneer. Other materials may be required to constitute the system.
  - 4. Head and sill flashing: Same as flexible flashing.
  - 5. Through-wall flashing:
    - a. Generally considered the same as flexible flashing.
    - b. Rare definition referred to full-width cap flashing under copings or wall caps.

1.4 SUBMITTALS

- A. General: Submit in accordance with SECTION 01 33 23 - SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Product Data: For each type of product. Indicate material type, composition, thickness, and installation procedures.

- C. Shop Drawings: For the following flashing materials that are specially fabricated:
1. Fabricated Flashing: Detail corner units, end-dam units, step flashing and other special applications.

D. Samples:

1. Flexible flashing material, 3" by 5".
2. Premanufactured inside and outside corners.
3. Fabricated step flashing and other special applications.
4. Drip plate, 6" long.
5. Drip plate premanufactured inside and outside corners.
6. Premanufactured end dams, for each application.
7. Termination bar, 6" long.

E. Certificates:

1. From flexible flashing manufacturer, certifying compatibility (including adequate adhesion) of flexible flashing and accessory materials with Project materials that connect to or that come in contact with flexible flashing.
2. Certifying the use of domestic manufactured stainless steel for flashing.

## 1.5 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer: Provide flashing materials by a single manufacturer with not less than twenty-five years of experience in manufacturing flexible flashing products.

B. Materials:

1. Flashing materials must be able to withstand 250° F temperature without changing the long-term performance of the flashing.

C. Pre-installation Conference:

1. At a scheduled pre-installation conference with all trades, contractor shall review flashing for the project and how the flashing shall be sequenced with the following: below grade waterproofing, air and vapor system, window installation, sealant installation, relief angles and roofing.

D. Mock-up:

1. Provide mock-up of complete flashing system, including flexible flashing, drip plate, inside and outside corners, end dams, step flashing, termination bar, flashing/drip plate joints and sealant.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

## 1.6 WARRANTY

- A. 20-year manufacturer's warranty.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURED UNITS

A. Flexible flashing:

1. Basis of Design Product: York 304 SA by York Manufacturing, Inc.
2. Products of manufacturers listed below meeting indicated standards and specified manufacturer's product data characteristics are acceptable for use, subject to compliance with specified requirements.  
Momentive; Elemax SS Flashing  
Vapro Shield, Inc.; Vapro-SS Flashing  
Wire Bond; Bond-N-Flash S.A.  
York 304 SA  
3GEN Masonry Products, Inc.; Genflash SS SA  
NO SUBSTITUTIONS.

3. Characteristics:
  - a. Type: Stainless steel core with one 2 mils uncoated (bare) stainless steel face (outward facing) bonded to a minimum 8 mils thick adhesive (inward facing), to produce an overall minimum thickness of 10 mils.
  - b. Stainless Steel: Type 304, ASTM A240. Domestically sourced per DFARS 252.225-7008 and/or DFARS 252.225-7009.
  - c. Adhesive: Butyl or acrylic.
  - d. Primer: As required by flashing manufacturer.
  - e. UV resistant.
  - f. Fire Resistant: ASTM E84 Class A material.
  - g. Mold Resistant: Passes ASTM D3273.
  - h. Passes AAMA 711-20.
  - i. Passes air barrier material test: ASTM E2178-13.
  - j. Size: Manufacturer's standard width rolls.
  
- B. Accessories:
  1. Sealant, Mastic and Primer: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding and sealing flashing sheets to each other and to substrates.
  2. Flashing Corners and End Dams: Type 304 stainless steel, 26 gauge, premanufactured inside/outside corners and end dams.
  3. Backer Plate: 6" x 20 ga. galvanized sheet metal backer plate behind sheathing at stud walls, for securing termination bar.
  4. Termination Bar: Type 304 stainless steel, 26 gauge termination bar with sealant lip on top edge.
  5. Drip Plate: Type 304 stainless steel, 26 gauge, 3" drip plate with 1/4" 30-degree angled and hemmed outside edge, including premanufactured inside/outside drip plate corners and end dams.
    - a. Basis of Design product shall be York Stainless Steel Drip Edge. At locations detailed without an exposed angled drip edge, the Basis of Design product shall be York Stainless Steel Drip Edge with non-angled hemmed outside edge.
    - b. Outside Corners: Basis of Design product shall be York Stainless Steel Drip Edge Corners, fabricated from single piece of sheet metal, without joints or seams. Manufacturer shall grind down point of outside corner to provide an eased corner free from sharp points and edges, prior to shipment of material.
    - c. Inside Corners, End Dams and Step Flashings: Fabricated from one or two pieces of sheet metal. Seams shall be overlapped, and welded or soldered.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. General:
  1. Install where indicated, specified, or required according to flashing manufacturer's written instructions and as follows.
  2. Prime substrate for installation of flexible flashing if recommended by material manufacturer.
  3. Flashing Width: Width of flashing material required starting 3/4" back from the outside face of exterior wythe, extending through the cavity, rising height required to extend above lintel steel at least 2", unless otherwise detailed.
  4. Flashing Length:
    - a. Flexible flashing shall be continuous where possible. Where joints are necessary, splice end joints by overlapping flashing at least 2" and seal with a compatible sealant recommended by flashing manufacturer.
    - b. Extend flashing 8" beyond openings. At the end of flashing at openings or other horizontal flashing terminations, use premanufactured sheet metal end dam units.
  5. Masonry and Concrete Back-up:
    - a. Surface apply after air barrier or dampproofing installation in accordance with manufacturer's installation instructions.
    - b. Fasten to masonry backup surface at the top by using a termination bar. Fasten termination bar to masonry back-up at 8" o.c., and seal top edge with compatible sealant recommended by flashing manufacturer.
  6. Stud Back-up with Sheathing:
    - a. Fasten to stud backup at the top using a termination bar.
      - 1) Install continuous galvanized sheet metal backer plate to face of studs, behind sheathing.
      - 2) Fasten termination bar to studs and continuous sheet metal backer plate at 8" o.c.
      - 3) Seal top edge of termination bar with compatible sealant recommended by flashing manufacturer.

7. Drip Plates: Install stainless steel drip plate at all flashing terminations at face of masonry. Install premanufactured corner units at all inside and outside corners. Set drip plates in full bed of sealant.
8. End Dams:
  - a. At lintels and heads, extend flashing 8" past opening at each end, and install premanufactured stainless steel sheet metal end dams.
  - b. At shelf angles, sills and other horizontal flashing terminations, install premanufactured stainless steel sheet metal end dams at each end.
9. Inside and Outside Corners: Install premanufactured corners from the manufacturer.
10. Step Flashings: Install fabricated stainless steel sheet metal step flashings where through-wall flashings are required to step down to meet detail requirements.
11. Stop membrane 3/4" back from face of masonry and install membrane using hard roller and roll the membrane with constant, firm pressure to ensure uniform contact with the substrate.
  - a. Provide guideline on drip plate at 3/4" location to facilitate installation of flexible flashing at proper location, as well as to facilitate Architect's field observations.
  - b. Apply sealant recommended by flashing manufacturer to leading edge of flexible flashing at drip plate as well as at all other termination edges of flashing.
12. Leave ready for air barrier transition flashing, installed in another Section, to be installed over sealed termination bar,.
13. Cavity drainage material, weeps and other masonry accessories shall be installed per Section 04 20 00 Masonry Units.
14. Cover flashing within a few days of installation to protect it from damage from the different trades, the environment, and falling debris. If the flashing is punctured, torn or has loose poly, replace the damaged flashing material.

### 3.2 SCHEDULES

#### A. Locations:

1. Exterior door heads.
2. Window heads.
3. Other wall openings.
4. Horizontal control joints.
5. Changes in veneer materials, vertically.
6. Over steel lintels, plates and angles in exterior masonry walls.
7. Within masonry parapets and walls as through flashing to detail.
8. At the bottom of cavity walls with weep holes.
9. Under window sills to detail.
10. Other locations indicated.

END OF SECTION

SECTION 07 92 00

JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Sealing and caulking of joints.
- B. Related Sections:
  - 1. Section 03 30 00 - Cast-In-Place Concrete.
  - 2. Section 04 20 00 - Masonry Units.
  - 3. Section 06 40 00 - Architectural Woodwork.
  - 4. Section 07 62 00 - Sheet Metal Flashing and Trim.
  - 5. Section 07 84 00 - Firestopping.
  - 6. Section 08 80 00 - Glazing.
  - 7. Section 09 21 16 - Gypsum Board Assemblies.

1.2 SUBMITTALS

- A. Submit under provisions of SECTION 01 33 23 - SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Submit product data indicating sealant chemical characteristics, performance criteria, limitations, color availability and application instructions.
- C. Submit two samples ¼" diameter x 4" in size illustrating color selections available.
- D. Submit manufacturer's certificate under provisions of SECTION 01 45 00 - QUALITY CONTROL that products meet or exceed specified requirements.

1.3 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum 3 years documented experience.
- B. Applicator: Company specializing in applying the work of this section with minimum 3 years documented experience and approved by sealant manufacturer.
- C. Conform to Sealant and Waterproofers Institute requirements for materials and installation.

1.4 FIELD SAMPLES

- A. Provide samples under provisions of SECTION 01 33 23 - SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Construct one field sample joint, 5 feet long, illustrating sealant type, color, and tooled surface.
- C. Locate where directed.
- D. Accepted sample may remain as part of the work.

1.5 PROJECT CONDITIONS

- A. Environmental Requirements: No caulking shall be done at temperatures below 40°F.

1.6 WARRANTY

- A. Furnish to the Owner a written warranty that the sealants shall remain watertight for a period of 2 years from the date of acceptance of the building. Joints which prove defective by leaking, cracking, melting or shrinking of the sealant shall be re-sealed without additional expense to the Owner.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Reference "SEALANT SCHEDULE" at end of this specification section for locations of Sealant Types.
- B. Modified Polyurethane (Type 1 Sealant):
1. Two or three-part conforming to ASTM C 920, Type M, Grade NS, Class 25.
  2. Color: Custom colors as selected by Architect.
  3. Acceptable products:  
MasterSeal NP2, Master Builders Solutions, a brand of MBCC Group.
- C. Pourable Urethane (Type 2 Sealant):
1. Multicomponent conforming to ASTM C 920, Type M, Grade P (pourable), Class 25, Use T (traffic).
  2. Color: Custom color as selected by Architect.
  3. Acceptable products:  
Urexpam NR-200, Pecora Corp.  
MasterSeal SL 2 Sealant; Master Builders Solutions, a brand of MBCC Group.  
THC 900 (Self leveling) or 901 (low sag), Tremco.
- D. Pourable Urethane Sealant (Type 3 Sealant):
1. Single-component conforming to ASTM C 920, Type S, Grade P (pourable), Class 25, Use T (traffic).
  2. Color: Gray or limestone as selected by Architect.
  3. Acceptable products:  
Sikaflex - 1CSL; Sika Corporation, Inc.  
MasterSeal SL 1; Master Builders Solutions, a brand of MBCC Group.  
Vulkem 45; Tremco
- E. Silicone, General Purpose (Type 4 Sealant)
1. One-part low modulus rubber based silicone conforming to ASTM C 920, Type S, Grade NS, Class 100/50.
  2. Color: As selected by Architect.
  3. Acceptable products  
Dowsil 790 Silicone Building Sealant, Dow Corning.  
SCS2700 Silpruf LM, GE Silicones.  
Spectrem 1, Tremco.
- F. Polyurethane Hybrid, Paintable (Type 5 Sealant):
1. One-part, moisture-cure, polyurethane hybrid sealant for interior use, conforming to ASTM C 920, Type S, Grade NS, Class 35 and Fed. Spec TT-S-00230C, Class A, Type II.
  2. Acceptable product:  
Dymonic FC, Tremco
- G. Silicone, Sanitary (Type 6 Sealant):
1. One-part conforming to ASTM C 920, Type S, Grade NS, Class 25, F.D.A. Regulation 21 CFR177.2600, and FDA Food Additive Regulation 121.2514.
  2. Color: Clear.
  3. Acceptable products:  
786 Silicone Sealant - M, Dow Corning.  
SCS1700 Sanitary, GE Silicones.
- H. Acrylic Latex (Type 7 Sealant)
1. One-part, non-sag acrylic latex, siliconized, conforming to ASTM C 834, Type OP, Grade NF or -18° C.
  2. Acceptable products:  
AC-20+, Pecora Corp.  
MasterSeal NP 520; Master Builders Solutions, a brand of MBCC Group.  
Tremflex 834; Tremco.
- I. Acoustical Sealant (Type 8 Sealant):
1. Acrylic Latex Acoustical sealant for concealed locations.
  2. Acceptable products:  
AC-20 FTR Acoustical and Insulation Sealant, Pecora Corp.  
Acoustical Sealant, Tremco  
Sheetrock Acoustical Sealant; USG Co.

- J. Silicone Sealant (Type 9 Sealant):
1. Single-component, low-modulus, neutral-curing, non-sag silicone sealant complying with ASTM D 5893 for Type NS.
  2. Color: Gray.
  3. Product/manufacturer; one of the following:  
RoadSaver Silicone; Crafc0, Inc.  
888; Dow Corning Corporation
- K. Sealant (Type 10 Sealant): Reference SECTION 09 21 16 - GYPSUM BOARD ASSEMBLIES
- L. Silicone Sealant (Type 11 Sealant):
1. ASTM C 1184, One-part, neutral-cure, silicone sealant.
  2. Color: Clear.
  3. Product/manufacturer:  
Dow Corning® 995 Silicone Structural Glazing Sealant.
- M. Silicone Sealant (Type 12 Sealant):
1. One-part medium modulus rubber based silicone conforming to ASTM C 920, Type S, Grade NS, Class 50.
  2. Color: As selected by Architect.
  3. Acceptable products; one of the following or approved equivalent:  
Dowsil 795 Silicone Building Sealant, Dow Corning.  
Pecora Contractor Silicone (PCS); Pecora Corp.

## 2.2 ACCESSORIES

- A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.
- B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.
- C. Joint Backing: ASTM D 1056 and C 1330. In vertical joints use closed cell polyethylene foam rod; oversized 30 to 50 percent larger than joint width. In horizontal joints, use solid neoprene or butyl rubber, Shore A hardness of 70.
1. At Exterior Insulation and Finish Systems, provide closed cell at both horizontal and vertical joints.
- D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify that surfaces and joint openings are ready to receive work and field measurements are as shown on drawings and recommended by the manufacturer.
- B. Beginning of installation means installer accepts existing substrate.

### 3.2 PREPARATION

- A. Joint surfaces shall be clean and dry. Remove loose mortar and other material completely with compressed air or by brushing.
1. Joints to be caulked shall be at least ¼" wide unless specifically specified smaller. At any point where the width of the joint is appreciably less, cut or grind out the joint to that width to assure an adequate volume of sealant along the length of the joint, except at concrete paving joints, those shall remain ⅙" wide as indicated.
  2. Pack with backing material the voids and recesses around metal frames which are deeper than the depth required for caulking. Leave the proper depth for the sealant.
  3. In open joints and where detailed, install rod stock as backing material. Roll the material into the joints to avoid stretching. The natural thickness of the rod stock shall be approximately twice the thickness of the joint in which it is installed.
  4. In raked masonry joints, apply a bondbreaker strip of polyethylene or masking tape along the bottom of the joints.



5. Where sealant is to be applied against smooth metal surfaces, wipe these surfaces clean with a suitable ketone solvent immediately prior to caulking.
6. Particular attention shall be paid to the preparation of horizontal joints in wear surfaces to be filled with sealant. Adjust joint depth to comply with sealant manufacturer's recommendations by malleting down the joint filler or filling in with rod stock as may be required. Joints in concrete paving shall be primed in accordance with manufacturer's recommendations.
7. Perform preparation in accordance with ASTM C 1193 for solvent release sealants, C 1193 for latex base sealants, C 919 for acoustical applications, and C 1193 for elastomeric sealants.

### 3.3 APPLICATION

- A. Priming: Prime porous joint surfaces, particularly masonry and concrete. Test the primer to make sure it causes no staining of the material on which it is applied.
- B. Depth of sealant: Seal joints to a depth of approximately ½ the joint width, but never less than ¼" deep. Follow the sealant manufacturer's recommendations where possible.
- C. Apply the sealant in accordance with the manufacturer's instructions.
  1. Force the sealant into joints with enough pressure to expel all air and provide a solid filling. Correct any flowing or sagging before final inspection is made.
  2. Where adjacent surfaces permit, use masking tape to obtain straight, even lines. Remove tape immediately after the joints have been sealed.
  3. Fill joints flush with adjacent surfaces except where a recessed joint is specifically detailed. Tool beads with a sled runner or similar tool to insure full contact with joint faces.
  4. For caulking horizontal joints in wear surfaces, use a gun with a narrow nozzle. Apply the flow type sealant with the nozzle riding along the bottom so that the sealant is forced up to completely fill the slot without cavities. Provide and use a portable vacuum cleaner to remove loose dirt from the joints just ahead of the caulking gun.
- D. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
- E. Tool joints concave. Sealant shall achieve a firm skin before surface coating is applied.

### 3.4 CLEANING/REPAIRING

- A. Clean adjacent surfaces of soiling due to caulking operations. This applicator shall be responsible for and shall bear the cost of replacing any material damaged or discolored due to caulking operations.
- B. Repair or replace defaced or disfigured finishes caused by work of this section.

### 3.5 SEALANT SCHEDULE

- A. Locations specified below for sealants and caulking required under this section are general and shall not be considered as affecting the required use of sealing compounds specified under other sections of the specifications.

<u>SEALANT TYPE</u>	<u>APPLICATION</u>
1	<ol style="list-style-type: none"><li>a. Vertical control and expansion joints in exterior and unpainted interior masonry surfaces. At joint width 1" or more, reference SECTION 07 95 00 - EXPANSION CONTROL.</li><li>b. Vertical joints at perimeter of window, door, and storefront elements where adjacent to stone, masonry, or concrete surfaces.</li><li>c. Reglets: The top groove along the surface-mounted flashing reglets.</li><li>d. Sealing joints in sheet metal fabrications.</li><li>e. Unless noted otherwise, any other exterior vertical joints.</li></ol>
2	<ol style="list-style-type: none"><li>a. Interior horizontal control and expansion joints in flooring, stone, masonry and tile flooring and at junctures between these materials and other adjacent materials.</li></ol>
3	<ol style="list-style-type: none"><li>a. Exterior horizontal control and expansion joints in concrete paving.</li><li>b. Filling of roof penetration pockets (pitch pans).</li></ol>

- 4
  - a. Sealing of joints between plumbing fixtures and substrates and between plastic laminate splashes and adjacent tops and walls.
  - b. Threshold and windowsills set in full bed of sealant.
  - c. Sealing of EIFS to EIFS joints. Seal to base coat and not to finish coat. Finish coat shall not turn into the joint.
- 5
  - a. General caulking as part of interior painting in joints subject to movement.
  - b. Sealing of joints between tilt-wall panels.
- 6
  - a. Sealing joints between countertops and substrates in concession areas and elsewhere which may be in contact with food.
- 7
  - a. General caulking as part of interior painting.
- 8
  - a. Setting sill track, head track, and end studs to substrates on acoustically rated partitions. Refer to SECTION 09 21 16 - GYPSUM BOARD ASSEMBLIES for application requirements.
- 9
  - a. **Exterior horizontal control and expansion joints in concrete paving.**
- 10
  - a. Sealing of joints in exterior glass-mat gypsum sheathing
- 11
  - a. Sealing of joints in butt glazing.
- 12
  - a. Sealing of joints of EIFS to other surfaces, perimeter seals.

END OF SECTION

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SECTION 08 41 13

ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Fixed aluminum windows utilizing storefront framing systems.
- B. Related Sections:
  - 1. Section 07 92 00 - Joint Sealants: caulking of perimeter joints.
  - 2. Section 08 80 00 - Glazing.

1.2 SUBMITTALS

- A. General: Submit in accordance with SECTION 01 33 23 - SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Shop Drawings: Include drawings showing elevations of each storefront type, detail sections of typical composite members, and glazing details.
- C. Samples: Submit for approval duplicate samples showing the limits of color range to which the entrance, storefront, and door materials will be processed. Samples shall be representative of the materials to be furnished, and the color of the installed materials shall be within the range of the approved samples.
- D. Verify that field measurements are as indicated on shop drawings and as instructed by the manufacturer.

1.3 SYSTEM DESCRIPTION AND PERFORMANCE

- A. Architectural Requirements
  - 1. Drawings are diagrammatic and do not purport to identify or solve problems of thermal or structural movement, glazing or anchorage.
  - 2. Requirements shown by details are intended to establish basic dimensions of units, sightlines and profiles of members.
  - 3. Provide concealed fastening wherever possible.
  - 4. Provide continuous snap-in thermally-broken aluminum backer plate at head and jamb conditions.
- B. Structural Requirements
  - 1. System to provide for expansion and contraction within system components caused by a cycling temperature range of 170°F. without causing detrimental effects to system or components.
  - 2. Design and size members to withstand dead loads and live loads caused by pressure and suction of wind as calculated in accordance with building code, and measured in accordance with ANSI/ASTM E 330.
  - 3. Limit mullion deflection to L/175, or flexure limit of glass with full recovery of glazing materials, whichever is less.
  - 4. System to accommodate, without damage to system or components, or deterioration of perimeter seal: Movement within system; movement between system and perimeter framing components; dynamic loading and release of loads; and deflection of structural support framing.
  - 5. Storefront manufacturer shall be responsible for design and engineering of storefront system, including necessary modifications to meet specified requirements and maintaining visual design concepts.
  - 6. Attachment considerations shall take into account site peculiarities and expansion and contraction movements so there is no possibility of loosening, weakening or fracturing connection between units and building structure or between units themselves.
  - 7. Design anchors, fasteners and braces to be structurally stressed not more than 50% of allowable stress when maximum loads are applied.
  - 8. Engineer storefront and entrances to be free from rattles, wind whistles and noise due to thermal and structural movement and wind pressure.
- C. Environmental Requirements
  - 1. Drain water entering joints, condensation occurring in glazing channels, or migrating moisture occurring within system, to exterior. No leakage shall occur in wall when tested in accordance with ASTM E 331 at test pressure of 6.24 lbs/sq ft.

2. Limit air infiltration through assembly to 0.06 cu ft/min/sq ft of assembly surface area, measured at a reference differential pressure across assembly of 1.57 lbs/sq ft. as measured in accordance with ANSI/ASTM E 283.
3. Thermal Transmittance (U-factor): Fixed glazing and framing areas shall have U-factor maximum of 0.45 BTU/Sq.Ft. x h x deg F as determined according to NFRC 100.
4. Maintain continuous air and vapor barrier throughout assembly, primarily in line with inside pane of glass and heel bead of glazing compound.

#### 1.4 QUALITY ASSURANCE

- A. Erector Qualifications: Erection of the entrance and storefront systems and doors shall be by an experienced erector approved by the manufacturer.
- B. Design Criteria:
  1. Deflection of glass framing members under design loads shall not exceed  $L/175$  or  $3/4$ ", whichever is less.
  2. Deadload deflection of horizontal glass framing members shall not exceed 0.125".
  3. Exterior Entrances and Storefront: Design windload shall be 22 psf.
- C. Perform work in accordance with AAMA SFM-1 and AAMA - Metal Curtain Wall, Window, Store Front and Entrance - Guide Specifications Manual.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and handle system components under provisions of SECTION 01 65 00 - PRODUCT DELIVERY REQUIREMENTS.
- B. Store and protect system components under provisions of SECTION 01 66 00 - PRODUCT STORAGE AND HANDLING REQUIREMENTS.
- C. Provide wrapping to protect prefinished aluminum surfaces.

#### 1.6 COORDINATION

- A. Manufacturer shall be responsible for details and dimensions not controlled by job conditions and shall show on his shop drawings required field measurements beyond his control.
- B. Coordinate with responsible trades to establish, verify and maintain field dimensions and job conditions.

#### 1.7 ENVIRONMENTAL CONDITIONS

- A. Do not install sealants when ambient temperature is less than 40°F. during and 48-hours after installation.

#### 1.8 WARRANTY

- A. Special Assembly Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of aluminum-framed systems that do not comply with requirements or that deteriorate within specified warranty period.
  1. Failures include, but are not limited to, the following:
    - a. Structural failures including, but not limited to, excessive deflection.
    - b. Noise or vibration caused by thermal movements.
    - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
    - d. Water leakage through fixed glazing and framing areas.
    - e. Failure or operating components to function properly.
  2. Warranty Period: 2 years from date of substantial completion.

## PART 2 - PRODUCTS

### 2.1 ACCEPTABLE MANUFACTURERS

- A. Provide aluminum entrances and storefronts as manufactured by one of the following:
- EFCO Corp.
  - Kawneer North America
  - Oldcastle Building Envelope
  - Tubelite, Inc
  - YKK AP America, Inc.

### 2.2 MATERIALS

- A. Extruded Aluminum: ASTM B 221; AA 6063-T5 alloy, temper.
- B. Sheet Aluminum: ASTM B 209; 5005-H34 alloy, temper; or other alloys and temper recommend by manufacturer appropriate for specified finish.
- C. Sheet Steel: ASTM A 446; hot-dipped galvanized.
- D. Steel Sections: ASTM A 36; shapes to suit mullion sections.
- E. Primer and Touch-Up Primer for Galvanized Surfaces: High-zinc-dust-content paint complying with SSPC-Paint 20.
- F. Fasteners: Stainless steel.

### 2.3 FABRICATED COMPONENTS

- A. General: Form section true to details with clean, straight, sharply defined profiles, free from defects impairing strength or durability.
- B. Framing:
1. Framing Types Basis of Design shall be Kawneer:
    - a. Exterior: Provide the following thermally broken framing systems where shown on drawings.
      - 1) 2" x 4-1/2" Framing System: Kawneer Trifab® VG™ 451T
  2. Fabricate the aluminum storefront systems with the shapes and sections detailed.
  3. Design the glass framing system to minimize loads on the glass due to building movement and incorporate provisions for thermal expansion by means of expansion joints. Where insulating glass is to be installed, design the glass framing system so that moisture does not accumulate in the glazing channel for prolonged periods.
  4. Construction: Mill joints to a hairline fit. Assemble and connect members to form rigid, watertight assemblies. No exposed fastenings will be permitted. Reinforce the framing internally as required to meet the design criteria specified above.
  5. Continuous Solid Closures: Fabricate required closures and covers to detail of aluminum sheet, plate, and angles. Provide solid continuous thermally-broken backer plate closures at head and all jambs.
  6. Accessories: Provide glazing gaskets, flashing, and miscellaneous shims and other parts detailed or otherwise required to complete the work.
  7. Provide manufacturer's standard closure plate at perimeter framing members to cover open side of framing member against surrounding construction. Provide solid aluminum head channel at head condition per drawings.
- C. Flashings:
1. Form from sheet aluminum with same finish as extruded sections. Apply finish after fabrication. Material thickness as required to suit condition without deflection or "oilcanning"; of proper alloy to match the finished extrusions.
  2. Subsill Flashing: Provide manufacturer's standard high-performance, thermally-broken aluminum subsill flashing with integral weep holes. End dams shall be manufacturer's standard fiberglass, plastic or thermally-broken aluminum end dams.

- D. Extruded Aluminum:
  - 1. Framing System: Principal extrusions shall have a minimum wall thickness of 0.08". Moldings, trim, and glass stops shall be not less than 0.050" thick.
- E. Fabricate frames allowing for minimum clearances and shim spacing around perimeter of assembly, yet enabling installation.
- F. Rigidly fit and secure joints and corners with internal reinforcement. Make joints and connections flush, hairline, and weatherproof.
- G. Develop drainage holes with moisture pattern to exterior.
- H. Prepare components to receive anchor devices. Fabricate anchorage items.
- I. Arrange fasteners, attachments, and jointing to ensure concealment from view.
- J. Prepare components with internal reinforcement for door hardware.
- K. Reinforce framing members for imposed loads.

## 2.4 HARDWARE

- A. Weatherstripping: Provide Kawneer's Polymeric Sealair Weathering System or approved equivalent, continuous at head, jamb, sill, and meeting stile.

## 2.5 FINISHES

- A. Dark Bronze Anodized (Ehrhardt ES, Hassler ES, Krahn ES, Kuehnle ES, Roth ES, Shultz ES)
  - 1. Finish coating to conform to AAMA 611. Finish for aluminum entrances, storefronts, frames shall match.
  - 2. Aluminum Finish: Exposed aluminum surfaces of entrances, storefronts, frames, and all their associated parts shall be Architectural Class I AA-M10C22A44 Hard Coat Color Anodic Coating Dark bronze color, .7 mil minimum. Screw and bolt heads exposed to view shall be finished to match the exposed aluminum surfaces.
- B. Clear Anodized (Kohrville ES, Metzler ES)
  - 1. Finish coating to conform to AAMA 611. Finish for aluminum entrances, storefronts, frames shall match.
  - 2. Aluminum Finish: Exposed aluminum surfaces of entrances, storefronts, frames, and all their associated parts shall be Architectural Class I AA-M10C22A41 Clear Anodic Coating, .7 mil minimum. Screw and bolt heads exposed to view shall be finished to match the exposed aluminum surfaces.
- C. Concealed Steel Items: Galvanized in accordance with ANSI/ASTM A 123 to 2.0 oz/sq ft.
- D. Apply one coat of bituminous paint to concealed aluminum surfaces in contact with cementitious or dissimilar materials.

## PART 3 - EXECUTION

### 3.1 INSPECTION

- A. Examine areas to receive storefronts for conditions that will adversely affect the execution and quality of work. Do not start this work until unsatisfactory conditions are corrected.
- B. Field check dimensions, elevations, and slopes on the connecting work affecting the storefront to assure a proper fit and weathertight installation.
- C. Verify that field measurements are as indicated on shop drawings and as instructed by the manufacturer.

### 3.2 INSTALLATION

- A. Install wall system and glazing in accordance with manufacturer's instructions and AAMA - Metal Curtain Wall, Window.
- B. Erecting Storefronts: Erect the members to be plumb, level, square and in proper alignment with other work, and free from sags, waves and buckles.
  - 1. Materials shall be accurately cut and fitted and rigidly anchored in place to resist safely all normal stresses to which the work will be subjected.
  - 2. Cut and machined ends and recesses shall be true, accurate and free of burrs and rough edges.
  - 3. Provide subsill extrusions positioned to collect water leakage through mullions and storefront. Subsill shall drain to the exterior. It shall run continuously across the opening width. The ends are sealed with end dams.
  - 4. Create end dams at ends of window heads, sills, at edges of storefronts, and other vertical elements to channel water to nearest weep hole away from window mullions and other items which might allow water to travel vertically.
  - 5. Provide clearance around the perimeter between entrance and storefront metal and the opening substrate (concrete, masonry, or stucco) for caulking.
- C. Sealing Joints: Seal the metal-to-metal framing joints properly in conformance with the manufacturer's standard procedure.
- D. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- E. Install glass and infill panels in accordance with SECTION 08 80 00 - GLAZING, using exterior dry method of glazing.
- F. Install perimeter 2 part polyurethane type sealant, backing materials, and installation requirements in accordance with SECTION 07 92 00 - JOINT SEALANTS.

### 3.3 TOLERANCES

- A. Maximum Variation from Plumb: 0.06" every 3' non-cumulative or 1/16" per 10', whichever is less.
- B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32".

### 3.4 ADJUSTING

- A. Adjust operating hardware for smooth operation.

### 3.5 PROTECT AND CLEAN

- A. Protection of Aluminum:
  - 1. Protect concealed aluminum surfaces that will contact masonry, concrete and steel with neoprene gaskets or a coat of bituminous paint to prevent galvanic and corrosive action.
  - 2. If drainage of moisture from incompatible metal passes over aluminum, paint the incompatible metal with a coat of aluminum pigmented paint.
  - 3. Protect finished aluminum surfaces from staining by gypsum and cement materials until all adjacent masonry and plaster work has been completed.
- B. Cleaning: Upon completion of the work, wash down aluminum surfaces with water and soft cloths and leave in first class condition.

END OF SECTION



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SECTION 08 80 00

GLAZING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Glass and glazing accessories.
- B. Related Sections:
  - 1. Section 07 92 00 - Joint Sealants

1.2 PERFORMANCE REQUIREMENTS

- A. Glass and glazing materials of this section shall provide continuity of building enclosure vapor and air barrier
  - 1. In conjunction with materials described in SECTION 07 92 00 - JOINT SEALANTS.
  - 2. Maintain continuous air and vapor barrier throughout glazed assembly from glass pane to heel bead of glazing sealant.
- B. Design and size glass to withstand dead loads and live loads caused by pressure and suction of wind as calculated in accordance with building code, and measured in accordance with ASTM E 330.
- C. Limit glass deflection to  $l/200$  or flexure limit of glass with full recovery of glazing materials, whichever is less.
- D. Windborne-debris-impact Resistance: Provide exterior glazing that passes basic-protection testing requirements in ASTM E 1996 for Wind Zone 1 when tested according to ASTM E 1886. Test specimens shall be no smaller in width and length than glazing indicated for use on the Project and shall be installed in same manner as glazing indicated for use on the Project.
  - 1. Large-Missile Test: For glazing located within 30 feet of grade.
  - 2. Small-Missile Test: For glazing located more than 30 feet above grade.

1.3 SUBMITTALS

- A. Submit product data and samples under provisions of SECTION 01 33 23 - SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.
- B. Provide structural, physical and environmental characteristics, size limitations, special handling or installation requirements.
- C. Provide data on glazing sealant. Identify colors available.
- D. Samples:
  - 1. Submit 2 samples of each type of glass (except clear glass), 12" x 12" in size, illustrating glass unit, coloration, design.
  - 2. Submit 4" long bead of glazing sealant in color selected.

1.4 QUALITY ASSURANCE

- A. Glazing Standards: Comply with recommendations of Glass Association of North America (GANA) "Glazing Manual."
- B. Source Quality Control: Glass shall be identified by the manufacturer's labels of grade and quality. Temporary labels shall not be removed until final cleaning. Permanent labels on tempered glass shall not be removed.
  - 1. 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.
  - 2. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the IGCC.

- C. Safety Glazing Standard: Where safety glass is indicated or required, provide type of products indicated which comply with ANSI Z97.1 and testing requirements of CPSC 16 CFR Part 1201 for Category II materials.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect glass and glazing materials during delivery, storage, and handling as required to prevent edge damage to glass, and damage to glass and glazing materials from effects of moisture including condensation, or temperature changes, and other causes.

#### 1.6 WARRANTY

- A. Provide written 10-year warranty signed by manufacturer of insulating glass agreeing to furnish replacements for those insulating glass units developing manufacturing defects. Manufacturing defects are defined as failure of hermetic seal of air space (beyond that due to glass breakage) as evidenced by intrusion of dirt or moisture, internal condensation or fogging, and other visual indications of seal failure or performance.

### PART 2 - PRODUCTS

#### 2.1 ACCEPTABLE MANUFACTURERS

- A. Basis of Design products are **Vitro Architectural Glass (PPG)**: Provide glass as manufactured by one of the following:  
AGC Glass North America  
Guardian Industries Corp.  
Technical Glass Products  
Oldcastle Building Envelope  
Pilkington North America, Inc. (NSG Group)  
Vitro Architectural Glass (formerly PPG Glass)

#### 2.2 GLASS

- A. (TT1) Tinted, Tempered, Insulating Low-E Glass: Manufacturer's standard 1" thick pre-assembled units consisting of 2 sheets of tempered glass, ASTM C 1048, enclosing a hermetically sealed dehydrated air space; with spacers, sealant, and without protective edge banding. Metal spacers shall be finished to match finish of aluminum storefronts. Match existing glazing to the greatest extent possible.
1. Thickness of Each Pane: 1/4".
  2. Air Space Thickness: 1/2".
  3. Interior Pane: Type I, Class 1 (Clear), Quality q3 (Glazing select), Kind FT - Fully Tempered, Condition A - Uncoated surfaces.
  4. Exterior Pane: Type I, Class 2 - Vitro Solargray tint (Tinted Heat-Absorbing and Light-Reducing), Quality q3 (Glazing select), Kind FT - Fully Tempered, Condition C - Other coated surfaces with low-emissivity Vitro Solarban 60 coating on second surface
  5. Performance Characteristics: Low-E insulating glass shall comply with the following:
    - a. Solar Heat Gain Coefficient: 0.25
    - b. Winter U-value: 0.29.
    - c. Visible Transmittance: 35%

#### 2.3 GLAZING MATERIALS

- A. Glazing Compound: Comply with ASTM C 1311 or FS TT-S-00230, one-part, non-sag acrylic polymeric sealant. Product/manufacturer; one of the following:  
Acryl-R Acrylic Sealant; Schnee-Moorehead, Inc.  
Mono 555; Tremco
- B. Channel Glazing Strips; Hollow Metal Doors and Frames: Provide black vinyl channel glazing strips, Glazing Vinyl for 990 Sliders Part #6062-01 as manufactured by Kawneer.
- C. Accessories: Setting blocks, tape, vinyl gaskets and spacer strips as required for a complete installation.

## PART 3 - EXECUTION

### 3.1 INSPECTION

- A. Examine areas to receive glass for conditions that will adversely affect the execution and quality of work. Do not start this work until unsatisfactory conditions are corrected.

### 3.2 INSTALLATION

- A. Setting Glass: Glazing shall be done at the site by skilled glaziers in conformance with the general conditions governing glazing in the GANA Glazing Manual.
  1. Glazing of aluminum windows and storefront shall be done in conformance with the methods recommended by the manufacturer of the aluminum items. Beads or stops furnished with the items to be glazed shall be used to secure the glass in place.
  2. For interior hollow metal door and frame glazing, install channel glazing strips and place glass within glazing strips. Install the removable stop and position the channel glazing strip to seal completely the void around the glass.
  3. Verify glass sizes for required edge clearances by measuring the openings. Cut each piece accurately and fit to its particular position. Center glass in the opening vertically and horizontally. Use edge blocks in vertical jambs to prevent lateral "walking" of the glass.
  4. Glass shall have clean cut edges. Do not seam, nip, stone or strike edges, or scarf corners, and do not install glass with flared edges at the bottom. Do not bump, drag, or rest the edge of a glass light against metal or other hard objects.
  5. Set tempered glass with tong marks completely concealed or in as inconspicuous a location as possible.

### 3.3 CLEANING

- A. Upon completion of the building, clean glass on both sides and remove labels, paint spots, putty and other defacement. Replace damaged glass with new.

END OF SECTION

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SECTION 09 65 66

ATHLETIC SHEET FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Supply and installation of indoor resilient multipurpose surfacing
  2. Application of the game lines
  3. References for the correct construction and preparation of concrete slabs to receive resilient flooring
- B. Related Sections:
1. Section 03 30 00 - Cast-in-Place Concrete.
  2. Section 09 65 00 - Resilient Flooring; rubber base.

1.2 SUBMITTALS

- A. General: Submit in accordance with SECTION 01 33 23 - SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.
- B. Product Data: Submit copies of each of the following:
1. Manufacturer's standard product data.
  2. Manufacturer's requirements for correct preparation, finishing and testing of substrate base material to receive premanufactured rubber sport surface.
  3. Adhesive product data sheets and manufacturer's certificates indicating approval for the proposed application.
  4. Manufacturer's standard warranty.
  5. Manufacturer's installation and maintenance instructions.
- C. Shop Drawings: Include appropriate room bordering or feature strip details.
- D. Samples:
1. Provide samples of the actual sport surface, feature and reducer strips, in standard colors. Architect reserves the right to reject any brand of flooring on the basis of color at no extra cost to the Owner. Submit for selection and approval brochures, samples or sample boards.
  2. Submit color samples of all the available game line paint colors for selection and approval.
- E. Closeout Submittals:
1. Submit manufacturer's maintenance instructions.
  2. Submit material and installation warranties.

1.3 QUALITY ASSURANCE

- A. Manufacturer, Product and Supplier Qualifications:
1. The manufacturer to be a firm experienced in the manufacturing of prefabricated rubber surface.
  2. The indoor resilient multipurpose surfacing shall have been actively marketed for a minimum of ten (10) years.
  3. The indoor resilient multipurpose surfacing supplier shall be an established firm experienced in the field and appointed as a distributor by the manufacturer of the indoor resilient multipurpose surfacing.
- B. Acceptable Installer:
1. The installer of the indoor resilient multipurpose surfacing shall have a minimum of five (5) years experience in the field installing indoor resilient multipurpose surfacing and have worked on at least five (5) projects of similar size, type and complexity.
  2. Installer to submit the indoor resilient athletic surfacing manufacturer's or distributor's certification attesting that they are an approved installer of the indoor resilient multipurpose surfacing.

#### 1.4 DELIVERY AND STORAGE

- A. Delivery: Material shall not be delivered until all related work is in place and finished and/or proper storage facilities and conditions can be provided and guaranteed stable according to manufacturer's recommendations.
- B. Storage: Store the material in a secure, clean and dry location. Maintain temperature between 55° and 85° Fahrenheit. Store the indoor resilient athletic surfacing rolls in an upright position on a smooth flat surface immediately upon delivery to jobsite. Rolls shipped in rigid protective cardboard containers can be laid horizontally prior to unpacking and installation.

#### 1.5 PROJECT CONDITIONS

- A. The area in which the indoor resilient multipurpose surfacing will be installed shall be dry and weather tight. Permanent heat, light and ventilation shall be installed and operable.
- B. All other trades shall have completed their work prior to the installation of the resilient athletic flooring. The contractor shall maintain a secure and clean working environment before, during and after the installation. Suspension of other trades' work may be authorized providing their work will not damage the new flooring.
- C. Maintain a stable room temperature of at least 65F for a minimum of one (1) week prior to, during and thereafter installation.
- D. Concrete subfloor surface pH level within the 7 to 10 range dependent upon installation type.
- E. Concrete subfloor should be no greater than 1/8" within a 10 ft diameter. This tolerance can be measured in accordance with ASTM E1155. A specified (FF ) of 50 and an (FL ) of 30 should reach this degree of floor flatness and floor level. There is no numerical correlation between F numbers and the deviation from the straight edge, however the above specified numbers should achieve a flat floor with minimal deviation in the slab. Reference ACI 117 and ACI 302.1R. The general contractor should provide a certificate of compliance with the above recommendations.
- F. Concrete subfloor must be clean and free of all foreign materials or objects including, but not limited to, curing compounds and sealers.
- G. Fill cracks, grooves, voids, depressions, and other minor imperfections with Ardex (or equal) cement-based patching/leveling compounds. Follow the manufacturer's directions. Moveable joints must be treated utilizing specific transitioning joint devices. Follow current ASTM F710 guidelines for the preparation of concrete slabs to receive resilient flooring.

#### 1.6 WARRANTY

- A. Materials: The indoor resilient athletic surfacing shall be covered by the manufacturer against product defects for 8 years. A 3rd party limited warranty shall also be provided as reinforcement. The manufacturer of the indoor resilient multipurpose surfacing must provide this warranty.
- B. Installation: The installation of the indoor resilient multipurpose surfacing shall be covered against poor workmanship and faulty installation by a two (2) year written, limited warranty.

#### 1.7 MAINTENANCE

- A. Furnish to the owner additional materials containing a total of at least 1% of each different color or design of the indoor resilient athletic surfacing used on the project.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Athletic Sheet Flooring: The basis of the design for the indoor resilient multipurpose surfacing is Omnisports Multi-Use as manufactured by Tarkett Sports.
  - 1. All other installation accessories and related components must be either made or approved by the indoor resilient athletic surfacing manufacturer.
  - 2. Alternate manufacturer and product: Taraflex Multi-Use 5.0 as manufactured by Gerflor.
  
- B. Omnisports Multi-Use prefabricated sport surface 6.2mm with slightly textured embossed surface as supplied by Tarkett Sports. Embossing of wood design and solid colors must be the same; varying embossing or surface textures will not be allowed. Printing of wood design shall closely resemble standard wood strip flooring in size, color, board length, and grain appearance.
  - 1. The wood design shall be protected by a clear layer of pure PVC (Polyvinyl Chloride) and Top Clean, a factory applied UV cured urethane treatment.
  - 2. Intermediate layers shall be fortified with a non-woven fiberglass grid for increased dimensional stability.
  - 3. The foam force reduction layer shall be high-density closed cell PVC foam with honeycomb embossing, and is applied in one continuous manufacturing process. Laminated or adhered foam layers will not be allowed. Field constructed products will not be accepted.
  - 4. Flooring will contain anti-fungal treatment.
  - 5. Physical properties of the indoor resilient athletic surfacing shall conform to the following minimums:

Width	.....	6'5" (2 m)
Length	.....	85' (25.9m) approx.
Total Thickness	.....	6.2 mm
Vertical Deformation	PASSED	1.3 (EN 14809)
Rolling Load	PASSED	0.30 (EN 1569 {11/1999})
Friction	PASSED	99 (EN 13036-4)
Abrasion Resistance	PASSED	0.10 (EN ISO 5470-1 {06/1999})
Sound Insulation	Excellent	+/- 19 dB (ISO 717/2)
In Room Sound Insulation	Excellent	65dB (NF S31-074)
Ball Rebound	PASSED	ASTM F2772 > 90%
Shock Absorption	PASSED	ASTM F2772 Class 2

- 6. Colors: Colors as selected by Architect from manufacturer's standard colors.
  - 7. Hardwood Design Series: A wood look design as available from the indoor resilient athletic surfacing manufacturer's standard range.
  - 8. Texture: Texture to remain consistent between solid colors and wood design when blending colors.
- C. Welding Rod: As supplied by the indoor resilient athletic surfacing manufacturer or supplier. Color to blend with the indoor resilient athletic surfacing color or design. All seams shall be welded to create a monolithic and impermeable surface.
  
  - D. Adhesive: As approved by the indoor resilient athletic surfacing manufacturer.
  
  - E. Game Line Paint Primer: As approved by the indoor resilient athletic surfacing manufacturer.
  
  - F. Game Line Paint: As approved by the indoor resilient athletic surfacing manufacturer. Colors are to be selected from the manufacturer's standard range.
  
  - G. Vented Base: Provide Vent Cove Wall Base as manufactured by Johnsonite. 4" high by 5/16" thick covered profile with a 3" long by 3/8" thick toe. Back surface grooved with vertical semi-circular (5/32" radius) vents, with pre-molded outside corners. Color as scheduled in MATERIAL FINISH SCHEDULE, sheet A9.01.
  
  - H. Floor filler/resurfacing material shall be as recommended by the indoor resilient athletic surfacing manufacturer.



## PART 3 - EXECUTION

### 3.1 INSPECTION

- A. Carefully and completely examine area to receive flooring and accessories for conditions that will adversely affect the execution and quality of work. Do not start this work until unsatisfactory conditions are corrected.
- B. It is the responsibility of the general contractor/construction manager to ensure that project/site conditions are acceptable for the installation of the indoor resilient athletic flooring.
- C. Verify that the area in which the indoor resilient athletic surfacing will be installed is dry and weather tight. Verify that permanent heat, light and ventilation is installed and operable.
- D. Verify that all other work that could cause damage, dirt and dust or interrupt the normal pace of the indoor resilient athletic flooring installation is completed or suspended.
- E. Verify that there is a stable room temperature of at least 65F.
- F. Verify that there are no foreign materials or objects on the subfloor and that the subfloor is clean and ready for installation.
- G. For GreenLay™ Installation to Concrete Subfloor:
  - 1. Moisture content less than fifteen (15) pounds/1,000 sq.ft./24 hours when tested using calcium chloride per ASTM F 1869 or no more than 92 % RH when tested per ASTM F2170.
  - 2. Follow Tarkett Sports' Installation Recommendations.
  - 3. If both tests are performed, use the highest value. Do not average the results of the tests. Report all field test results in writing to the General Contractor and Architect prior to installation.
- H. Verify that the concrete subfloor surface pH level is within the 7 - 10 range.
- I. Document the results indicating the slab is within manufacturer's tolerances for slab deviation.

### 3.2 PREPARATION

- A. Sand the entire surface of the concrete slab.
- B. Sweep the concrete slab so as to remove all dirt and dust. If a sweeping compound is to be used it must be a sweeping compound that does not contain oil or other items that may inhibit the adhesive bond.
- C. Slab must be dust free. In the event that dust impairs adhesive bond, priming the slab prior to application of adhesive may be necessary. Follow manufacturer's installation guidelines.
- D. The beginning of installation stipulates the acceptance of surface and site conditions.

### 3.3 INSTALLATION

- A. The installation area shall be closed to all traffic and activity for a period to be set by the indoor resilient athletic surfacing installer. The indoor resilient athletic surfacing installation shall not begin until the installer is familiar with the existing conditions.
- B. All necessary precautions should be taken to minimize noise, smell, dust, the use of hazardous materials and any other items that may inconvenience others.
- C. Install the indoor resilient athletic surfacing in strict accordance with the indoor resilient athletic surfacing manufacturer's written instructions.
- D. Install the indoor resilient athletic surfacing minimizing cross seams. Provide a seam diagram during the submittal process for approval prior to installation.
- E. Paint game lines using approved game line paint primer and game line paint in strict accordance with the game line paint manufacturer's instructions.

F. Install appropriate threshold plates or transition strips where necessary.

3.4 CLEANING

A. Remove all unused materials, tools, and equipment and dispose of any debris properly.

B. Clean the indoor resilient athletic surfacing in accordance with the manufacturer's instructions.

3.5 PROTECTION

A. All traffic shall be prohibited for a period of 12 hours after installation, then limited traffic for an additional 12 hours.

B. If required, protect the indoor resilient athletic surfacing from damage using coverings approved by the manufacturer.

END OF SECTION

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SECTION 09 67 23  
RESINOUS FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Decorative epoxy-resin flooring consisting of colored quartz aggregate in an epoxy matrix.

1.2 SUBMITTALS

- A. Product Data: For each type of product specified. Include manufacturer's technical data, installation instructions, and recommendations for each resinous flooring component required.
- B. Samples for Verification: Of each resinous flooring system required, 6 inches square, applied by Installer for this Project to a rigid backing, in color, texture, and finish indicated. Where finishes involve normal color and texture variations, include Sample sets showing the full range of variations expected.
- C. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.
- D. Material Test Reports: From a qualified independent testing agency indicating and interpreting test results of the resinous flooring's reaction to chemicals and other reagents and substantiating compliance with requirements.
- E. Material Certificates: In lieu of material test reports, when permitted by Architect, signed by manufacturers certifying that materials furnished comply with requirements.
- F. Concrete Slab Testing
1. Alkalinity and Adhesion Testing:
    - a. Submit result of pH tests.
    - b. Submit written documentation of acceptable pH levels of selected flooring manufacturer.
    - c. Submit letter from flooring manufacturer stating that floor alkalinity is acceptable and manufacturer will issue warranty.
    - d. Proceed with installation only after substrates pass testing.
  2. Relative Humidity Probe Tests:
    - a. Submit results for in situ relative humidity probe tests.
    - b. Submit date and time measurements were made.
    - c. Submit locations and depth of probe holes.
    - d. Submit temperature and relative humidity in each probe hole.
    - e. Submit ambient air temperature.
    - f. Acceptable relative humidity is typically 75% or less. Submit written documentation of tolerances for selected flooring manufacturer. Proceed with installation only after substrates have relative humidity percentage stated as acceptable by manufacturer.
    - g. Submit letter from flooring manufacturer stating that relative humidity is acceptable and manufacturer will issue warranty.
  3. Anhydrous Calcium Chloride Testing
    - a. Submit time and date of placement and retrieval.
    - b. Submit ambient air temperature and humidity during test duration
    - c. Submit manufacturer's instructions and relative technical data.
    - d. Acceptable moisture emission rates are typically 3 lbs. per 1000 sq. ft. or less, in 24 hours. Submit written documentation of tolerances for selected flooring manufacturer. Proceed with installation only after substrates have maximum moisture-vapor-emission rate as stated by manufacturer.
    - e. Submit letter from flooring manufacturer stating that floor moisture emission rates are acceptable and manufacturer will issue warranty.

### 1.3 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer (applicator) who has specialized in installing resinous flooring similar in material, design, and extent to that indicated for this Project and who is acceptable to resinous flooring manufacturer. Engage an installer who is certified in writing by resinous flooring manufacturer as qualified to install resinous flooring systems specified.
- B. Source Limitations: Obtain primary resinous flooring materials, including primers, resins, hardening agents, and sealing or finish coats, through one source from a single manufacturer. Provide secondary materials including patching and fill material, joint sealant, and repair materials of type and from source recommended by manufacturer of primary materials.
- C. Field Samples: On floor area selected by Architect, provide full-thickness resinous flooring system samples that are at least 48 inches square to demonstrate texture, color, thickness, chemical resistance, cleanability, and other features of each resinous flooring system required. Simulate finished lighting conditions for review of in-place field samples.
  - 1. If field samples are unacceptable, make adjustments to comply with requirements and apply additional samples until field samples are approved.
  - 2. After field samples are approved, these surfaces will be used to evaluate resinous flooring.
  - 3. Obtain Architect's approval of field samples before applying resinous flooring.

### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storage and mixing with other components.
- B. Store materials to comply with manufacturer's written instructions to prevent deterioration from moisture, heat, cold, direct sunlight, or other detrimental effects.

### 1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with resinous flooring manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting resinous flooring installation.
- B. Lighting: Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during resinous flooring installation.
- C. Close spaces to traffic during resinous flooring application and for not less than 24 hours after application, unless manufacturer recommends a longer period.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work Include, but are not limited to:
  - Dex O-Tex, Division of Crossfield Products Corp. (phone 310.886.9100 web site: [www.dexotex.com](http://www.dexotex.com))
  - Dur-A-Flex, Inc. (phone 800.253.3539 web site: [www.dur-a-flex.com](http://www.dur-a-flex.com))
  - General Polymers, Inc., Division of Sherwin-William (phone 800.543.7694 web site: [www.generalpolymers.com](http://www.generalpolymers.com))
  - Harris Specialty Chemicals, Inc. (phone 800.322.7825)
  - Key Resin Company (phone 888.943.4532 web site: [www.keyresin.com](http://www.keyresin.com))
  - Neogard, Division of Jones-Blair (phone 800.321.6588 web site: [www.neogard.com](http://www.neogard.com))
  - Palma Inc. (phone 800.336.7256 web site: [www.palmainc.com](http://www.palmainc.com))
  - RBC Industries, Inc. (phone 888.722.3769 [www.rbcepoxy.com/index2.htm](http://www.rbcepoxy.com/index2.htm))
  - Silikal Resin Systems (phone 800.477.4545 we site: [www.silikalresins.com](http://www.silikalresins.com))
  - Stonhard (phone 800.257.7953 web site: [www.stonhard.com](http://www.stonhard.com))
- 1. Color and Pattern: As selected by Architect from manufacturer's full range of colors and patterns produced for resinous flooring complying with requirements indicated.
- 2. Total Thickness of Body Coat(s): As recommended by manufacturer for system compliance with requirements.
- 3. System Thickness: Minimum 1/8 inch.

4. Wearing Surface: Antislip.
  5. Base: 4 inch high integral cove base.
  6. Components: Provide manufacturer's standard components complying with requirements, unless otherwise indicated. Provide the following optional components where recommended by the manufacturer for intended uses and locations:
    - a. Primer.
    - b. Reinforcing membrane.
    - c. Chemical-resistant sealing or finish coat(s).
- B. Physical Properties: Provide resinous flooring system with the following minimum physical property requirements when tested according to standard test methods indicated:
1. Compression Strength: 12,500 psi per ASTM C 579.
  2. Tensile Strength: 2,600 psi per ASTM C 307.
  3. Flexural Modulus of Elasticity: 4,500 psi per ASTM C 580.
  4. Water Absorption: 0.04 percent maximum per ASTM D 570.
  5. Indentation: 0.025 percent maximum per MIL-D-3134.
  6. Impact Resistance: No chipping, cracking, or delamination and not more than 1/16-inch permanent indentation per MIL-D-3134.
  7. Resistance to Elevated Temperature: No slip or flow of more than 1/16 inch per MIL-D-3134.
  8. Abrasion Resistance: 24 mg maximum weight loss per ASTM D 2047.
  9. Flammability: Self-extinguishing per ASTM D 635.
  10. Hardness: 75-80, Shore D per ASTM D 2240.
  11. Bond Strength: 400 psi, 100 percent concrete failure per ACI 503R.
- C. Chemical Resistance: Test specimens of cured resinous flooring system are unaffected when tested according to ASTM D 543, Procedure A, for immersion in the following reagents for not less than 7 days:
1. Ammonium hydroxide, carbon tetrachloride, citric acid, dimethyl formamide, formaldehyde (3%), heavy-duty detergent, heptane, hydrogen peroxide (28%), lactic acid, oleic acid, phenol solution, sodium carbonate (20%), sodium chloride (10%), sodium hydroxide (60%), sodium hypochlorite, sulfuric acid (30%), urine.

## 2.2 MATERIALS

- A. (PF-01) Resinous Flooring: Resinous floor surfacing system consisting of primer; body coat(s) including resin, hardener, aggregates, and colorants, if any; and sealing or finish coat(s).
1. Reinforcing Membrane: Manufacturer's flexible resin recommended for crack isolation to help prevent substrate cracks from reflecting through resinous flooring.
- B. Patching and Fill Material: Resinous product of or approved by resinous flooring manufacturer and recommended by manufacturer for application indicated.
- C. Joint Sealant: Type recommended or produced by resinous flooring manufacturer for type of service and joint condition indicated.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. General: Prepare and clean substrate according to resinous flooring manufacturer's written instructions for substrate indicated. Provide clean, dry, and neutral substrate for resinous flooring application.
- B. Testing of concrete slabs
1. Anhydrous Calcium Chloride Testing
    - a. Conduct anhydrous calcium chloride testing per ASTM F1869, modified to include testing over concrete containing lightweight aggregate.
    - b. Environmental requirements of area to be tested are to match that of the finished floor covering. Doors, windows, roofing, etc. must be installed and the temperature of the building controlled to a finished building atmosphere. Ensure interior building climate is 75 degrees F  $\pm$  10 degrees F and 50% Relative Humidity  $\pm$  10% for 72 hours prior to, and throughout the duration of the tests.
    - c. The number of test kits required is determined by the square footage of areas scheduled to receive finish flooring. A minimum of three test kits are required in the first 1,000 sq. ft. a minimum of one test kit per each additional 1,000 sq. ft. with consideration given to separation of test areas. Time of exposure is a minimum of 60 hours and a maximum of 72 hours.

- d. A prepackaged calcium chloride test kit is equipped with a sealed dish of anhydrous calcium chloride, a metering dome with gasket and instructions.
    - 1) Clean substrate in area to be tested by removing dust solvent, paint, wax, oil, grease, residual adhesive, adhesive removers, curing, sealing, hardening, or parting compounds, alkaline salts, excessive carbonation, or laitance, mold mildew and other foreign materials.
    - 2) Weigh the tape sealed dish on a gram scale with 1/10th gram gradation. Record start weight, date and time on dish's label and instruction document.
    - 3) Unseal dish and expose test according to preprinted test kit instructions.
    - 4) Allow 60 to 72 hours of exposure. Retrieve test dish re-seal and re-weigh according to instructions.
    - 5) Provide a diagram of the building, with calculations, documenting each test location with its results in writing.
  - e. Acceptable moisture emission rates are typically 3 lbs. per 1000 sq. ft. or less, in 24 hours; however, submit written tolerances for selected flooring manufacturer. Proceed with installation only after substrates have maximum moisture-vapor-emission rate as stated by manufacturer.
  - f. Submit letter from flooring manufacturer stating that floor moisture emission rates are acceptable and manufacturer will issue warranty.
2. In Situ Relative Humidity Probe Test:
- a. Conduct in situ relative humidity probe testing per ASTM F2170.
  - b. Concrete floor slabs shall be at the service temperature and the occupied air space above the slab shall be at the service temperature service relative humidity for at least 48 hours before taking relative humidity measurements in the concrete slab.
  - c. Perform 3 tests for the first 1,000 sq/ft. and a minimum of 1 test for every 1,000 sq/ft. thereafter.
  - d. For slabs on-grade and below-grade choose a testing location within 3 feet of each exterior wall.
  - e. Drill probe holes 40% into depth of slab for slabs drying from the top only and 20% into the slab for slabs drying from top and bottom.
  - f. Remove dust from hole using vacuum cleaner and allow 72 hours to achieve moisture equilibration within hole before taking relative humidity measurements.
  - g. After inserting probe allow necessary amount of time for probe to reach temperature equilibrium before measuring relative humidity.
  - h. Use the relative humidity probe to measure the ambient air temperature and relative humidity above the slab in the vicinity of the hole.
  - i. Proceed with installation only after substrates pass testing.
  - j. Submit letter from flooring manufacturer stating that floor relative humidity percentage is acceptable and manufacturer will issue warranty.
3. Alkalinity and Adhesion Testing
- a. Conduct pH test per ASTM F710.
  - b. Test for alkalinity prior to installation of flooring materials.
  - c. pH levels shall not exceed the written recommendation of the flooring manufacturer and the adhesive manufacturer.
  - d. A pH range of 5-9 is optimum, not to exceed 9 pH. Submit written acceptable pH levels of selected flooring manufacturer.
  - e. Proceed with installation only after substrates pass testing.
  - f. Submit letter from flooring manufacturer stating that floor alkalinity is acceptable and manufacturer will issue warranty.
- C. Concrete Substrates: Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with resinous flooring.
1. Comply with ASTM C 811 requirements, unless manufacturer's written instructions are more stringent.
  2. Repair damaged and deteriorated concrete according to resinous flooring manufacturer's written recommendations.
- D. Resinous Materials: Mix components and prepare materials according to resinous flooring manufacturer's written instructions.
- E. Use patching and fill material to fill holes and depressions in substrate according to manufacturer's written instructions.
- F. Treat control joints and other nonmoving substrate cracks to prevent cracks from reflecting through resinous flooring according to manufacturer's written recommendations.

### 3.2 APPLICATION

- A. General: Apply components of resinous flooring system according to manufacturer's written instructions to produce a uniform, monolithic wearing surface of thickness indicated.
  - 1. Coordinate application of components to provide optimum adhesion of resinous flooring system to substrate and optimum intercoat adhesion.
  - 2. Cure resinous flooring components according to manufacturer's written instructions. Prevent contamination during application and curing processes.
  - 3. At substrate expansion and isolation joints, provide joint in resinous flooring to comply with resinous flooring manufacturer's written recommendations.
  - 4. Apply joint sealant to comply with manufacturer's written recommendations.
- B. Apply primer over prepared substrate at manufacturer's recommended spreading rate.
- C. Apply reinforcing membrane to substrate cracks or entire substrate surface as recommended by manufacturer.
- D. Apply self-leveling slurry body coat(s) in thickness indicated.
- E. Broadcast aggregates and, after resin is cured, remove excess aggregates to provide surface texture indicated.
- F. Integral Cove Base: Apply cove base mix to wall surfaces adjacent floor applications unless otherwise indicated. Round internal and external corners. Install cove base according to manufacturer's written instructions and details including taping, mixing, priming, troweling, sanding, and topcoating of cove base.
- G. Apply sealing or finish coat(s), including grout coat, if any, of type recommended by resinous flooring manufacturer to produce finish indicated. Apply in number of coats and at spreading rates recommended in writing by manufacturer.

### 3.3 FIELD QUALITY CONTROL

- A. Material Sampling: Owner may at any time and any number of times during flooring application require material samples for testing for compliance with requirements.
  - 1. Owner will engage an independent testing agency to take samples of materials being used. Material samples will be taken, identified and sealed, and certified in presence of Contractor.
  - 2. Testing agency will test samples for compliance with requirements, using applicable referenced testing procedures or, if not referenced, using testing procedures listed in manufacturer's Product Data.
  - 3. If test results show installed materials do not comply with specified requirements, pay for testing, remove noncomplying materials, prepare surfaces coated with unacceptable materials, and reapply flooring materials to comply with requirements.

### 3.4 CLEANING AND PROTECTION

- A. Protect resinous flooring from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by resinous flooring manufacturer.
- B. Clean resinous flooring not more than 4 days before dates scheduled for inspections intended to establish date of substantial completion in each project area. Use cleaning materials and procedures recommended in writing by resinous flooring manufacturer.

END OF SECTION



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SECTION 09 68 13

TILE CARPETING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Carpet tile, including the following:
1. Walk-off carpeting.
  2. Rubber base.
  3. Accessories, including edge strips.

1.2 SUBMITTALS

- A. Product Data: Submit in accordance with SECTION 01 33 23 - SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.
1. Provide manufacturer's installation instructions, including manufacturer's approved adhesive to be used for installation of carpet tile.
  2. Provide certification of manufacturer's approval of adhesive.
- B. Product data for each type of carpet material and accessory required. Products proposed must meet or exceed the specifications identified in this section. Submit manufacturer's technical specifications, published standard warranty, attached comparative checklist, and the following manufacturer's test reports:
1. Methenamine Pill Test (DOC FF #1-70), Rating Pass.
  2. Flooring Radiant Panel Test, NFPA-253, ASTM E 648.
  3. Smoke Density, NBS Smoke Density Chamber NFPA-258, 450 or less.
  4. Static Test, AATCC Test Method 134-1979, 2.5KV or below under standard test conditions 70°F., 20% R.H.
- C. Samples for verification purposes in manufacturer's standard size, showing full range of color, texture, and pattern variations expected. Prepare samples from material to be used for the work. Submit the following:
1. 12" square samples of each type of carpet material required.
  2. 12" long samples of each type of exposed edge striping and accessory item.
- D. Maintenance Manual: Provide 2 copies of a printed maintenance manual, written by the carpet manufacturer's Technical Service Department delivered to the Owner at the project site. Include the following:
1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
  2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.
- E. Concrete Slab Testing
1. Alkalinity and Adhesion Testing:
    - a. Submit result of pH tests.
    - b. Submit written documentation of acceptable pH levels of selected flooring manufacturer.
    - c. Submit letter from flooring manufacturer stating that floor alkalinity is acceptable and manufacturer will issue warranty.
    - d. Proceed with installation only after substrates pass testing.
  2. Relative Humidity Probe Tests:
    - a. Submit results for in situ relative humidity probe tests.
    - b. Submit date and time measurements were made.
    - c. Submit locations and depth of probe holes.
    - d. Submit temperature and relative humidity in each probe hole.
    - e. Submit ambient air temperature.
    - f. Acceptable relative humidity is typically 75% or less. Submit written documentation of tolerances for selected flooring manufacturer. Proceed with installation only after substrates have relative humidity percentage stated as acceptable by manufacturer.
    - g. Submit letter from flooring manufacturer stating that relative humidity is acceptable and manufacturer will issue warranty.
  3. Anhydrous Calcium Chloride Testing
    - a. Submit time and date of placement and retrieval.
    - b. Submit ambient air temperature and humidity during test duration
    - c. Submit manufacturer's instructions and relative technical data.

- d. Acceptable moisture emission rates are typically 3 lbs. per 1000 sq. ft. or less, in 24 hours. Submit written documentation of tolerances for selected flooring manufacturer. Proceed with installation only after substrates have maximum moisture-vapor-emission rate as stated by manufacturer.
- e. Submit letter from flooring manufacturer stating that floor moisture emission rates are acceptable and manufacturer will issue warranty.

### 1.3 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in carpet manufacturing with 5 years minimum experience.
- B. Installer: Company specializing in installing carpet with minimum five years (5) documented experience and must be certified by manufacturer specified. Use for installation only personnel who are skilled in the work required, familiar with the manufacturer's recommended methods required for installation.
- C. Installer Qualifications: An experienced installer with 3 years minimum documented experience in carpeting installations of similar scope.
- D. Manufacturer's technical representative to visit project site once carpet installation has begun and shall provide written certification letter indicating that the carpet installation is in accordance with manufacturer's recommendations.
- E. Manufacturer's representative shall provide training session with Owner's maintenance personnel regarding care and cleaning procedures for completed carpet installation.

### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Carpet tile shall be delivered to the project site in manufacturer's standard boxes. Each box shall have register number permanently attached to box.
- B. Store materials for 3 days prior to installation in the areas of installation to achieve temperature stability.

### 1.5 SITE CONDITIONS

- A. Measurements: Dimensions supplied on the drawings are approximate. Contractor shall carefully check all dimensions and other conditions affecting his work in the field and shall be responsible for proper installation.

### 1.6 ENVIRONMENTAL REQUIREMENTS

- A. Temperature and Humidity: Carpet must be installed when the indoor temperature is between 65°F. and 95°F. with a maximum relative humidity of 65%. If ambient temperatures are outside these parameters, the installation must not begin until the HVAC system is operational and these conditions are maintained at least 48 hours before, during, and 72 hours after completion.
- B. Provide sufficient lighting.
- C. Manufacturer to off gas carpet at their facilities prior to shipping to job site.
- D. Ventilate installation area during installation and three (3) days after installation.
- E. Ventilation: During installation, maintain fresh air ventilation using exhaust fans, and be operating the ventilation system at full capacity. Always exhaust air to the outside and avoid re-circulation. After installation, maintain fresh air ventilation for 48 to 72 hours at normal room temperatures by operating the ventilation or exhaust fan system at full capacity.

### 1.7 OPERATION AND MAINTENANCE DATA

- A. Submit operation and maintenance data under provisions of SECTION 01 78 23 - OPERATION AND MAINTENANCE DATA.
- B. Include maintenance procedures, recommended maintenance materials and suggested schedule for cleaning and shampooing.

## 1.8 MAINTENANCE

- A. Extra Materials: Upon completion of work, deliver to the project site not less than 2 boxes of each type, color and pattern of carpet tile, exclusive of materials required to properly complete installation. Furnish maintenance materials from same production run as materials installed. Package maintenance materials in manufacturer's standard cardboard boxes, identified with appropriate labels.

## 1.9 WARRANTIES

- A. Manufacturer's Lifetime Commercial Limited warranty, non-prorated, against manufacturing defects covering all costs including freight, labor, and material for the following:
1. Edge Ravel - wet or dry.
  2. Back delamination, wet or dry.
  3. Loss of 20 lb. average tuft bind - wet or dry.
  4. Static protection - 3.0 KV when tested under the Standard Shuffle Test, 70 F - 20% RH
  5. Wear - No more than 10% face yarn loss.
  6. Adhesive failure.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. (CPT-01) Walk-Off Carpet: Provide Abrasive Action II, Style 02578, with Powerbond Vinyl Cushion manufactured by Tarkett. Carpet shall meet the following minimum requirements, NO EXCEPTIONS:
1. Color shall be as selected by Architect from manufacturer's full color range.
  2. Construction: Accuweave® Patterned Loop.
  3. Face Weight: 24 oz. per sq. yard.
  4. Gauge: 1/12.
  5. Stitches per Inch: 8.0
  6. Pile Height Average: 0.187 Inch
  7. Fiber System: TDX Nylon
  8. Dye Method: Solution Dyed.
  9. Soil Stain Protection: Ensure
  10. Size: 24" x 24".
- B. Substrate Filler: As recommended by adhesive and carpet tile manufacturer; compatible with substrate.
- C. Substrate Primer and Sealer: Type as recommended by carpet tile manufacturer.
- D. Adhesive: Moisture-resistant type as recommended by the carpet tile manufacturer.
- E. Edge Strips: Provide two-piece vinyl, 1/4" leg, Joining Moulding, No. 940 'T' with No. 970 Track, and provide No. 356 'T', where 1/2" leg is required, as manufactured by BurkeMercer Products (phone 800.669.7010 web site: [www.burkflooring.com](http://www.burkflooring.com)). Color(s) as selected by Architect.
- F. (RB-01) Rubber Base: ASTM F 1861, Type TS (rubber, vulcanized thermoset), Style Cove (with top-set toe), 1/8" thick, 4" high. Color(s) as scheduled in SECTION 09 99 00 - COLOR SCHEDULE. Furnish base in manufacturer's continuous rolls. Outside corners shall be factory formed pre-molded units matching base in color and finish. Product/manufacturer; one of the following:  
Wallflowers® Premium Wall Base; Flexco  
Baseworks™ Thermoset Rubber Wall Base; Tarkett/Johnsonite  
Pinnacle Type TS Rubber Base; Roppe Rubber Corp.  
NO SUBSTITUTIONS on Type TS (rubber, vulcanized thermoset)

## PART 3 - EXECUTION

### 3.1 INSPECTION

- A. Before commencement of any work the Contractor shall inspect the floors to receive carpet tile to determine the condition of those surfaces, and shall furnish and apply suitable primer and otherwise prepare floor surfaces in accordance with the carpet tile manufacturer's instruction.

### 3.2 PREPARATION

#### A. Testing of concrete slabs

##### 1. Anhydrous Calcium Chloride Testing

- a. Conduct anhydrous calcium chloride testing per ASTM F1869, modified to include testing over concrete containing lightweight aggregate.
- b. Environmental requirements of area to be tested are to match that of the finished floor covering. Doors, windows, roofing, etc. must be installed and the temperature of the building controlled to a finished building atmosphere. Ensure interior building climate is 75 degrees F  $\pm$  10 degrees F and 50% Relative Humidity  $\pm$  10% for 72 hours prior to, and throughout the duration of the tests.
- c. The number of test kits required is determined by the square footage of areas scheduled to receive finish flooring. A minimum of three test kits are required in the first 1,000 sq. ft. a minimum of one test kit per each additional 1,000 sq. ft. with consideration given to separation of test areas. Time of exposure is a minimum of 60 hours and a maximum of 72 hours.
- d. A prepackaged calcium chloride test kit is equipped with a sealed dish of anhydrous calcium chloride, a metering dome with gasket and instructions.
  - 1) Clean substrate in area to be tested by removing dust solvent, paint, wax, oil, grease, residual adhesive, adhesive removers, curing, sealing, hardening, or parting compounds, alkaline salts, excessive carbonation, or laitance, mold mildew and other foreign materials.
  - 2) Weigh the tape sealed dish on a gram scale with 1/10th gram gradation. Record start weight, date and time on dish's label and instruction document.
  - 3) Unseal dish and expose test according to preprinted test kit instructions.
  - 4) Allow 60 to 72 hours of exposure. Retrieve test dish re-seal and re-weigh according to instructions.
  - 5) Provide a diagram of the building, with calculations, documenting each test location with its results in writing.
- e. Acceptable moisture emission rates are typically 3 lbs. per 1000 sq. ft. or less, in 24 hours; however, submit written tolerances for selected flooring manufacturer. Proceed with installation only after substrates have maximum moisture-vapor-emission rate as stated by manufacturer.
- f. Submit letter from flooring manufacturer stating that floor moisture emission rates are acceptable and manufacturer will issue warranty.

##### 2. In Situ Relative Humidity Probe Test:

- a. Conduct in situ relative humidity probe testing per ASTM F2170.
- b. Concrete floor slabs shall be at the service temperature and the occupied air space above the slab shall be at the service temperature service relative humidity for at least 48 hours before taking relative humidity measurements in the concrete slab.
- c. Perform 3 tests for the first 1,000 sq/ft. and a minimum of 1 test for every 1,000 sq/ft. thereafter.
- d. For slabs on-grade and below-grade choose a testing location within 3 feet of each exterior wall.
- e. Drill probe holes 40% into depth of slab for slabs drying from the top only and 20% into the slab for slabs drying from top and bottom.
- f. Remove dust from hole using vacuum cleaner and allow 72 hours to achieve moisture equilibration within hole before taking relative humidity measurements.
- g. After inserting probe allow necessary amount of time for probe to reach temperature equilibrium before measuring relative humidity.
- h. Use the relative humidity probe to measure the ambient air temperature and relative humidity above the slab in the vicinity of the hole.
- i. Proceed with installation only after substrates pass testing.
- j. Submit letter from flooring manufacturer stating that floor relative humidity percentage is acceptable and manufacturer will issue warranty.

##### 3. Alkalinity and Adhesion Testing

- a. Conduct pH test per ASTM F710.
- b. Test for alkalinity prior to installation of flooring materials.
- c. pH levels shall not exceed the written recommendation of the flooring manufacturer and the adhesive manufacturer.
- d. A pH range of 5-9 is optimum, not to exceed 9 pH. Submit written acceptable pH levels of selected flooring manufacturer.
- e. Proceed with installation only after substrates pass testing.
- f. Submit letter from flooring manufacturer stating that floor alkalinity is acceptable and manufacturer will issue warranty.

- B. Delay installation until all surrounding work, including painting, has been completed. Vacuum substrate immediately prior to carpet tile installation and remove all deleterious substances which would interfere with installation or be harmful to the work.

- C. Ensure floors are level, with maximum surface variation of 1/4 inch in 10 feet non-cumulative. Inspect subflooring for cracks, holes, abrasions, rough spots, ridges, or other conditions which will adversely affect execution and quality of work.
- D. Ensure concrete floors are free from scaling and irregularities and exhibit neutrality relative to acidity and alkalinity.
- E. Use an approved cementitious filler to patch cracks, small holes and for leveling.
- F. Notify Architect in writing of any condition which will prevent satisfactory completion of work. Do not proceed until such defects are entirely corrected. Application or installation of carpet tile shall constitute acceptance of sub-floors.

### 3.3 INSTALLATION

- A. General: Comply with CRI Carpet Installation Standard 2011, "Modular Carpet." (Tiles)
- B. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.
- C. Extend carpet tile under open-bottomed and raised-bottom obstructions, and under removable flanges of obstructions. Extend carpet tile into closets and alcoves of rooms indicated to be carpeted, unless another floor finish is indicated for such spaces. Extend carpet tile under all movable furniture and equipment.
- D. Vacuum clean substrate. Spread adhesive in quantity recommended by manufacturer after primer application to ensure proper adhesion over full area of installation. Apply only enough adhesive to permit proper adhesion of carpet tile before initial set.

### 3.4 CLEANING

- A. Remove excess adhesive from floor, base and wall surfaces without damage.
- B. Clean and vacuum carpet tile surfaces.

### 3.5 PROTECTION

- A. Prohibit traffic from carpet tile areas for 24 hours after installation.

END OF SECTION

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SECTION 09 91 00

PAINTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: On-the-job painting and finishing of exterior and interior surfaces.
1. Included: Paint and finish the following materials, fittings, and equipment items which are exposed-to-view.
    - a. Iron, steel, and galvanized metal.
    - b. Concrete masonry units.
    - c. Gypsum board.
    - d. Interior caulked joints.
    - e. Bare and insulation covered piping and ductwork, conduit, hangers, grilles and registers, and primed metal surfaces and factory-finished surfaces of mechanical and electrical equipment.
  2. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels, including the following:
    - a. Factory-finished metal lockers and finished light fixtures.
    - b. Architectural aluminum and stainless steel.
    - c. Interior concrete floors and steps and all exterior concrete.
    - d. Acoustic panel ceilings, unless noted on drawings.
    - e. Pre-finished cabinets.
    - f. Operating parts: Moving parts of operating mechanical and electrical equipment, such as: valve and damper operators, linkages, sensing devices, motor and fan shafts
    - g. Labels: UL, FM, or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.
  3. Contractor shall examine the drawings for mechanical and electrical work, and all materials installed throughout the building which require painting shall be painted under this section of the specifications.

1.2 SYSTEM DESCRIPTION

- A. For purposes of this painting specification, the following areas and spaces are not considered finished, occupied areas and there will be no painting therein except for doors and frames and as may be specifically scheduled in article paint schedule.
1. Mechanical chases.
  2. Spaces above suspended ceilings.
  3. Underfloor crawl spaces.
  4. Elevator hoistways.

1.3 SUBMITTALS

- A. Samples:
1. Submit in accordance with SECTION 01 33 23 - SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
  2. Submit two 8-1/2" x 11" samples of each paint color scheduled on the color schedule prepared by the Architect. Samples shall be on heavy cardboard and shall be made with the actual mixed paints to be used on the project.
  3. Samples for Initial Selection of each type of texture finish product.
- B. Paint Schedule:
1. If painting materials other than those specified are proposed for use, submit a complete schedule of the materials to be substituted.
  2. This schedule shall be in the same form as the paint schedule included in this section, and shall list materials by manufacturer, brand name, and type for each surface to be finished.
  3. Provide data sheet for each paint type listed in schedule.



- C. Federal law requires renovation firms (including sole proprietorships) to be certified and requires individuals to be trained in the use of lead-safe work practices. Contractors who perform renovation, repairs, and painting jobs shall:
  - 1. Provide a copy of your EPA lead training certificate.
  - 2. Show what lead-safe methods you will use to perform the job.
  - 3. Provide references from at least three recent jobs involving projects before 1978.
  - 4. Keep records to demonstrate that you and your workers have been trained in lead-safe work practices and that you follow lead-safe work practices on the job.
- D. Close-out Schedule: Upon completion of work, furnish a full schedule of paint types and colors actually used and formulas for each to the Owner.

#### 1.4 QUALITY ASSURANCE

- A. Product Manufacturer: Company specializing in manufacturing quality paint and finish products with 3 years' experience.
- B. Applicator: Company specializing in commercial painting and finishing with 2 years' experience.
- C. Product Labels: Include manufacturer's name, type of paint, stock number, color and label analysis on label of containers.
- D. Single Source Responsibility: Provide primers and other undercoat paint produced by same manufacturer as final coats. Use only thinners approved by paint manufacturer, and use only within recommended limits.
- E. V.O.C. (Volatile Organic Compound) Compliance: Products listed in the schedules and/or substitutes proposed for use by Contractor must be formulated to meet all applicable ordinances and regulations regarding maximum V.O.C. content. Utilize products which have been specially formulated to meet such requirements.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials in original containers with seals unbroken and labels intact.
- B. Storage: Contractor shall designate a specific space at the project site for storing and mixing materials. Protect this space and repair all damage resulting from use. Do not store kerosene nor gasoline in this space. Remove oily rags at the end of each day's work.

#### 1.6 PROJECT CONDITIONS

- A. Provide continuous ventilation and heating facilities to maintain surface and ambient temperatures above 65°F. for 24 hours before, during, and 48 hours after application of finishes, unless required otherwise by manufacturer's instructions.
- B. Minimum application temperatures for latex paints: 45°F. for interiors; 50°F. for exterior; unless required otherwise by manufacturer's instructions.
- C. Minimum application temperature for varnish and finishes: 65°F. for interior or exterior, unless required otherwise by manufacturer's instructions.
- D. Provide lighting level of 80 ft.-candles measured mid-height at substrate surface.
- E. Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85%; or to damp or wet surfaces; unless otherwise permitted by the paint manufacturer's printed instructions. Painting may be continued during inclement weather only if the areas and surfaces to be painted are enclosed and heated within the temperature limits specified during application and drying periods of 24 hours between coats and 72 hours after final coat.
- F. Protection: Provide sufficient drop cloths to fully protect adjacent finished work.

## 1.7 PRECAUTIONS

- A. Do not store paints, oils, thinners and other flammable items inside the building. They shall be stored in approved containers when not in actual use during the painting job. The fire hazard shall be kept at a minimum.
- B. Take precautions to protect the public and construction workers during the progress of the work.
- C. Furnish a temporary fire extinguisher of suitable chemicals and capacity, located near flammable materials.

## 1.8 MAINTENANCE

- A. Extra Materials: Upon completion of the work, deliver to project site 2 gallons of each type and color of paint applied to interior and exterior surfaces. Provide formula for custom match colors.

## PART 2 - PRODUCTS

### 2.1 ACCEPTABLE MANUFACTURERS

- A. Provide paint as manufactured by one of the following:
  - Benjamin Moore & Co. (<https://www.benjaminmoore.com>)
  - PPG Paints (<https://www.ppgpaints.com>)
  - The Sherwin-Williams Co. (<https://www.sherwin-williams.com>)
- B. Materials described are based on the specifications of the above listed manufacturers and are given to designate the quality of materials required. Materials of best quality grade are representative of the standard of quality required. Materials not displaying manufacturer's identification as a first line, best-grade product will not be acceptable.
- C. Colors: The Architect will prepare a color schedule. Reference "Material Finish Schedule" in drawings. Regardless of which brand of paint is selected for use the Contractor shall intermix and blend as required to obtain an exact match to each color on the color schedule.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify that surfaces and substrate conditions are ready to receive work as instructed by the product manufacturer.
- B. Examine surfaces scheduled to be finished prior to commencement of work. Report to Architect any condition that may potentially affect proper application.
- C. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
  - 1. Gypsum wallboard: 12 percent.
  - 2. Interior located wood: 15 percent, measured in accordance with ASTM D 4442.
  - 3. Concrete: 12 percent.
  - 4. Masonry: 12 percent.
  - 5. Plaster: 12 percent
- D. Test shop-applied primers for compatibility with subsequent cover materials.
- E. Perform the following Test procedure prior to painting. This will determine if Passivators exist on galvanized metal. This procedure is not necessary on galvanized metal with G 90 Paint Grip.
  - 1. Prepare a solution by dissolving 20 grams of copper sulfate in one liter (1000 grams) of water. Copper sulfate crystals may be purchased at most drug stores.
  - 2. Solvent wash a small area per the procedure of SSPC-SP1.
  - 3. Sand a small washed area using emery cloth.
  - 4. Using a cotton swab saturated with the copper sulfate solution, apply a swipe to both sanded and unsanded washed areas.

5. If the sanded and unsanded surfaces turn black at the same time and that time is less than 10 seconds, there is no passivation on the surface other than light oil, and a normal degreasing/cleaning operation is sufficient preparation prior to the coating application. If the unsanded surface turns slower than the sanded surface, or not at all, a passivator of some type is present on the surface. If neither surface turns, the surface is probably an alloy of zinc or some other metal.
6. If the galvanized steel has been treated or passivated, the treatment or passivator must be removed by brush blasting. If this method is prohibited by environmental regulations, then chemical etching with Amchem's GALVAPREP SG-3 will be acceptable, if previously approved by the Architect. The chemical etching manufacturer's procedures should be followed carefully.
7. If the surface is determined to be an alloy by this test procedure, notify Architect and adhesion tests of the proposed coating applied over the proposed surface preparation must be conducted.
8. If no passivators are present, wash galvanized metal surfaces with mineral spirits to remove residual grease and oil.

F. Beginning of installation means acceptance of existing surfaces and substrate.

### 3.2 PREPARATION

- A. Perform preparation and cleaning procedures in accordance with coating manufacturer's instructions for each substrate condition.
- B. Fill open joints, cracks and crevices on steel buck frames with metal putty and sand smooth before painting.
- C. Remove hardware and accessories, plates, lighting fixtures and similar items which are not to be finish-painted or provide adequate surface-applied protection for these items in place.
- D. Uncoated steel and iron surfaces: Remove grease, scale, dirt, and rust. Where heavy coatings of scale are evident, remove by wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Spot prime paint after repairs.
- E. Shop primed steel surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces.

### 3.3 APPLICATION

- A. Workmanship shall be of the highest quality. Mix and use paint materials in accord with the manufacturer's directions. Spread materials evenly, flow smoothly, and brush out without sags or runs.
- B. Provide finish coats which are compatible with primer paints used. Provide barrier coats over incompatible primers where required.
- C. When undercoats, stains or other conditions show through final paint coat, apply additional coats until paint film is of uniform color and sheen.
- D. Between coats, sand enamel and lacquer finish on wood and metal surfaces to produce a smooth, even finish. Use #220 grit sandpaper or finer.
- E. Tint priming coats and undercoats to approximate shade of final coat to assure uniformity of color in the finish. Touch up suction spots and "hot spots" before applying the last coat to produce an even result in the finish coat.
- F. Exposed ductwork, piping and conduit in finished, occupied areas shall be painted the same color as the wall or ceiling against which it is installed, unless otherwise noted.
- G. Apply the finish coat on gypsum board, plaster, and concrete surfaces with rollers.
- H. On concrete masonry unit wall surfaces without a block filler, apply the first coat of paint with a spray gun.
- I. Apply paint to sound absorbing concrete masonry units with brushes and/or rollers; do not spray.
  1. Do not paint fibrous fillers of sound absorbing concrete masonry units.

2. Do not allow any paint, primer, or block filler to enter acoustic cells or impinge upon acoustic fillers in any way, including but not limited to, by overspray of spray-applied paint, or by drips, runs, sags, or splashes of paint, or through careless or negligent application of paint.
3. No paint shall be allowed on fibrous fillers of sound absorbing concrete masonry units; otherwise, sound absorbing concrete masonry units and fibrous fillers shall be replaced at no cost to Owner.

### 3.4 TOUCH UP AND CLEAN

- A. Touching Up: On completion, carefully touch up all holidays, marred and damaged spots, and work over all surfaces that have been repaired by other trades.
- B. Cleaning: Remove spilled, splashed, and splattered paint from all surfaces. Do not mar surface finish of item being cleaned.
- C. Reinstall the items removed under the provisions of paragraph above.

### 3.5 RE-PAINTING

- A. Locations and Extent: The re-painting of existing surfaces shall be as follows:
  1. Painted wall, door and frame surfaces which have been reworked, cut into or patched, whether specifically designated on the drawings or not. Re-painting shall include all openings in existing walls.
  2. Entire rooms/areas, as designated on the drawings.
- B. Colors: Match existing colors of corresponding surfaces except where new colors are scheduled.
- C. Preparation:
  1. Clean surfaces to remove dust and dirt. Remove oil, grease, wax, loose paint, mill scale dirt, foreign matter, rust, mold, mildew, mortar, efflorescence, and sealers and other contaminants which would inhibit paint bonding to the old paint.
  2. Remove rust and loose and flaking paint by scraping and sanding.
  3. Glossy surfaces of old paint films must be clean and dull before repainting. Thorough washing with an abrasive cleanser will clean and dull in one operation, or wash thoroughly and dull by sanding.
  4. Spot prime any bare areas with an appropriate primer in conformance with the following paint schedule for new work.
  5. Check for compatibility by applying a test patch of the recommended coating system, covering at least 2 to 3 Sq.Ft. Allow to dry one week before testing adhesion per ASTM D 3359. If the coating system is incompatible, complete removal of existing finish is required.
  6. Tectum Panels: Surface must be clean, dry, and in sound condition. Remove all oil, dirt, grease, and other foreign material to ensure adequate adhesion.
- D. Painting: Generally, apply one coat of finish paint over old surfaces, using the same materials scheduled in the paint schedule for like new surfaces.
- E. Painting Tectum Panels: Paint shall be spray-applied. Do not roll on paint.
- F. Verification: Verify the extent of re-painting work at the building and make due allowance for cutting and patching required for installation of mechanical and electrical work.

### 3.6 PAINT SCHEDULE

- A. The products listed below represent top of the line products of each manufacturer. These products are not presented as being equivalent, as there are too many variables to match each product across the board. Manufacturer's designations are:

PPG	Pittsburgh Paints
SW	The Sherwin-Williams Co.

B. Interior Metal

1. Steel door frames, borrowed light frames, louvers and vision panel frames in doors, hollow metal doors, sound retardant doors, and ladders.
  - 1 primer coat
    - PPG Red Inhibitive Steel Primer, 6-208
    - SW Kromik Metal Primer E41N1
  - 2 finish coats
    - PPG Speedhide 6-1110
    - SW ProMar 200 Alkyd Semi-Gloss Enamel, Series B34 W 200
2. Steel pipe handrails and railings.
  - 1 primer coat
    - PPG Red Inhibitive Steel Primer, 6-208
    - SW Kromik Metal Primer E41N1
  - 2 finish coats
    - PPG Int/Ext Industrial Gloss Alkyd, 7-282 Series
    - SW Industrial Enamel, Series B54
3. Grilles, diffusers and registers in walls and ceilings.
  - 1 finish coat
    - PPG Speedhide Alkyd Lo-Sheen, 6-90
    - SW ProMar 200 Alkyd Eg-Shel Enamel, Series B33 W 200
4. Other exposed iron and steel.
  - 1 primer coat
    - PPG Speedhide Inhibitive Steel Primer, 6-208
    - SW Kem Kromik Metal Primer, B50 W 1
  - 1 finish coat
    - PPG Speedhide Alkyd Lo-Sheen, 6-90
    - SW ProMar 200 Alkyd Eg-Shel Enamel, Series B33 W 200
5. Other exposed galvanized metal.
  - 1 primer coat
    - PPG Speedhide White Galvanized Steel Primer, 6-209
    - SW Galvite Paint, B50 WZ30
  - 2 finish coat
    - PPG Speedhide Alkyd Lo-Sheen, 6-90
    - SW ProMar 200 Alkyd Eg-Shel Enamel, Series B33 W 200

C. Interior Concrete Masonry (At sound absorbing concrete masonry unit blocks, do not paint fibrous fillers)

1. Concrete masonry unit walls scheduled to have Epoxy Paint.
  - 1 filler coat
    - PPG Pitt-Glaze Int/Ext Latex Block Filler 16-90
    - SW Heavy Duty Block Filler, B42 W 46
  - 2 finish coats
    - PPG Auquapon WB Waterborne Gloss Epoxy coating 98-1 Series
    - SW Water-Based Catalyzed Epoxy, Series B70, Gloss Hardener
2. Concrete masonry unit walls in Activity Room/Gymnasium
  - 1 filler coat
    - PPG Pitt-Glaze Int/Ext Latex Block Filler 16-90
    - SW Heavy Duty Block Filler, B42 W 46
  - 2 finish coats
    - PPG Speedhide Interior Acrylic Latex Semi-Gloss Enamel, 6-510 Series
    - SW Pro-Mar 200 Latex Semi-Gloss, B31 W 200
3. Other concrete masonry unit walls.
  - 1 filler coat
    - PPG Pitt-Glaze Int/Ext Latex Block Filler 16-90
    - SW Heavy Duty Block Filler, B42 W 46
  - 2 finish coats
    - PPG Speedhide Interior Acrylic Latex Semi-Gloss Enamel, 6-510 Series
    - SW Pro-Mar 200 Latex Semi-Gloss, B31 W 200

D. Gypsum Wallboard

1. Gypsum board ceilings and furr downs.
  - 1 texture coat
    - USG Multi-Purpose Texture - Sprayed Splatter - Light Finish Texture
    - PPG Speedhide Acrylic Texture Coating 4-50

- 3 finish coats
  - PPG Speedhide Interior Flat Latex 6-70 Series
  - SW ProMar 200 Latex Flat Wall Paint, Series B30 W 200
- 2. All other gypsum board walls.
  - 1 texture coat
    - USG Multi-Purpose Texture - sprayed splatter medium-light finish texture
    - PPG Speedhide Acrylic Texture Coating 4-50
  - 1 primer coat
    - SW PrepRite ProBlock Interior-Exterior Latex Primer-Sealer, B51-600 or approved equivalent
  - 2 finish coats
    - PPG Speedhide Interior Semi-Gloss Latex Enamel 6-510 Series
    - SW Pro-Mar 200 Latex Semi-Gloss, B31 W 200
- E. Interior Caulked Joints
  - 1. Caulking
    - 2 finish coats
      - PPG Speedhide Interior Semi-Gloss Latex Enamel 6-510 Series
      - SW Pro-Mar 200 Latex Semi-Gloss, B31 W 200
- F. Exterior Metal
  - 1. Steel door frames and hollow metal doors.
    - 1 primer coat
      - PPG Speedhide Int/Ext Rust Inhibitive Steel Primer 6-208 Series
      - SW Kromik Metal Primer E41N1
    - 2 finish coats
      - PPG Int/Ext Industrial Gloss Alkyd Enamel 7-282 Series
      - SW Industrial Enamel, Series B54
  - 2. Galvanized steel pipe handrails, railings, lintels, gates, metal fencing, ladders, ductwork, flashings, copings, roof hatches, tubular steel downspouts, galvanized gutters and downspouts, scuppers, ventilators, and louvers. (Reference test procedure for Passivators)
    - 1 primer coat
      - PPG Speedhide Int/Ext Galvanized Steel Primer 6-209
      - SW Galvite Paint, B50 WZ30
    - 2 finish coats
      - PPG Int/Ext Industrial Gloss Alkyd Enamel 7-282 Series
      - SW Industrial Enamel, Series B54

END OF SECTION

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SECTION 10 14 00

IDENTIFYING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
  - 1. Marquee and electronic sign.
  - 2. Vinyl Adhesive Letters at Storefront

1.2 SUBMITTALS

- A. General: Submit in accordance with SECTION 01 33 23 - SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Samples: Submit manufacturer's complete line of color samples, 1" x 3", for initial color selection.
- C. Invoices: Submit certified copies of invoices indicating description and quantity of signs delivered and installed.
- D. Template: Submit full-size template drawing for approval:
  - 1. Aluminum letter size, stock, spacing, anchorage devices, etc.

1.3 PRE-INSTALLATION CONFERENCE

- A. Aluminum Letter Pre-installation Meeting: Contractor shall schedule a pre-installation meeting at the project site with the Architect, Contractor and building letter installer for approval of template field layout prior to beginning of installation.

1.4 QUALITY ASSURANCE

- A. Interior signs shall be provided by a single source with at least five years' experience successfully providing signs of similar type and scope.
- B. Signs shall comply with the Texas Accessibility Standards (TAS) and other laws and ordinances of authorities having jurisdiction. Braille shall be Grade II, having dimensions as required to meet TAS.

1.5 PACKING, DELIVERY, AND STORAGE

- A. Deliver components correctly packaged to prevent damage. Pack modules and back-up plates unassembled to allow for mechanical mounting of backplate to wall with concealed fasteners.
- B. Individually and clearly identify each sign number, type, location to be installed, mounting instructions, and other pertinent information.

1.6 WARRANTY

- A. Cast Aluminum Letters: Provide 5-year manufacturer's warranty.

PART 2 - PRODUCTS

2.1 ELECTRONIC SIGNAGE

- A. Basis of Design: Model 5.5-9632 as manufactured by Spectrum Scoreboards. Other manufacturers must have a minimum of five (5) years experience manufacturing products meeting or exceeding the specifications and Comply with Division 1 requirements regarding substitutions to be considered:
  - 1. Daktronics, Inc.
  - 2. LED Partners
  - 3. Poblocki Sign Company.
  - 4. PolyVision Corporation.



- B. Double Sided Full Color LED Display:
  - 1. Dimensions: As indicated on Drawings.
  - 2. Composition: Signage enclosed with brick with spacing around the display to allow for air flow.
  - 3. Cover: UL Listed LED Vandal Cover.
  - 4. UV Inhibitor infused sign face:
    - a. Protect graphics for life of the sign.
  - 5. Panel: Air vented, Aluminum, matte finish
    - a. Colors: Architect to select color from manufacturer's full range.
  - 6. LED Display: Color 32 X 144 Pixel Matrix.
    - a. Available Colors: Over 281 Quintillion colors.
    - b. Font: Arial.
    - c. Displays 4 lines of 5.5 inches tall characters with approx. 24-30 characters per line.
    - d. Capable of displaying 1-4 lines of text.
    - e. Variable fonts and text sizes up to 25.2 inches tall.
    - f. Cloud-Based Software:
      - 1) SignCommand.com.
    - g. Graphics: 3M Vinyl Photo-Real Graphics.
  - 7. Electrical: 100,000 hour average LED useful life. Refer to Division 26 – "Electrical."
    - a. LED Cabinet:
      - 1) Circuit: 2 – 20 amp (1 per side).
      - 2) Volts: 120 V.
      - 3) Max Draw: 10.8 amps per circuit.
    - b. ID Cabinet:
      - 1) Circuit: 1-20 amp. 2) Volts: 120-277 V.
      - 2) 3) Max Draw: .9 amps per circuit.

## 2.2 EXTERIOR VINYL ADHESIVE LETTERS

- A. Vinyl Adhesive Letters:
  - 1. Provide 2-mil thick, moisture resistant, electronic cut and thermal transfer Scotchcal™ ElectroCut™ Graphic Film Series 7725 or approved equivalent.
  - 2. Provide letters/numbers at each building entry in number/letter configuration as on drawings.
  - 3. Provide letters/numbers in location near entry as shown on drawings.
  - 4. Provide 7-year warranty.
  - 5. Color as selected by Architect.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Erecting Letters: Erect letters straight and level on the exterior face of building where shown.
  - 1. Attached to face brick: Secure with threaded stud anchors set in non-staining, quick setting cement. Letters shall be flush mounted to masonry surfaces.
  - 2. Attached to CMU wall: Secure letters to CMU wall with stainless steel threaded rods and non-staining, quick setting cement. Letters shall be flush mounted to masonry surfaces.
  - 3. Bottom rail mounting on top of prefabricated aluminum canopy.
    - a. Attach continuous aluminum rail to top of aluminum canopy as indicated on the Drawings.
    - b. Drill and tap letters from the bottom, with stainless steel screws going through aluminum rails.
    - c. Provide a flattened base on letters with round bottoms (O, S, G, etc.) to receive studs.
    - d. Include tiebacks as recommended by letter fabricator.
  
- B. Marquee Sign: Install marquee sign in strict compliance with manufacturer's instructions.

### 3.2 CLEANING

- A. On completion, clean exposed surfaces and leave free of defects.
  
- B. Do not use abrasives.

### 3.3 COORDINATION

- A. Contractor shall coordinate the installation of the identifying devices with other trades involved in the project.

### 3.4 DAMAGE

- A. An identifying device which is scratched or defaced will be rejected.

END OF SECTION

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SECTION 10 73 26

PREFABRICATED WALKWAY COVERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Prefabricated walkway canopies.
- B. Related Requirements:
  - 1. Section 03 30 00 - Cast-in-place Concrete.
  - 2. Section 07 92 00 - Joint Sealants.

1.2 SUBMITTALS

- A. General: Submit in accordance with SECTION 01 33 23 - SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Shop Drawings: Include drawings showing small scale layouts of prefabricated walkway canopies and large-scale details of edge conditions, joints, expansion joints, anchorages, trim, closures, and special details.
- C. Samples: Submit two 12" square samples of finished metal panels.
- D. Certification: Submit design calculations sealed and signed by an engineer registered in the State of Texas. Design calculations shall state that the protective cover system design complies with the wind requirements of all governing jurisdictions, the stability criteria of applicable building code, and all other governing criteria.

1.3 QUALITY ASSURANCE

- A. Wind Loading: Fabricate and install prefabricated walkway canopies and other components of system to comply with code requirements for resisting wind effects based on a 120 mph wind.
- B. Installer Qualifications: Engage an experienced installer who is an authorized representative of the canopy manufacturer and has completed installation of canopies similar in material, design, and extent to canopy required for this project.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Provide prefabricated walkway canopies as manufactured by one of the following:
  - AVAddek
  - Canopy Solutions
  - Dittmer Architectural Aluminum
  - Mapes Industries, Inc.

2.2 MATERIALS

- A. Aluminum Sheets: Extruded aluminum sections, Alloy 6063, T6 temper.
- B. Structural Supports: Extruded aluminum sections, Alloy 6063, T6 temper.
- C. Fasteners: Manufacturer's standard non-corrosive types, with heads gasketed.
- D. Accessories: Provide components required for a complete prefabricated walkway canopy system, including fascia, trim, closures, clips, fillers, and similar items. Match materials and finishes of prefabricated walkway canopy framing.

- E. Finish and color selection of each component shall be chosen from the manufacturer's color selections and shall include:
  - 1. Clear anodized finish (minimum thickness of 0.7 mils).
  - 2. Hardcoat bronze anodized finish (minimum thickness of 0.7 mils).
  - 3. Prefinished fluoropolymer coating containing 70% Kynar 500. Color shall be custom or standard color as selected by Architect from Fluropon colors as manufactured by Valspar.
  - 4. Polyester Baked Enamel. Color as selected by Architect.

### 2.3 FABRICATION

- A. General: Fabricate and finish canopies and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes. Comply with indicated profiles and dimensional requirements. Internal gutters shall connect to weep system.
- B. Wall-mounted Suspended Canopies:
  - 1. Hanger Rods: Round aluminum rods with baked enamel finish.
  - 2. Gutter shall scupper out at each end.

## PART 3 - EXECUTION

### 3.1 INSPECTION

- A. Examine surfaces to receive prefabricated walkway canopies for conditions that will adversely affect the execution and quality of work. Do not start this work until unsatisfactory conditions are corrected.

### 3.2 INSTALLATION

- A. General: Comply with canopy fabricator's and material manufacturer's instructions and recommendations for installation, as applicable to project conditions and supporting substrates. Anchor supports and other components of the work securely in place, with provisions for thermal and structural movement. Install expansion joints to provide for thermal and structural movement.

### 3.3 CLEANING AND PROTECTION

- A. Damaged Units: Replace canopies and other components of the work which have been damaged or have deteriorated beyond successful repair by means of finish touch-up or similar minor repair procedures.
- B. Cleaning: Upon completion of canopy installation, clean finished surfaces as recommended by canopy manufacturer and maintain in a clean condition during construction.

END OF SECTION

SECTION 23 02 00

BASIC MATERIALS AND METHODS FOR HVAC

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. The requirements of the General Conditions and Supplementary Conditions apply to all Work herein.
- B. The Contract Drawings indicate the extent and general arrangement of the systems. If any departure from the Contract Drawings is deemed necessary by the Contractor, details of such departures and the reasons therefore, shall be submitted to the Architect/Engineer for review as soon as practicable. No such departures shall be made without the prior written approval of the Architect/Engineer.
- C. Notwithstanding any reference in the Specifications to any article, device, product, material, fixture, form or type of construction by name, make or catalog number, such reference shall not be construed as limiting competition; and the Contractor, in such cases, may at his option use any article, device, product, material, fixture, form or type of construction which in the judgment of the Architect/Engineer, expressed in writing, is the equivalent of that specified.

1.2 SCOPE OF WORK

- A. The Work included under this Contract consists of the furnishing and installation of all equipment and material necessary and required to form complete and functioning systems in all of their various phases, all as shown on the accompanying Drawings and/or described in these Specifications. The Contractor shall review all pertinent drawings, including those of other contracts, prior to commencement of Work.
- B. This Division requires the furnishing and installing of all items as specified herein, indicated on the Drawings or reasonably inferred as necessary for safe and proper operation; including every article, device or accessory (whether or not specifically called for by item) reasonably necessary to facilitate each system's functioning as indicated by the design and the equipment specified. Elements of the work include, but are not limited to, materials, labor, supervision, transportation, storage, equipment, utilities, all required permits, licenses and inspections. All work performed under this Section shall be in accordance with the Project Manual, Drawings and Specifications and is subject to the terms and conditions of the Contract.
- C. The approximate locations of Mechanical (HVAC) items are indicated on the Drawings. These Drawings are not intended to give complete and accurate details in regard to location of outlets, apparatus, etc. Exact locations are to be determined by actual measurements at the building, and will in all cases be subject to the review of the Owner or Engineer, who reserves the right to make any reasonable changes in the locations indicated without additional cost to the Owner.
- D. Items specifically mentioned in the Specifications but not shown on the Drawings and/or items shown on Drawings but not specifically mentioned in the Specifications shall be installed by the Contractor under the appropriate section of work as if they were both specified and shown.
- E. All discrepancies between the Contract Documents and actual job-site conditions shall be reported to the Owner or Engineer so that they will be resolved prior to bidding. Where this cannot be done at least 7 working days prior to bid; the greater or more costly of the discrepancy shall be bid. All labor and materials required to perform the work described shall be included as part of this Contract.
- F. It is the intention of this Section of the Specifications to outline minimum requirements to furnish the Owner with a turn-key and fully operating system in cooperation with other trades.

- G. It is the intent of the above "Scope" to give the Contractor a general outline of the extent of the Work involved; however, it is not intended to include each and every item required for the Work. Anything omitted from the "Scope" but shown on the Drawings, or specified later, or necessary for a complete and functioning heating, ventilating and air conditioning system shall be considered a part of the overall "Scope".
- H. The Contractor shall rough-in fixtures and equipment furnished by others from rough-in and placement drawings furnished by others. The Contractor shall make final connection to fixtures and equipment furnished by others.
- I. The Contractor shall participate in the commissioning process as required; including, but not limited to, meeting attendance, completion of checklists, and participation in functional testing.

### 1.3 SCHEMATIC NATURE OF CONTRACT DOCUMENTS

- A. The Contract Documents are schematic in nature in that they are only to establish scope and a minimum level of quality. They are not to be used as actual working construction drawings. The actual working construction drawings shall be the reviewed shop drawings.
- B. All duct or pipe or equipment locations as indicated on the documents do not indicate every transition, offset, or exact location. All transitions, offsets, clearances and exact locations shall be established by actual field measurements, coordination with the structural, architectural and reflected ceiling plans, and other trades. Submit shop drawings for review.
- C. All transitions, offsets and relocations as required by actual field conditions shall be performed by the Contractor at no additional cost to the Owner.
- D. Additional coordination with electrical contractor may be required to allow adequate clearances of electrical equipment, fixtures and associated appurtenances. Contractor to notify Architect and Engineer of unresolved clearances, conflicts or equipment locations.

### 1.4 SITE VISIT AND FAMILIARIZATION

- A. Before submitting a bid, it will be necessary for each Contractor whose work is involved to visit the site and ascertain for himself the conditions to be met therein in installing his work and make due provision for same in his bid. It will be assumed that this Contractor in submitting his bid has visited the premises and that his bid covers all work necessary to properly install the equipment shown. Failure on the part of the Contractor to comply with this requirement shall not be considered justification for the omission or faulty installation of any work covered by these Specifications and Drawings.
- B. Understand the existing utilities from which services will be supplied; verify locations of utility services, and determine requirements for connections.
- C. Determine in advance that equipment and materials proposed for installation fit into the confines indicated.

### 1.5 WORK SPECIFIED IN OTHER SECTIONS

- A. Finish painting is specified. Prime and protective painting are included in the work of this Division.
- B. Owner and General Contractor furnished equipment shall be properly connected to Mechanical (HVAC) systems.
- C. Furnishing and installing all required Mechanical (HVAC) equipment control relays and electrical interlock devices, conduit, wire and J-boxes are included in the Work of this Division.

1.6 PERMITS, TESTS, INSPECTIONS

- A. Arrange and pay for all permits, fees, tests, and all inspections as required by governmental authorities.

1.7 DATE OF SUBSTANTIAL COMPLETION

- A. The date of final acceptance shall be the date of substantial completion. Refer to Division One for additional requirements.
- B. The date of final acceptance shall be documented in writing and signed by the Architect, Owner and Contractor.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to the project properly identified with names, model numbers, types, grades, compliance labels, and other information needed for identification.
- B. Deliver products to the project at such time as the project is ready to receive the equipment, pipe or duct - properly protected from incidental damage and weather damage.
- C. Damaged equipment, duct or pipe shall be promptly removed from the site and new, undamaged equipment, pipe or duct shall be installed in its place promptly with no additional charge to the Owner.

1.9 NOISE AND VIBRATION

- A. The heating, ventilating and air conditioning systems, and the component parts thereof, shall be guaranteed to operate without objectionable noise and vibration.
- B. Provide foundations, supports and isolators as specified or indicated, properly adjusted to prevent transmission of vibration to the building structure, piping and other items.
- C. Carefully fabricate ductwork and fittings with smooth interior finish to prevent turbulence and generation or regeneration of noise.
- D. All equipment shall be selected to operate with minimum of noise and vibration. If, in the opinion of the Architect, objectionable noise or vibration is produced or transmitted to or through the building structure by equipment, piping, ducts or other parts of the Work, the Contractor shall rectify such conditions without extra cost to the Owner.

1.10 DELEGATED DESIGN FOR ANCHORAGE OF ROOF MOUNTED EQUIPMENT

- A. The Contractor shall engage a qualified professional engineer to design all roof mounted equipment curbs, equipment supports, equipment tie downs, equipment connections, and methods of attachment for components that are to be anchored to the building structure. The design shall comply with wind load and uplift requirements utilizing design criteria per ICC (IBC) and ASCE 7 unless criteria is otherwise indicated in the Construction Documents.
- B. Submittal: Signed and sealed engineering analysis data and accompanying details, drawings, and supplemental installation information shall be submitted to the engineer for review.

1.11 APPLICABLE CODES AND STANDARDS

- A. Obtain all required permits and inspections for all work required by the Contract Documents and pay all required fees in connection thereof.
- B. Arrange with the serving utility companies for the connection of all required utilities and pay all charges, meter charges, connection fees and inspection fees, if required.



- C. Comply with all applicable codes, specifications, local ordinances, industry standards, utility company regulations and the applicable requirements which includes and is not limited to the following nationally accepted codes and standards:
1. Air Moving & Conditioning Association, AMCA.
  2. American Standards Association, ASA.
  3. American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc., ASHRAE.
  4. American Society of Mechanical Engineers, ASME.
  5. American Society of Plumbing Engineers, ASPE.
  6. American Society of Testing Materials, ASTM.
  7. American Water Works Association, AWWA.
  8. National Bureau of Standards, NBS.
  9. National Fire Protection Association, NFPA.
  10. Sheet Metal & Air Conditioning Contractors' National Association, SMACNA.
  11. Underwriters' Laboratories, Inc., UL.
  12. International Building Code, IBC.
  13. International Energy Conservation Code, IECC.
  14. International Fire Code, IFC.
  15. International Fuel Gas Code, IFGC.
  16. International Mechanical Code, IMC.
- D. Where differences existing between the Contract Documents and applicable state or city building codes, state and local ordinances, industry standards, utility company regulations and the applicable requirements of the nationally accepted codes and standards, the more stringent or costly application shall govern. Promptly notify the Engineer in writing of all differences.
- E. When directed in writing by the Engineer, remove all work installed that does not comply with the Contract Documents and applicable state or city building codes, state and local ordinances, industry standards, utility company regulations and the applicable requirements of the above listed nationally accepted codes and standards, correct the deficiencies, and complete the work at no additional cost to the Owner.

#### 1.12 DEFINITIONS AND SYMBOLS

- A. General Explanation: A substantial amount of construction and Specification language constitutes definitions for terms found in other Contract Documents, including Drawings which must be recognized as diagrammatic and schematic in nature and not completely descriptive of requirements indicated thereon. Certain terms used in Contract Documents are defined generally in this article, unless defined otherwise in Division 01.
- B. Definitions and explanations of this Section are not necessarily either complete or exclusive, but are general for work to the extent not stated more explicitly in another provision of the Contract Documents.
- C. Indicated: The term "Indicated" is a cross-reference to details, notes or schedules on the Drawings, to other paragraphs or schedules in the Specifications and to similar means of recording requirements in Contract Documents. Where such terms as "Shown", "Noted", "Scheduled", "Specified" and "Detailed" are used in lieu of "Indicated", it is for the purpose of helping the reader locate cross-reference material, and no limitation of location is intended except as specifically shown.
- D. Directed: Where not otherwise explained, terms such as "Directed", "Requested", "Accepted", and "Permitted" mean by the Architect or Engineer. However, no such implied meaning will be interpreted to extend the Architect's or Engineer's responsibility into the Contractor's area of construction supervision.
- E. Reviewed: Where used in conjunction with the Engineer's response to submittals, requests for information, applications, inquiries, reports and claims by the Contractor the meaning of the term "Reviewed" will be held to limitations of Architect's and Engineer's responsibilities and duties as specified in the General and Supplemental Conditions. In no case will "Reviewed" by Engineer be interpreted as a release of the Contractor from responsibility to fulfill the terms and requirements of the Contract Documents.

- F. Furnish: Except as otherwise defined in greater detail, the term "Furnish" is used to mean supply and deliver to the project site, ready for unloading, unpacking, assembly, installation, etc., as applicable in each instance.
- G. Install: Except as otherwise defined in greater detail, the term "Install" is used to describe operations at the project site including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protection, cleaning and similar operations, as applicable in each instance.
- H. Provide: Except as otherwise defined in greater detail, the term "Provide" is used to mean "Furnish and Install", complete and ready for intended use, as applicable in each instance.
- I. Installer: Entity (person or firm) engaged by the Contractor, or its Subcontractor or Sub-subcontractor for performance of a particular unit of work at the project site, including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protection, cleaning and similar operations, as applicable in each instance. It is a general requirement that such entities (Installers) be expert in the operations they are engaged to perform.
- J. Imperative Language: Used generally in Specifications. Except as otherwise indicated, requirements expressed imperatively are to be performed by the Contractor. For clarity of reading at certain locations, contrasting subjective language is used to describe responsibilities that must be fulfilled indirectly by the Contractor or, when so noted, by other identified installers or entities.
- K. Minimum Quality/Quantity: In every instance, the quality level or quantity shown or specified is intended as minimum quality level or quantity of work to be performed or provided. Except as otherwise specifically indicated, the actual work may either comply exactly with that minimum (within specified tolerances), or may exceed that minimum within reasonable tolerance limits. In complying with requirements, indicated or scheduled numeric values are either minimums or maximums as noted or as appropriate for the context of the requirements. Refer instances of uncertainty to Owner or Engineer via a request for information (RFI) for decision before proceeding.
- L. Abbreviations and Symbols: The language of Specifications and other Contract Documents including Drawings is of an abbreviated type in certain instances, and implies words and meanings which will be appropriately interpreted. Actual word abbreviations of a self-explanatory nature have been included in text of Specifications and Drawings. Specific abbreviations and symbols have been established, principally for lengthy technical terminology and primarily in conjunction with coordination of Specification requirements with notations on Drawings and in Schedules. These are frequently defined in Section at first instance of use or on a Legend and Symbol Drawing. Trade and industry association names and titles of generally recognized industry standards are frequently abbreviated. Singular words will be interpreted as plural and plural words will be interpreted as singular where applicable and where full context of Contract Documents so indicate. Except as otherwise indicated, graphic symbols and abbreviations used on Drawings and in Specifications are those recognized in construction industry for indicated purposes. Where not otherwise noted symbols and abbreviations are defined by the latest ASHRAE Fundamentals Handbook, chapter 34 "Abbreviations and Symbols", ASME and ASPE published standards.

#### 1.13 DRAWINGS AND SPECIFICATIONS

- A. These Specifications are intended to supplement the Drawings and it will not be the province of the Specifications to mention any part of the Work which the Drawings are competent to fully explain in every particular and such omission is not to relieve the Contractor from carrying out portions indicated on the Drawings only.
- B. Should items be required by these Specifications and not indicated on the Drawings, they are to be supplied even if of such nature that they could have been indicated thereon. In case of disagreement between Drawings and Specifications, or within either Drawings or Specifications, the better quality or greater quantity of work shall be estimated and the matter referred to the Architect or Engineer for review with a request for information and clarification at least 7 working days prior to bid opening date for issuance of an addendum.

- C. The listing of product manufacturers, materials and methods in the various sections of the Specifications, and indicated on the Drawings, is intended to establish a standard of quality only. It is not the intention of the Owner or Engineer to discriminate against any product, material or method that is the equivalent of the standards as indicated and/or specified, nor is it intended to preclude open, competitive bidding. The fact that a specific manufacturer is listed as an acceptable manufacturer should not be interpreted to mean that the manufacturer's standard product will meet the requirements of the project design, Drawings, Specifications and space constraints.
- D. The Architect or Engineer and Owner shall be the sole judge of quality and equivalence of equipment, materials and methods.
- E. Products by other reliable manufacturers, other materials, and other methods, will be accepted as outlined, provided they have equivalent capacity, construction, and performance. However, under no circumstances shall any substitution be made without the written permission of the Architect or Engineer and Owner. Request for prior approval must be made in writing 10 calendar days prior to the bid date without fail.
- F. Wherever a definite product, material or method is specified and there is not a statement that another product, material or method will be acceptable, it is the intention of the Owner or Engineer that the specified product, material or method is the only one that shall be used without prior approval.
- G. Wherever a definite material or manufacturer's product is specified and the Specification states that products of similar design and equivalent construction from the specified list of manufacturers may be substituted, it is the intention of the Owner or Engineer that products of manufacturers that are specified are the only products that will be acceptable and that products of other manufacturers will not be considered for substitution without approval.
- H. Wherever a definite product, material or method is specified and there is a statement that "OR EQUIVALENT" product, material or method will be acceptable, it is the intention of the Owner or Engineer that the specified product, material or method or an "OR EQUIVALENT" product, material or method may be used if it complies with the Specifications and is submitted for review to the Engineer as outline herein.
- I. Where permission to use substituted or alternative equipment on the project is granted by the Owner or Engineer in writing, it shall be the responsibility of the Contractor or Subcontractor involved to verify that the equipment will fit in the space available which includes allowances for all required Code and maintenance clearances, and to coordinate all equipment structural support, plumbing and electrical requirements and provisions with the Mechanical (HVAC) Design Documents and all other trades, including Division 26.
- J. Changes in architectural, structural, electrical, mechanical, and plumbing requirements for the substitution shall be the responsibility of the bidder wishing to make the substitution. This shall include the cost of redesign by the affected designer(s). Any additional cost incurred by affected Subcontractors shall be the responsibility of this bidder and not the Owner.
- K. If any request for a substitution of product, material or method is rejected, the Contractor will automatically be required to furnish the product, material or method named in the Specifications. Repetitive requests for substitutions will not be considered.
- L. The Owner or Engineer will investigate all requests for substitutions when submitted in accordance with the requirements listed above; and if accepted, will issue a letter allowing the substitutions.
- M. Where equipment other than that used in the design as specified or shown on the Drawings is substituted (either from an approved manufacturers list or by submittal review), it shall be the responsibility of the substituting Contractor to coordinate space requirements, building provisions and connection requirements with their respective trade(s) and all other trades; and to pay all additional costs to other trades, the Owner, the Architect or Engineer, if any, due to the substitutions.

#### 1.14 SUBMITTALS

- A. Coordinate with Division 01 for submittal timetable requirements, unless noted otherwise within thirty (30) days after the Contract is awarded. The Contractor shall submit an electronic copy of a complete set of shop drawings and complete data covering each item of equipment or material. The submittal of each item requiring a submittal must be received by the Architect or Engineer within the above thirty-day period. The Architect or Engineer shall not be responsible for any delays or costs incurred due to excessive shop drawing review time for submittals received after the thirty (30) day time limit. The Architect and Engineer will retain a copy of all shop drawings for their files. All literature pertaining to items subject to Shop Drawing submittal shall be submitted at one time. Submittals shall be placed in one electronic file in PDF 8.0 format and bookmarked for individual specification sections. Individual electronic files of submittals for individual specifications shall not be permitted. Each submittal shall include the following items:
1. A cover sheet with the names and addresses of the Project, Architect, MEP Engineer, General Contractor and the Subcontractor making the submittal. The cover sheet shall also contain the section number covering the item or items submitted and the item nomenclature or description.
  2. An index page with a listing of all data included in the Submittal.
  3. A list of variations page with a listing of all variations, including unfurnished or additional required accessories, items or other features, between the submitted equipment and the specified equipment. If there are no variations, then this page shall state "NO VARIATIONS". Where variations affect the work of other Contractors, then the Contractor shall certify on this page that these variations have been fully coordinated with the affected Contractors and that all expenses associated with the variations will be paid by the submitting Contractor. This page will be signed by the submitting Contractor.
  4. Equipment information including manufacturer's name and designation, size, performance and capacity data as applicable. All applicable Listings, Labels, Approvals and Standards shall be clearly indicated.
  5. Dimensional data and scaled drawings as applicable to show that the submitted equipment will fit the space available with all required Code and maintenance clearances clearly indicated and labeled at a minimum scale of 1/4" = 1'-0", as required to demonstrate that the alternate or substituted product will fit in the space available.
  6. Identification of each item of material or equipment matching that indicated on the Drawings.
  7. Sufficient pictorial, descriptive and diagrammatic data on each item to show its conformance with the Drawings and Specifications. Any options or special requirements or accessories shall be so indicated. All applicable information shall be clearly indicated with arrows or another approved method.
  8. Additional information as required in other Sections of this Division.
  9. Certification by the General Contractor and Subcontractor that the material submitted is in accordance with the Drawings and Specifications, signed and dated in long hand. Submittals that do not comply with the above requirements shall be returned to the Contractor and shall be marked "REVISE AND RESUBMIT".
- B. Refer to Division 00 and Division 01 for additional information on shop drawings and submittals.
- C. Equipment and materials submittals and shop drawings will be reviewed for compliance with design concept only. It will be assumed that the submitting Contractor has verified that all items submitted can be installed in the space allotted. Review of shop drawings and submittals shall not be considered as a verification or guarantee of measurements or building conditions.
- D. Where shop drawings and submittals are marked "REVIEWED", the review of the submittal does not indicate that submittals have been checked in detail nor does it in any way relieve the Contractor from his responsibility to furnish material and perform work as required by the Contract Documents.
- E. Shop drawings shall be reviewed and returned to the Contractor with one of the following categories indicated:
1. REVIEWED: Contractor need take no further submittal action, shall include this submittal in the O&M manual and may order the equipment submitted on.

2. REVIEWED AS NOTED: Contractor shall submit a letter verifying that required exceptions to the submittal have been received and complied with including additional accessories or coordination action as noted, and shall include this submittal and compliance letter in the O&M manual. The contractor may order the equipment submitted on at the time of the returned submittal providing the Contractor complies with the exceptions noted.
  3. NOT APPROVED: Contractor shall resubmit new submittal on material, equipment or method of installation when the alternate or substitute is not approved. The Contractor will automatically be required to furnish the product, material or method named in the Specifications and/or Drawings. Contractor shall not order equipment that is not approved. Repetitive requests for substitutions will not be considered.
  4. REVISE AND RESUBMIT: Contractor shall resubmit new submittal on material, equipment or method of installation when the alternate or substitute is marked revise and resubmit. The Contractor will automatically be required to furnish the product, material or method named in the Specifications and/or provide as noted on previous shop drawings. Contractor shall not order equipment marked revise and resubmit. Repetitive requests for substitutions will not be considered.
  5. CONTRACTOR'S CERTIFICATION REQUIRED: Contractor shall resubmit submittal on material, equipment or method of installation. The Contractor's stamp is required stating that the submittal meets all conditions of the Contract Documents. The stamp shall be signed by the General Contractor. The submittal will not be reviewed if the stamp is not placed and signed on all shop drawings.
  6. MANUFACTURER NOT AS SPECIFIED: Contractor shall resubmit new submittal on material, equipment or method of installation when the alternate or substitute is marked manufacturer not as specified. The Contractor will automatically be required to furnish the product, material or method named in the Specifications. Contractor shall not order equipment when submittal is marked manufacturer not as specified. Repetitive requests for substitutions will not be considered.
- F. Materials and equipment which are purchased or installed without submittal review shall be at the risk of the Contractor and the cost for removal and replacement of such materials and equipment and related work which is judged unsatisfactory by the Owner or Engineer for any reason shall be at the expense of the Contractor. The responsible Contractor shall remove the material and equipment noted above and replace with specified equipment or material at his own expense when directed in writing by the Architect or Engineer.
- G. Shop Drawing Submittals shall be complete and checked prior to submission to the Engineer for review.
- H. Submittals are required for, but not limited to, the following items subject to project requirements:
1. Coordination Drawings
  2. Common Motor Requirements for HVAC Equipment
  3. Expansion Fittings and Loops for HVAC Piping
  4. Variable Frequency Motor Speed Control for HVAC Equipment
  5. Hangers and Support for Piping and Equipment HVAC
  6. Vibration and Seismic Controls for HVAC Piping and Equipment
  7. Testing, Adjusting, and Balancing
  8. Duct Insulation
  9. HVAC Equipment Insulation
  10. HVAC Piping Insulation
  11. Refrigerant Monitor System
  12. Energy Management and Control System
  13. Above Ground Hydronic Piping
  14. Hydronic Specialties
  15. Hydronic Pumps
  16. Refrigerant Piping
  17. Metal Ductwork
  18. Ductwork Accessories
  19. Duct Silencers
  20. HVAC Fans
  21. High-Volume Low-Speed Propeller Fans
  22. Dust Collection Systems
  23. Series Fan Powered Terminal Units
  24. Single Duct VAV Terminal Box

25. Parallel Fan Powered Terminal Unit
26. Dual Duct Air Terminal Units
27. Air Distribution Devices
28. HVAC Gravity Ventilators
29. Air Filters
30. Air Purification Systems
31. Flue Pipe Systems
32. Non-Condensing Boilers
33. Condensing Boilers
34. Finned Water-Tube Boilers
35. Steel Water-Tube Boilers
36. Gas Fired Furnaces
37. Gas Fired Roof Mounted Make-up Air Unit Heaters
38. Shell and Tube Heat Exchanger
39. Plate-Type, Liquid-To-Liquid Heat Exchangers
40. Centrifugal Liquid Chiller
41. Rotary Screw Water Chillers
42. Air Cooled Rotary Liquid Chiller
43. Induced Draft Cooling Tower
44. Energy Recovery Ventilator
45. Modular Indoor Central Station Air Handling Units
46. Packaged Air Handling Unit
47. Modular Outdoor Central Station Air Handling Units
48. 100% Outside Air Rooftop Unit with Gas Heat
49. Self-Contained Air Conditioners
50. Rooftop Heating and Cooling Units Electric Cooling-Gas Heating
51. Rooftop Heating and Cooling Units Electric Cooling-Electric Heat
52. Variable Air Volume Rooftop Units
53. Split System Air-Conditioners - Wall-Mounted
54. Variable Refrigerant Flow (VRF) for HVAC System
55. Water Source Heat Pump Unit
56. Fan Coil Unit
57. Unit Ventilators
58. Electric Unit Heaters
59. Electric Duct Heaters
60. Radiant Heating Electric Cables
61. Air Conditioning Unit for Swimming Pool Enclosures

- I. Refer to other Division 23 sections for additional submittal requirements. Provide samples of actual materials and/or equipment to be used on the Project upon request of the Owner or Engineer.

#### 1.15 COORDINATION DRAWINGS

- A. Prepare coordination drawings to a scale of 1/4"=1'-0" or larger; detailing major elements, components, and systems of mechanical equipment and materials in relationship with other systems, installations, and building components. Indicate locations where space is limited for installation and access, and where sequencing and coordination of installations are of importance to the efficient flow of the Work, including (but not necessarily limited to) the following:
  1. Indicate the proposed locations of pipe, duct, equipment, and other materials. Include the following:
    - a. Wall and type locations.
    - b. Clearances for installing and maintaining insulation.
    - c. Locations of light fixtures and sprinkler heads.
    - d. Clearances for servicing and maintaining equipment, including tube removal, filter removal, and space for equipment disassembly required for periodic maintenance.
    - e. Equipment connections and support details.
    - f. Exterior wall and foundation penetrations.
    - g. Routing of storm and sanitary sewer piping.
    - h. Fire-rated wall and floor penetrations.
    - i. Sizes and location of required concrete pads and bases.
    - j. Valve stem movement.

- k. Structural floor, wall and roof opening sizes and details.
  2. Indicate scheduling, sequencing, movement, and positioning of large equipment into the building during construction.
  3. Prepare floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.
  4. Prepare reflected ceiling plans to coordinate and integrate installations, air distribution devices, light fixtures, communication systems components, and other ceiling-mounted items.
- B. This Contractor shall be responsible for coordination of all items that will affect the installation of the work of this Division. This coordination shall include, but not be limited to: voltage, ampacity, capacity, electrical and piping connections, space requirements, sequence of construction, building requirements and special conditions.
- C. By submitting coordination drawings on the project, this Contractor is indicating that all necessary coordination has been completed and that the systems, products and equipment submitted can be installed in the building and will operate as specified and intended, in full coordination with all other Contractors and Subcontractors.

#### 1.16 RECORD DOCUMENTS

- A. Prepare Record Documents in accordance with the requirements of Division 00 and Division 01, in addition to the requirements specified in Division 23.
- B. The Contractor shall maintain a separate set of clearly and legibly marked Record Drawings on the job site to record all changes and modifications, including, but not limited to the following: work details, alterations to meet site conditions, and changes made by "Change Order" notices. Mark the drawings with colored pencil(s). These shall be available for review by the Owner, Architect or Engineer during the entire construction stage.
- C. The Record Drawings shall be updated concurrently as construction progresses, and in no case less frequently than a daily basis. They shall indicate accurate dimensions for all buried or concealed work, precise locations of all concealed pipe or duct, locations of all concealed valves, controls and devices and any deviations from the work shown on the Construction Documents. All dimensions shall include at least two dimensions to permanent structure points.
- D. Record Drawings shall indicate, at a minimum, the following installed conditions:
1. Duct mains and branches, size and location, for both exterior and interior; locations of dampers, fire dampers, duct access panels, and other control devices; filters, fuel fired heaters, fan coils, condensing units, and roof-top A/C units requiring periodic maintenance or repair.
  2. Mains and branches of piping systems, with valves and control devices located and numbered, concealed unions located, and with items requiring maintenance located (i.e., traps, strainers, expansion compensators, tanks, etc.). Valve location diagrams, complete with valve tag chart. Indicate actual inverts and horizontal locations of underground piping.
  3. Equipment locations (exposed and concealed), dimensioned from prominent building lines.
  4. Approved substitutions, Contract Modifications, and actual equipment and materials installed.
  5. Contract Modifications, actual equipment and materials installed.
- E. Engage the services of a Land Surveyor or Professional Engineer registered in the state in which the project is located as specified herein to record the locations and invert elevations of underground installations.
- F. If the Contractor does not keep an accurate set of Record Drawings, the pay request may be altered or delayed at the request of the Architect. Delivery of Record Documents is a condition of final acceptance. Record Drawings shall be furnished in addition to Shop Drawings.
- G. The Contractor shall submit an electronic copy of the record documents in PDF format and one (1) full size set of Record Drawing prints to the Architect or Engineer for review prior to scheduling the final inspection at the completion of the work. The drawings shall have the name(s) and seal(s) of the Engineer(s) removed or blanked out and shall be clearly marked and signed on each sheet as follows:

CERTIFIED RECORD DRAWINGS

DATE:

(NAME OF GENERAL CONTRACTOR)

BY: \_\_\_\_\_

(SIGNATURE)

(NAME OF SUBCONTRACTOR)

BY: \_\_\_\_\_

(SIGNATURE)

1.17 OPERATING AND MAINTENANCE MANUALS

- A. Prepare operating and maintenance manuals in accordance with Division 00 and Division 01 and, in addition to the requirements specified in those Divisions, include the following information for equipment items:
  - 1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.
    - a. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
    - b. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
    - c. Servicing instructions and lubrication charts and schedules.

1.18 CERTIFICATIONS AND TEST REPORTS

- A. Submit a detailed schedule for completion and testing of each system indicating scheduled dates for completion of system installation and outlining tests to be performed and scheduled date for each test. This detailed completion and test schedule shall be submitted at least 90 days before the projected substantial completion date.
- B. Test result reporting forms shall be submitted for review no later than the date of the detailed schedule.
- C. Submit 4 copies of all certifications and test reports to the Architect or Engineer for review adequately in advance of substantial completion of the Work to allow for remedial action as required to correct deficiencies discovered in equipment and systems.
- D. Certifications and test reports to be submitted shall include, but not be limited to, those items outlined in Section 23 02 00.

1.19 OPERATING AND MAINTENANCE MANUALS

- A. Prepare Operations and Maintenance manuals in accordance with the requirements of Division 01 and Division 23. In addition to the requirements of other Sections, this shall include the following information for equipment items:
  - 1. Identifying names, name tags designations and locations for all equipment.
  - 2. Valve tag lists with valve number, type, color coding, location and function.
  - 3. Reviewed Shop Drawing submittals with exceptions noted compliance letter.
  - 4. Fabrication drawings.



5. Equipment and device bulletins and data sheets clearly highlighted to show equipment installed on the project and including performance curves and data as applicable, i.e., description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and model numbers of replacement parts.
  6. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
  7. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
  8. Servicing instructions and lubrication charts and schedules.
  9. Equipment and motor name plate data.
  10. Wiring diagrams.
  11. Exploded parts views and parts lists for all equipment and devices.
  12. Color coding charts for all painted equipment and conduit.
  13. Location and listing of all spare parts and special keys and tools furnished to the Owner.
  14. Furnish recommended lubrication schedule for all required lubrication points with listing of type and approximate amount of lubricant required.
- B. Coordinate with Division 01 for Operations and Maintenance manual requirements. Unless noted otherwise, bind together in "D ring" style three-ring binders (National model no. 79-883 or equivalent). Binders shall be large enough to allow ¼" of spare capacity. Include three (3) sets with all approved Shop Drawing submittals, fabrication drawings, bulletins, maintenance instructions, operating instructions and parts exploded views and lists for each and every piece of equipment furnished under this Specification. All sections shall be typed and indexed into sections with tabbed insertable dividers, labeled for easy reference. Utilize the individual specification section numbers shown in the Mechanical Specifications as an organization guideline. Bulletins containing information about equipment that is not installed on the project shall be properly marked up or stripped and reassembled. All pertinent information required by the Owner for proper operation and maintenance of equipment supplied by Division 23 shall be clearly and legibly set forth in memoranda that shall, likewise, be bound with bulletins.
- C. In addition to the bound "hard-copy" Operation and Maintenance manuals referenced above, provide an identical electronic copy in searchable PDF format, with all sections bookmarked within the file for easy reference. Provide a USB flash drive with the final manual to the Owner.
- D. Operating and Maintenance Manuals shall be turned over to the Owner or Engineer for review a minimum of fourteen (14) working days prior to the beginning of the operator training period.
- E. Operating and Maintenance Manuals which the Engineer deems incomplete, poorly organized, or otherwise unacceptable will be rejected in writing. The Contractor will subsequently be required to again turn over Operating and Maintenance Manuals, with all deficiencies corrected, until deemed acceptable by the Engineer.

#### 1.20 OPERATOR TRAINING

- A. The Contractor shall furnish the services of factory trained specialists to instruct the Owner's operating personnel. The Owner's operator training shall include a minimum of 12 hours of onsite training in three (3) shifts of four (4) hours each.
- B. Before proceeding with the instruction of Owner Personnel, prepare a typed outline in triplicate, listing the subjects that will be covered in this instruction, and submit the outline for review by the Owner. At the conclusion of the instruction period, obtain the signature of each person being instructed on each copy of the reviewed outline to signify that he has a proper understanding of the operation and maintenance of the systems and resubmit the signed outlines.
- C. Refer to other Division 23 Sections for additional Operator Training requirements.

#### 1.21 FINAL COMPLETION

- A. At the completion of the Work, all equipment and systems shall be tested and faulty equipment and material shall be repaired or replaced. Refer to Sections of Division 23 for additional requirements.
- B. Clean and adjust all air distribution devices and replace all air filters immediately prior to Substantial Completion.
- C. Touch up and/or refinish all scratched equipment and devices immediately prior to Substantial Completion.

#### 1.22 CONTRACTOR'S GUARANTEE

- A. Use of the HVAC systems to provide temporary service during construction period will not be allowed without permission from the Owner in writing; and, if granted, shall not cause the warranty period to start, except as defined below.
- B. Contractor shall guarantee to keep the entire installation in repair and perfect working order for a period of one year after the date of the Substantial Completion, and shall furnish (free of additional cost to the Owner) all materials and labor necessary to comply with the above guarantee throughout the year beginning from the date of Substantial Completion, Beneficial Occupancy by the Owner, or the Certificate of Final Payment as agreed upon by all parties.
- C. This guarantee shall not include cleaning or changing filters except as required by testing, adjusting and balancing.
- D. All air conditioning compressors shall have parts and labor guarantees provided by the equipment manufacturer for a period of not less than 5 years beyond the date of Substantial Completion.
- E. Refer to Sections in Division 23 for additional guarantee or warranty requirements.

#### 1.23 TRANSFER OF ELECTRONIC FILES

- A. Project documents are not intended or represented to be suitable for reuse by Architect/Owner or others on extensions of this project or on any other project. Any such reuse or modification without written verification or adaptation by Engineer, as appropriate for the specific purpose intended, will be at Architect/Owner's risk and without liability or legal exposure to Engineer or its consultants from all claims, damages, losses and expense, including attorney's fees arising out of or resulting thereof.
- B. Because data stored in electronic media format can deteriorate or be modified inadvertently, or otherwise, without authorization of the data's creator, the party receiving the electronic files agrees that it will perform acceptance tests or procedures within sixty (60) days of receipt, after which time the receiving party shall be deemed to have accepted the data thus transferred to be acceptable. Any errors detected within the sixty (60) day acceptance period will be corrected by the party delivering the electronic files. Engineer is not responsible for maintaining documents stored in electronic media format after acceptance by the Architect/Owner.
- C. When transferring documents in electronic media format, Engineer makes no representations as to the long term compatibility, usability or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by Engineer at the beginning of the Project.
- D. Any reuse or modifications will be at the Contractor's sole risk and without liability or legal exposure to Architect, Engineer or any consultant.

- E. The Texas Board of Architectural Examiners (TBAE) has stated that it is in violation of Texas law for persons other than the Architect of record to revise the Architectural drawings without the Architect's written consent.
1. It is agreed that "MEP" hard copy or computer-generated documents will not be issued to any other party except directly to the Architect/Owner. The Contract Documents are contractually copyrighted and cannot be used for any other project or purpose except as specifically indicated in AIA B-141 Standard Form of Agreement Between Architect and Owner.
  2. If the client, Architect or Owner of the project requires electronic media for "record purposes", then AutoCAD/ Revit documents will be prepared by Engineer on electronic media such as removable memory devices, flash drives or CD's. These documents can also be submitted via file transfer protocols. AutoCAD/ Revit files will be submitted with all title block references intact to permit the end user to only view and plot the drawings. Revisions will not be permitted in this configuration.
  3. At the Architect/Owner's request, Engineer will assist the Contractor in the preparation of the submittals and prepare one copy of AutoCAD/ Revit files on electronic media or submit through file transfer protocols. The electronic media will be prepared with all indicia of documents ownership removed. The electronic media will be prepared in a ".rvt" or ".dwg" format to permit the end user to revise the drawings.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Provide materials and equipment manufactured by a domestic United States manufacturer and assembled in the United States for all local and Federal Government projects. These materials and equipment shall comply with "Buy American Act."
- B. Access Doors: Provide access doors as required for access to equipment, valves, controls, cleanouts and other apparatus where concealed. Access doors shall have concealed hinges and screw driver cam locks.
- C. All access doors located in wet areas such as restrooms, locker rooms, shower rooms, kitchen and any other wet areas shall be constructed of stainless steel.
- D. Access Doors: shall be as follows:
1. Plaster Surfaces: Milcor Style K.
  2. Ceramic Tile Surface: Milcor Style M.
  3. Drywall Surfaces: Milcor Style DW.
  4. Install doors only in locations approved by the Architect.

### 2.2 EQUIPMENT PADS

- A. Provide 6-inch-high concrete pads for indoor floor mounted equipment. Pads shall conform to the shape of the equipment with a minimum extension of 6 inch beyond the equipment on all sides. Top and sides of pads shall be troweled to a smooth finish, equivalent to the floor. External corners shall be bullnosed to a 3/4" radius, unless shown otherwise.
- B. Provide 6-inch-high concrete pads for all exterior mounted equipment. Pads shall conform to the shape of the equipment with a minimum extension of 6 inch beyond the equipment on all sides. Provide a 4-foot monolithic extension to the pad in front of the equipment for service when mounted on a non-finished area (i.e. landscape, gravel, clay, etc.) Top and sides of pads shall be troweled to a smooth finish. External corners shall be bullnosed to a 3/4" radius, unless shown otherwise.

## PART 3 - EXECUTION

### 3.1 ROUGH-IN

- A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected via reviewed submittals.

- B. Refer to equipment specifications in Divisions 2 through 48 for additional rough-in requirements.

### 3.2 MECHANICAL INSTALLATIONS

- A. General: Sequence, coordinate, and integrate the various elements of mechanical systems, materials, and equipment. Comply with the following requirements:
1. Coordinate mechanical systems, equipment, and materials installation with other building components.
  2. Verify all dimensions by field measurements.
  3. Arrange for chases, slots, and openings in other building components during progress of construction, to allow for mechanical installations.
  4. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed.
  5. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing in the building.
  6. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible.
  7. Coordinate connection of mechanical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.
  8. Install systems, materials, and equipment to conform with architectural action markings on submittal, including coordination drawings, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, resolve conflicts and submit proposed solution to the Architect for review.
  9. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces.
  10. Install mechanical equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. As much as possible, connect equipment for ease of disconnecting, with minimum of interference with other installations. Extend grease fittings to an accessible location and label.
  11. Install access doors where units are concealed behind finished surfaces. Refer to paragraph 2.1 in this section and architect for access doors specifications and location.
  12. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.
  13. Provide roof curbs for all roof mounted equipment. Coordinate with roof construction for pitched roof. Provide roof curbs which match the roof slope and provides a level top for equipment installation. Refer to Architectural drawings and details.
  14. The equipment to be furnished under these Specifications shall be essentially the standard product of the manufacturer. Where two or more units of the same class of equipment are required, these units shall be products of a single manufacturer; however, the component parts of the system need not be the product of the same manufacturer.
  15. The Architectural and Structural features of the building and the space limitations shall be considered in selection of all equipment. No equipment shall be furnished which will not suit the arrangement and space limitations indicated.
  16. Lubrication: Prior to start-up, check and properly lubricate all bearings as recommended by the manufacturer.
  17. Where the word "Concealed" is used in these Specifications in connection with insulating, painting, piping, ducts, etc., it shall be understood to mean hidden from sight as in chases, furred spaces or suspended ceilings. "Exposed" shall be understood to mean the opposite of concealed.
  18. Identification of Mechanical Equipment:
    - a. Mechanical equipment shall be identified by means of nameplates permanently attached to the equipment. Nameplates shall be engraved laminated plastic or etched metal. Submittals shall include dimensions and lettering format for approval. Attachment shall be with escutcheon pins, self-tapping screws, or machine screws.
    - b. Tags shall be attached to all valves, including control valves, with nonferrous chain. Tags shall be brass and at least 1-1/2 inches in diameter. Nameplate and tag symbols shall correspond to the identification symbols on the temperature control submittal and the "as-built" drawings.

19. Provide construction filters for all air handling units, fan coil unit, VAV boxes, and all other air handling equipment during the entire construction period.
20. Provide temporary construction strainers for all strainers in the hydronic systems during the initial flushing of the systems.

### 3.3 CUTTING AND PATCHING

- A. Protection of Installed Work: During cutting and patching operations, protect adjacent installations.
- B. Perform cutting, fitting, and patching of mechanical equipment and materials required to:
  1. Uncover Work to provide for installation of ill-timed Work.
  2. Remove and replace defective Work.
  3. Remove and replace Work not conforming to requirements of the Contract Documents.
  4. Remove samples of installed Work as specified for testing.
  5. Install equipment and materials in existing structures.
  6. Upon written instructions from the Engineer, uncover and restore Work to provide for Engineer/Owner's observation of concealed Work, without additional cost to the Owner.
  7. Patch existing finished surfaces and building components using new materials matching existing materials and experienced Installers. Patch finished surfaces and building components using new materials specified for the original installation and experienced Installers; refer to the materials and methods required for the surface and building components being patched; Refer to Paragraph 1.11 I for definition of "Installer."
- C. Cut, remove and legally dispose of selected mechanical equipment, components, and materials as indicated, including but not limited to removal of mechanical piping, mechanical ducts and HVAC units, and other mechanical items made obsolete by the new Work.
- D. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.
- E. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.

### 3.4 WORK SEQUENCE, TIMING, COORDINATION WITH OWNER, ARCHITECT AND ENGINEER

- A. The Owner will cooperate with the Contractor, however, the following provisions must be observed:
  1. A meeting will be held at the project site, prior to any construction, between the Owner's Representative, the General Contractor, the Sub-Contractors and the Engineer to discuss Contractor's employee parking space, access, storage of equipment or materials, and use of the Owner's facilities or utilities. The Owner's decisions regarding such matters shall be final.
  2. During the construction of this project, normal facility activities will continue in existing buildings until renovated areas are completed. Plumbing, fire protection, lighting, electrical, communications, heating, air conditioning, and ventilation systems shall be maintained in service within the occupied spaces of the existing building.
  3. Contractor shall not start-up any of the HVAC equipment unless the Owner, Architect and Engineer are signed off.
  4. Start-up for major HVAC equipment such as chillers, cooling towers, variable frequency drives and hot water boilers shall be performed by a factory technician. The start-up shall include a written report signed off by Contractor, Engineer and Owner.

### 3.5 DEMOLITION AND WORK WITHIN EXISTING BUILDINGS

- A. In the preparation of these documents every effort has been made to show the approximate locations of, and connections to, the existing piping, duct, equipment and other apparatus related to this phase of the Work. However, this Contractor shall be responsible for verifying all of the above information. This Contractor shall visit the existing site to inspect the facilities and related areas. This Contractor shall inspect and verify all details and requirements of all the Contract Documents, prior to the submission of a proposal. All discrepancies between the Contract Documents and actual job-site conditions shall be resolved by the contractor, who shall produce drawings that shall be submitted to the Architect/Engineer for review. All labor and materials required to perform the work described shall be a part of this Contract.
- B. All equipment and/or systems noted on the Drawings "To Remain" shall be inspected and tested on site to certify its working condition. A written report on the condition of all equipment to remain, including a copy of the test results and recommended remedial actions and costs shall be made by this Contractor to the Architect/Engineer for review.
- C. All equipment and/or systems noted on the Drawings "To Be Removed" shall be removed including, associated pipe and duct, pipe and duct hangers and/or line supports. Where duct or pipe is to be capped for future or end of line use, it shall be properly tagged with its function or service appropriately identified. Where existing equipment is to be removed or relocated and has an electric motor or connection, the Electrical Contractor shall disconnect motor or connection, remove wiring to a safe point and this Contractor shall remove or relocate motor or connection along with the equipment.
- D. During construction and remodeling, portions of the Project shall remain in service. Construction equipment, material, tools, extension cords, etc., shall be arranged so as to present minimum hazard or interruption to the occupants of the building. None of the construction work shall interfere with the proper operation of the existing facility; or be so conducted as to cause harm or danger to persons on the premises. All fire exits, stairs or corridors required for proper access, circulation or exit shall remain clear of equipment, materials or debris. The General Contractor shall maintain barricades, other separations in corridors and other spaces where work is conducted.
- E. Certain work during the demolition and construction phases may require overtime or night time shifts or temporary evacuation of the occupants. Coordinate and schedule all proposed down time with the Owner at least seventy-two (72) hours in advance in writing.
- F. Any salvageable equipment as determined by the Owner, shall be delivered to the Owner, and placed in storage at the location of his choice. All other debris shall be removed from the site immediately.
- G. Equipment, piping or other potential hazards to the occupants of the building shall not be left overnight outside of the designated working or construction area.
- H. Make every effort to minimize damage to the existing building and the Owner's property. Repair, patch or replace as required any damage that occurs as a result of work at the site. Care shall be taken to minimize interference with the Owner's activities during construction and to keep construction disrupted areas to a minimum. Coordinate with the Owner and other trades in scheduling and performance of the work.
- I. Include in the contract price all rerouting of existing pipe, duct, etc., and the reconnecting of the existing equipment as necessitated by field conditions to allow the installation of the new systems regardless of whether or not such rerouting, reconnecting or relocating is shown on the Drawings. Furnish all temporary pipe, duct, controls, etc., as required to maintain heating, cooling, and ventilation services for the existing areas with a minimum of interruption.
- J. All existing pipe, duct, materials, equipment, controls and appurtenances not included in the remodel or alteration areas are to remain in place.

- K. Pipe, duct, equipment and controls serving mechanical and other Owner's equipment, etc., which is to remain but is served by pipe, duct, equipment and controls that are disturbed by the remodeling work, shall be reconnected in such a manner as to leave this equipment in proper operating condition.
- L. No portion of the fire protection systems shall be turned off, modified or changed in any way without the express knowledge and written permission of the Owner's representative in order to protect systems that shall remain in service.
- M. It is the intention of this Section of the Specifications to outline minimum requirements to furnish the Owner with a turn-key and operating system in cooperation with other trades with a minimum of disruption or downtime.
- N. Refer to Architectural Demolition and/or Alteration plans for actual location of walls, ceilings, etc., being removed and/or remodeled.

END OF SECTION

SECTION 23 03 00

MECHANICAL DEMOLITION FOR REMODELING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Mechanical demolition.
- B. The Drawings do not show all demolition work required. The Contractor shall make himself familiar with the required scope of work to accomplish the work required by these documents. All demolition work implied or required shall be included in the scope of this contract.
- C. Utility service outages required by the new installation will be permitted but only at a time approved by the Owner. The Contractor shall allow the Owner 2 weeks in order to schedule required outages. The time allowed for outages will not be during normal working hours unless otherwise approved by the Owner. All costs of outages, including overtime charges, shall be included in the contract amount.

1.2 RELATED SECTIONS

- A. Section 02 40 00 - Demolition and Structure Moving.

1.3 WORK SEQUENCE, TIMING, COORDINATION WITH OWNER

- A. The Owner will cooperate with the Contractor; however, the following provisions must be observed:
  - 1. During the construction of this project, normal facility activities will continue in existing buildings until new buildings or renovated areas are completed. Plumbing, fire protection, lighting, electrical, communications, heating, air conditioning, and ventilation systems shall be maintained in service within the occupied spaces of the existing building.
  - 2. A meeting will be held at the project site, prior to any construction, between the Owner's Representative, the General Contractor, the Subcontractors and Sub-subcontractors, and the Engineer to discuss Contractor's employee parking space, access, storage of equipment or materials, and use of the Owner's facilities or utilities. The Owner's decisions regarding such matters shall be final.

1.4 DEMOLITION AND WORK WITHIN EXISTING BUILDINGS

- A. In the preparation of these documents every effort has been made to show the approximate locations of, and connections to the existing piping, duct, equipment and other apparatus related to this phase of the Work. However, this Contractor shall be responsible for verifying all of the above information. This Contractor shall visit the existing site to inspect the facilities and related areas. This Contractor shall inspect and verify all details and requirements of all the Contract Documents, prior to the submission of a proposal. All discrepancies between the Contract Documents and actual job-site conditions shall be resolved by the contractor, who shall produce drawings which shall be submitted to the Architect/Engineer for review. All labor and materials required to perform the work described shall be a part of this Contract.
- B. All equipment and/or systems noted on the Drawings "To Remain" shall be inspected and tested on site to certify its working condition. A written report on the condition of all equipment to remain, including a copy of the test results and recommended remedial actions and costs shall be made by this Contractor to the Architect/Engineer for review.



- C. All equipment and/or systems noted on the Drawings "To Be Removed" should be removed including, associated pipe and duct, pipe and duct hangers and/or line supports. Where duct or pipe is to be capped for future or end of line use, it shall be properly tagged with its function or service appropriately identified. Where existing equipment is to be removed or relocated and has an electric motor or connection, the Electrical Contractor shall disconnect motor or connection, remove wiring to a safe point and this Contractor shall remove or relocate motor or connection along with the equipment.
- D. During construction and remodeling, portions of the Project shall remain in service. Construction equipment, material, tools, extension cords, etc., shall be arranged so as to present minimum hazard or interruption to the occupants of the building. None of the construction work shall interfere with the proper operation of the existing facility; or be so conducted as to cause harm or danger to persons on the premises. All fire exits, stairs or corridors required for proper access, circulation or exit shall remain clear of equipment, materials or debris. The General Contractor shall maintain barricades, other separations in corridors and other spaces where work is conducted.
- E. Certain work during the demolition and construction phases may require overtime or night time shifts or temporary evacuation of the occupants. Coordinate and schedule all proposed down time with the Owner at least seventy-two (72) hours in advance in writing.
- F. Any salvageable equipment as determined by the Owner, shall be delivered to the Owner, and placed in storage at the location of his choice. All other debris shall be removed from the site immediately.
- G. Equipment, piping or other potential hazards to the occupants of the building shall not be left overnight outside of the designated working or construction area.
- H. Make every effort to minimize damage to the existing building and the Owner's property. Repair, patch or replace as required any damage which occurs as a result of work at the site. Care shall be taken to minimize interference with the Owner's activities during construction and to keep construction disrupted areas to a minimum. Coordinate with the Owner and other trades in scheduling and performance of the work.
- I. Include in the contract price all rerouting of existing pipe, duct, etc., and the reconnecting of the existing equipment as necessitated by field conditions to allow the installation of the new systems regardless of whether or not such rerouting, reconnecting or relocating is shown on the drawings. Furnish all temporary pipe, duct, controls, etc., as required to maintain heating, cooling, and ventilation services for the existing areas with a minimum of interruption.
- J. All existing pipe, duct, materials, equipment, controls and appurtenances not included in the remodel or alteration areas are to remain in place.
- K. Pipe, duct, equipment and controls serving mechanical and other Owner's equipment, etc., which is to remain but which is served by pipe, duct, equipment and controls that are disturbed by the remodeling work, shall be reconnected in such a manner as to leave this equipment in proper operating condition.
- L. No portion of the fire protection systems shall be turned off, modified or changed in any way without the express knowledge and written permission of the Owner's representative in order to protect systems that shall remain in service.
- M. It is the intention of this Section of the Specifications to outline minimum requirements to furnish the Owner with a turn-key and operating system in cooperation with other trades with a minimum of disruption or downtime.
- N. Refer to Architectural Demolition and/or Alteration plans for actual location of walls, ceilings, etc., being removed and/or remodeled.

## PART 2 - PRODUCTS

### 2.1 MATERIALS AND EQUIPMENT

- A. Materials and equipment for patching and extending work: As specified in individual Sections.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Field verify measurements, and piping arrangements are as shown on Drawings.
- B. Verify that abandoned piping and equipment serve only abandoned facilities.
- C. Demolition Drawings are based on casual field observation and existing Record Documents. Report discrepancies to Architect and Engineer before disturbing existing installation.
- D. Beginning of demolition means that the contractor accepts existing conditions.

### 3.2 PREPARATION

- A. Disconnect mechanical systems in walls, floors, and ceilings scheduled for removal.
- B. Coordinate utility service outages with Utility Company.
- C. Provide temporary connections, if required, to maintain existing systems in service during construction. When work must be performed on energized equipment, use personnel experienced in such operations.
- D. Existing Service: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Obtain permission from Owner at least 24 hours before partially or completely disabling system. Minimize outage duration. Make temporary connections to maintain service in areas adjacent to work area.
- E. Existing Fire Alarm System: Maintain existing system in service until new system is accepted. Disable system only to make switchovers and connections. Notify Owner and local fire service at least 24 hours before partially or completely disabling system. Minimize outage duration. Make temporary connections to maintain service in areas adjacent to work area.

### 3.3 DEMOLITION AND EXTENSION OF EXISTING MECHANICAL WORK

- A. Demolish and extend existing mechanical work under provisions of Division 02 and this Section.
- B. Remove, relocate, and extend existing systems to accommodate new construction.
- C. Remove abandoned piping to source of supply.
- D. Remove exposed abandoned piping systems, including abandoned systems above accessible ceiling finishes. Cut systems flush with walls and floors, and patch surfaces.
- E. Repair adjacent construction and finishes damaged during demolition and extension work.
- F. Maintain access to existing systems which remain active. Modify installation or provide access doors as appropriate.
- G. Extend existing systems using materials and methods compatible with existing systems, or as specified.

3.4 CLEANING AND REPAIR

- A. Clean and repair existing materials and equipment which remain or are to be reused.

3.5 INSTALLATION

- A. Install relocated materials and equipment under the provisions of Division 02.

3.6 REMOVAL OF MATERIALS

- A. The Contractor shall modify, remove, and/or relocate all materials and items so indicated on the Drawings or required by the installation of new facilities. All removals and/or dismantling shall be conducted in a manner as to produce maximum salvage. Salvage materials shall remain the property of the Owner, and shall be delivered to such destination as directed by the Owner. Materials and/or items scheduled for relocation and which are damaged during dismantling or reassembly operations shall be repaired and restored to good operating condition. The Contractor may, at his discretion and upon the approval of the Owner, substitute new materials and/or items of like design and quality in lieu of materials and/or items to be relocated.
- B. All items which are to be relocated shall be carefully removed in reverse to original assembly or placement and protected until relocated. The contractor shall clean and repair and provide all new materials, fittings, and appurtenances required to complete the relocations and to restore to good operative order. All relocations shall be performed by workmen skilled in the work and in accordance with standard practice of the trades involved.
- C. When items scheduled for relocation are found to be in damaged condition before work has been started on dismantling, the Contractor shall call the attention of the Owner to such items and receive further instructions before removal. Items damaged in repositioning operations are the Contractor's responsibility and shall be repaired or replaced by the Contractor as approved by the Owner, at no additional cost to the Owner.
- D. Service lines and wiring to items to be removed, salvaged, or relocated shall be removed to points indicated on the Drawings, specified, or acceptable to the Owner. Service lines and wiring not scheduled for reuse shall be removed to the points at which reuse is to be continued or service is to remain. Such services shall be sealed, capped, or otherwise tied-off or disconnected in a safe manner acceptable to the Owner. All disconnections or connections into the existing facilities shall be done in such a manner as to result in minimum interruption of services to adjacent occupied areas. Services to existing areas or facilities which must remain in operation during the construction period shall not be interrupted without prior specific approval of the Owner as hereinbefore specified.
- E. Certain work during the demolition and construction phases may require overtime or nighttime shifts or temporary evacuation of the occupants. Coordinate and schedule all proposed down time with the Owner's Representative at least 72 hours in advance in writing.
- F. Make every effort to minimize damage to the existing building and the Owner's property. Repair, patch, or replace as required any damage which occurs as a result of work at the site. Care shall be taken to minimize interference with the Owner's activities during construction. Cooperate with the Owner and other trades in scheduling and performance of the work.
- G. See Paragraph I on page 23 02 00 – 18
- H. The Contractor shall be responsible for loss or damage to the existing facilities caused by him and his workmen, and shall be responsible for repairing such loss or damage. The Contractor shall send proper notices, make necessary arrangements, and perform other services required for the care, protection and in-service maintenance of all electrical services for the new and existing facilities. The Contractor shall erect temporary barricades, with necessary safety devices, as required to protect personnel from injury, removing all such temporary protection upon completion of the work.

- I. Where existing construction is removed to provide working and extension access to existing utilities, Contractor shall remove doors, piping, conduit, outlet boxes, wiring, light fixtures, air conditioning ductwork and equipment, etc., to provide this access and shall reinstall same upon completion of work in the areas affected.
- J. Where partitions, walls, floors, or ceilings of existing construction are being removed, all contractors shall remove and reinstall in locations approved by the Architect all devices required for the operation of the various systems installed in the existing construction.

END OF SECTION



SECTION 23 05 13

COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.
- B. Section 23 02 00 - Basic Materials and Methods for HVAC shall be included as a part of this Section as though written in full in this document.

1.2 SCOPE

- A. Scope of the Work shall include the furnishing and complete installation of the equipment covered by this Section, with all auxiliaries, ready for owner's use.
- B. WORK SPECIFIED ELSEWHERE:
  - 1. Painting
  - 2. Automatic temperature controls
  - 3. Power control wiring to motors and equipment

1.3 WARRANTY

- A. Warrant the Work specified herein for one year and motors for five years beginning on the date of substantial completion.

1.4 REFERENCE STANDARDS

- A. IEEE 112 - IEEE Standard Test Procedure for Polyphase Induction Motors and Generators; 2017.
- B. NEMA MG 1 - Motors and Generators; 2021.

1.5 SUBMITTALS

- A. SHOP DRAWINGS: Indicate size material, and finish. Show locations and installation procedures. Include details of joints, attachments, and clearances.
- B. PRODUCT DATA: Submit schedules, charts, literature, and illustrations to indicate the performance, fabrication procedures variations, and accessories.
- C. MOTOR NAMEPLATE INFORMATION: Manufacturer's name, address, utility and operating data.
- D. Refer to Division One for additional information.

1.6 DELIVERY AND STORAGE

- A. DELIVERY: Deliver clearly labeled, undamaged materials in the manufacturers' unopened containers.
- B. TIME AND COORDINATION: Deliver materials to allow for minimum storage time at the project site. Coordinate delivery with the scheduled time of installation.
- C. STORAGE: Store materials in a clean, dry location, protected from weather and abuse.

PART 2 - PRODUCTS

2.1 ELECTRIC MOTORS

- A. APPROVED MANUFACTURERS: Provide motors by a single manufacturer as much as possible.
  - 1. Baldor
  - 2. Marathon
  - 3. Siemens-Allis
  - 4. General Electric
  - 5. U.S. Motor
  
- B. TEMPERATURE RATING: Provide insulation as follows:
  - 1. CLASS B: 40 degrees C maximum.
  - 2. CLASS F:
    - a. Between 40 degrees C and 65 degrees C maximum.
    - b. Totally enclosed motors.
  
- C. STARTING CAPABILITY: As required for service indicated five starts minimum per hour.
  
- D. PHASES AND CURRENT: Verify electrical service compatibility with motors to be used.
  - 1. UP TO 3/4 HP: Provide electronically commutated brushless DC single phase motors with built-in inverter and microprocessor-based control.
  - 2. 1 HP AND LARGER: Provide squirrel-cage AC induction polyphase motors.
  - 3. Name plate voltage shall be the same as the circuit's nominal voltage, serving the motor.
  
- E. SERVICE FACTOR: 1.15 for polyphase; 1.35 for single phase.
  
- F. FRAMES: U-frames 1.5 hp. and larger.
  
- G. BEARINGS: Provide sealed re-greaseable ball bearings; with top mounted Zerk lubrication fittings and bottom side drains minimum average life 100,000 hours typically, and others as follows:
  - 1. Design for thrust where applicable.
  - 2. PERMANENTLY SEALED: Where not accessible for greasing.
  - 3. SLEEVE-TYPE WITH OIL CUPS: Light duty fractional hp. motors or polyphase requiring minimum noise level.
  
- H. ENCLOSURE TYPE: Provide enclosures as follows, except where otherwise indicated:
  - 1. CONCEALED INDOOR: ODP (Open Drip Proof).
  - 2. EXPOSED INDOOR: Guard Protected.
  - 3. OUTDOOR TYPICAL: Type II. TEFC.
  - 4. OUTDOOR WEATHER PROTECTED: Type I. WPI.
  - 5. EXPLOSION PROOF, XP: For use in hazardous locations.
  
- I. OVERLOAD PROTECTION: Built-in sensing device for stopping motor in all phase legs and signaling where indicated for fractional horse power motors.
  
- J. NOISE RATING: "Quiet" except where otherwise indicated.
  
- K. All motors that are to be operated by a variable frequency drive shall be inverter duty rated motors.
  
- L. All motors operated by variable frequency drive shall be equipped with a maintenance free, conductive microfiber, shaft grounding ring with a minimum of two rows of circumferential microfibers to discharge electrical shaft currents within the motor and/or its bearings.
  
- M. EFFICIENCY: Minimum full load efficiency listed in the following table, when tested in accordance with IEEE 112, Method B, including stray load loss measure.

NEMA MG 1 Efficiency - 1800 RPM Synchronous Speed
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Motor horsepower	Index Letter	Minimum Efficiency
3 - 5	G	89.5
7.5	G	91.0
10	F	91.7
15 - 20	E	93.0
25 - 30	E	93.6
40	D	94.1
50	C	95.0
60	C	95.0
75	C	95.0
100 - 125	B	95.4
150 - 200	B	95.8



NEMA MG 1 Efficiency - 1200 RPM Synchronous Speed		
Motor horsepower	Index Letter	Minimum Efficiency
3 - 5	G	89.5
7.5	G	90.2
10	F	91.7
15	F	91.7
20	E	92.4
25 - 30	E	93.6
40 - 50	D	94.1
60	D	94.5
75	C	94.5
100 - 125	C	95.0
150 - 200	B	95.4

2.2 MOTOR CONTROLLERS (STARTERS)

- A. All motor controllers (for equipment furnished under Division 23) shall be furnished under Division 23 and installed under Division 26 unless otherwise noted on the plans.
  - 1. Starters shall be provided for 3 phase motors 1 horsepower and greater.
- B. Motor starters shall be furnished as follows.
  - 1. GENERAL: Motor starters shall be Square D Company Class 8536 across-the-line magnetic type, full-voltage, non-reversing (FAVOR) starter. All starters shall be constructed and tested in accordance with the latest NEMA standards, sizes and horsepower. ICE sizes are not acceptable. Starters shall be mounted in a general purpose dead front, painted steel enclosure and surface-mounted. Provide size and number of poles as shown and required by equipment served. Provide two speed, two winding or two speed, single winding motor starter as required for two speed motors.
  - 2. CONTACTS: Magnetic starter contacts shall be double break solid silver alloy. All contacts shall be replaceable without removing power wiring or removing starter from panel. The starter shall have straight-through wiring.
  - 3. OPERATING COILS: Operating coils shall be 120 volts and shall be of molded construction. When the coil fails, the starter shall open and shall not lock in the closed position.
  - 4. OVERLOAD RELAYS: Provide manual reset, trip-free Class 20 overload relays in each phase conductor in of all starters. Overload relays shall be melting alloy type with visual trip indication. All 3 phase and single phase starters shall have one overload relay in each underground conductor. Relay shall not be field adjustable from manual to automatic reset. Provide 6 overload relays for two speed motor starters.
  - 5. PILOT LIGHTS: Provide a red running pilot light for all motor starters. Pilot lights shall be mounted in the starter enclosure cover. Pilot lights shall be operated from an interlock on the motor starter and shall not be wired across the operating coil.
  - 6. CONTROLS: Provide starters with HAND-OFF-AUTOMATIC switches. Coordinate additional motor starter controls with the requirements of Division 23. Motor starter controls shall be mounted in the starter enclosure cover.
  - 7. CONTROL POWER TRANSFORMER: Provide a single-phase 480 volt control power transformer with each starter for 120 volt control power. Connect the primary side to the line side of the motor starter. The primary side shall be protected by a fuse for each conductor. The secondary side shall have one leg fused and one leg grounded. Arrange transformer terminals so that wiring to terminals will not be located above the transformer.
  - 8. AUXILIARY CONTACTS: Each starter shall have one normally open and one normally closed convertible auxiliary contact in addition to the number of contacts required for the "holding interlock", remote monitoring, and control wiring. In addition, it shall be possible to field-install three more additional auxiliary contacts without removing existing wiring or removing the starter from its enclosure.
  - 9. UNIT WIRING: Unit shall be completely pre-wired to terminals to eliminate any interior field wiring except for line and load power wiring and HVAC control wiring.
  - 10. ENCLOSURES: All motor starter enclosures shall be NEMA 1, general purpose enclosures or NEMA-3R if mounted exposed to high moisture conditions. Provide NEMA 4X when located by cooling towers.

11. POWER MONITOR: Provide a square "D" 8430 MPS phase failure and under-voltage relay, base and wiring required for starters serving all 3 phase motors. Set the under-voltage setting according to minimum voltage required for the motor to operate within its range.

- C. APPROVED MANUFACTURERS: Controller numbers are based on first named manufacturer. Provide one of the following manufacturer's.
1. Siemens.
  2. Square D.
  3. General Electric.
  4. Eaton.

### 2.3 COMBINATION MOTOR STARTERS

- A. GENERAL: Combination motor starters shall consist of a magnetic starter and a fusible or non-fusible disconnect switch in a dead front, painted steel NEMA 1 enclosure unless otherwise noted and shall be surface-mounted. Size and number of poles shall as shown and required by equipment served. Combination motor starters shall be as specified for motor starters in Paragraph 2.02-B, except as modified herein.
- B. DISCONNECT SWITCH: Disconnect switches shall be as specified in Section 26 28 16.
- C. APPROVED MANUFACTURERS: Controller numbers are based on first named manufacturer. Provide one of the following manufacturer's.
1. Siemens.
  2. Square D.
  3. General Electric.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. All equipment shall be installed in accordance with the manufacturers' recommendations and printed installation instructions.
- B. All items required for a complete and proper installation are not necessarily indicated on the plans or in the specifications. Contractors' price shall include all items required as per manufacturers' requirements.
- C. Install in a professional manner. Any part or parts not meeting this requirement shall be replaced or rebuilt without extra expense to Owner.
- D. Install rotating equipment in static and dynamic balance.
- E. Provide foundations, supports, and isolators properly adjusted to allow minimum vibration transmission within the building.
- F. Correct objectionable noise or vibration transmission in order to operate equipment satisfactorily as determined by the Engineer.

END OF SECTION



SECTION 23 05 48

VIBRATION AND SEISMIC CONTROLS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.
- B. Section 23 02 00 - Basic Materials and Methods for HVAC shall be included as a part of this Section as though written in full in this document.

1.2 WORK INCLUDED

- A. Vibration and sound control products.

1.3 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of vibration control products of type, size, and capacity required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Vibration and sound control products shall conform to ASHRAE criteria for average noise criteria curves for all equipment at full load conditions.
- C. Unless otherwise indicated, sound and vibration control products shall be provided by a single manufacturer.

1.4 SUBMITTALS

- A. SHOP DRAWINGS: Indicate size, material, and finish. Show locations and installation procedures. Include details of joints, attachments, and clearances.
- B. PRODUCT DATA: Submit schedules, charts, literature, and illustrations to indicate the performance, fabrication procedures, product variations, and accessories.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. VMC Group
- B. Mason Industries, Inc.
- C. Kinetics Noise Control, Inc.
- D. Vibration Eliminator Co., Inc.

2.2 GENERAL

- A. Provide vibration isolation supports for equipment, piping and ductwork, to prevent transmission of vibration and noise to the building structure that may cause discomfort to the occupants.
- B. Model numbers of VMC Group products are included for identification. Products of the listed manufacturers will be acceptable provided they comply with all the requirements of this specification.

### 2.3 FLOOR MOUNTED AIR HANDLING UNITS AND ENERGY RECOVERY UNITS

- A. Provide VMC Group model CAL-2 aluminum housed isolators sized for 2" static deflection. Cast iron or steel housings may be used provided they are hot-dip galvanized after fabrication.
- B. If floor mounted air handling units are furnished with internal vibration isolation option, provide VMC Group model SP-NRC, style E, consisting of two layers of 1" thick ribbed elastomeric pad bonded to a 16 gauge galvanized steel separator plate to address high frequency breakout and afford additional unit elevation for condensate drains. Ribbed elastomeric pads shall be located in accordance with the air handling unit manufacturer's recommendations.

### 2.4 CONDENSING UNITS

- A. Provide VMC Group model NRC, 1" thick ribbed elastomeric isolation pads sized for approximately 40 psi loading and 1/8" deflection.
- B. Pads shall be located in accordance with the condensing unit manufacturer's recommendations.

### 2.5 PIPING

- A. Provide VMC Group model HRS combination spring and elastomeric isolation hangers in mechanical equipment rooms, for a minimum distance of 50 feet from isolated equipment for all chilled water and hot water piping 1-1/2" diameter and larger. Isolators shall be sized for the same deflection as the isolators specified for the equipment up to a maximum of 2" deflection for at least the first three piping hangers; the remaining hangers shall have isolators sized for 1" deflection.
- B. Floor supported piping is required to be isolated with VMC Group model AW-1 open springs sized for 1" deflection.
- C. All condenser water piping shall be supported with VMC Group model AW-1 open springs sized for 1" deflection for floor or roof mounted piping and VMC Group model HRS-1 combination spring and elastomeric isolation hangers sized for 1" deflection for suspended piping.
- D. Provide line size flexible connectors at supply and return of pumps, chillers, and all other locations indicated on the mechanical drawings and details. Flexible pipe connectors shall be VMC Group model 2800 single sphere EPDM construction and shall include 150 lb. cadmium plated carbon steel floating flanges.

### 2.6 CORROSION PROTECTION

- A. All vibration isolators shall be designed and treated for resistance to corrosion.
- B. Steel components: PVC coated or phosphate coated and painted with industrial grade enamel. Nuts, bolts, and washers: zinc-electroplated.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. All equipment shall be installed in accordance with the manufacturer's recommendations and printed installation instructions.
- B. All items required for a complete and proper installation are not necessarily indicated on the plans or in the specifications. Provide all items required as per manufacturer's requirements.

- C. If internal isolation option is used on air handling units, the mechanical contractor shall verify proper adjustment and operation of isolators prior to start-up. All shipping brackets and temporary restraint devices shall be removed.
- D. The vibration isolation supplier shall certify in writing that he has inspected the installation and that all external isolation materials and devices are installed correctly and functioning properly.

END OF SECTION



SECTION 23 05 93

TESTING, ADJUSTING, AND BALANCING

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.
- B. Section 23 02 00 - Basic Materials and Methods for HVAC shall be included as a part of this Section as though written in full in this document.

1.2 RELATED DOCUMENTS

- A. Approved submittal date on equipment installed, to accomplish the test procedures, outlined under paragraph 3.01 of this Section, will be provided by the Contractor.

1.3 DESCRIPTION

- A. The TAB of the air conditioning systems shall be performed by an impartial technical firm hired by the Owner whose operations are limited only to the field of professional TAB. The TAB work will be done under the direct supervision of a qualified engineer employed by the TAB firm.
- B. The TAB firm will be responsible for inspecting, adjusting, balancing, and logging the data on the performance of fans, dampers in the duct system, and air distribution devices. The Contractor and the various Subcontractors of the equipment installed shall cooperate with the TAB firm to furnish necessary data on the design and proper applications of the system components and provide labor and material required to eliminate deficiencies or malperformance.

1.4 QUALITY ASSURANCE

- A. QUALIFICATIONS OF CONTRACTOR PERSONNEL: Submit evidence to show that the personnel who shall be in charge of correcting deficiencies for balancing the systems are qualified. The Owner and Engineer reserve the right to require that the originally approved personnel be replaced with other qualified personnel if, in the Owner and Engineer's opinion, the original personnel are not qualified to properly place the system in condition for balancing.
- B. QUALIFICATIONS OF TAB FIRM PERSONNEL:
  - 1. A minimum of one registered Professional Engineer licensed in the State, is required to be in permanent employment of the firm.
  - 2. Personnel used on the jobsite shall be either Professional Engineers or technicians, who shall have been permanent, full time employees of the firm for a minimum of six months prior to the start of Work for that specified project.
  - 3. Evidence shall be submitted to show that the personnel who actually balance the systems are qualified. Evidence showing that the personnel have passed the tests required by the Associated Air Balance Council (AABC) shall be required.
- C. CALIBRATION LIST: Submit to the Engineer for approval, a list of the gauges, thermometers, velometer, and other balancing devices to be used in balancing the system. Submit evidence to show that the balancing devices are properly calibrated before proceeding with system balancing.



PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 SERVICES OF THE CONTRACTOR

- A. The Drawings and Specifications have indicated valves, dampers, and miscellaneous adjustment devices for the purpose of adjustment to obtain optimum operating conditions. Install these devices in a manner that leaves them accessible, and provide access as requested by the TAB firm.
- B. Have systems complete and in operational readiness prior to notifying the TAB firm that the project is ready for their services, and certify in writing to the Architect and Owner that such a condition exists.
- C. As a part of the Work of this Section, make changes in the sheaves, belts, and dampers or the addition of dampers required for correct balance of the new work as required by the TAB firm, at no additional cost to the Owner.
- D. Fully examine the existing system to be balanced, to determine whether or not sufficient volume dampers, balancing valves, thermometers, gauges, pressure and temperature taps, means of reading static pressure and total pressure in duct systems, means of determining water flow, and other means of taking data needed for proper water and air balancing are existing. Submit to the Engineer in writing a listing of omitted items considered necessary to balance existing systems. Submit the list and proposal as a cost add item.
- E. Verify that fresh air louvers are free of blockage, coils are clean and fresh air ducts to each air handling unit have individually adjustable volume regulating dampers.
- F. Provide, correct, repair, or replace deficient items or conditions found during the testing, adjusting, and balancing period.
- G. In order that systems may be properly tested, balanced, and adjusted as specified, operate the systems at no expense to the Owner for the length of time necessary to properly verify their completion and readiness for TAB period.
- H. Project construction schedules shall provide time to permit the successful completion of TAB services prior to Substantial Completion. Complete, operational readiness, prior to commencement of TAB services, shall include the following services of the Contractor:
  - 1. Construction status of building shall permit the closing of doors, windows, ceilings installed and penetrations complete, to obtain project operating conditions.
  - 2. AIR DISTRIBUTION SYSTEMS:
    - a. Verify installation for conformity to design. Supply, return, and exhaust ducts terminated and pressure tested for leakage as specified.
    - b. Volume and fire dampers properly located and functional. Dampers serving requirements of minimum and maximum outside air, return and relief shall provide tight closure and full opening, smooth and free operation.
    - c. Supply, return, exhaust and transfer grilles, registers and diffusers shall be installed.
    - d. Air handling systems, units and associated apparatus, such as heating and cooling coils, filter sections, access doors, etc., shall be blanked and sealed to eliminate excessive bypass or leakage of air.
    - e. Fans (supply and exhaust) operating and verified for freedom from vibrations, proper fan rotation and belt tension; overload heater elements shall be of proper size and rating; record motor amperage and voltage and verify that these functions do not exceed nameplate ratings.
    - f. Furnish or revise fan drives or motors as necessary to attain the specified air volumes.
  - 3. WATER CIRCULATING SYSTEMS:
    - a. Position valves pertinent to system design and require operation to permit full flow of water through system components. Operate hydronic systems under full flow conditions until circulating water is clean. Remove and clean strainers as required during this cycle of operation.

- b. For retrofit projects, record each existing pump motor amperage and voltage. Readings shall not exceed nameplate rating.
  - c. Verify, on new equipment, electrical starter overload heater elements to be of proper size and rating.
  - d. Ensure that water circulating systems shall be full of water and free of air; expansion tanks set for proper water level, and air vents installed at high points of systems and operating freely. Advise Engineer of deficiencies.
  - e. Check and set operating temperatures of heat exchangers to design requirements.
  - f. The various existing water circulating systems, including existing strainers, shall be cleaned, filled, purged of air, and put into operation before hydronic balancing.
4. AUTOMATIC CONTROLS:
- a. Verify that control components are installed in accordance with project documents and functional, electrical interlocks, damper sequences, air and water resets, fire and freeze stats.
  - b. Controlling instruments shall be functional and set for design operating conditions. Factory precalibration of room thermostats and pneumatic equipment will not be acceptable.
  - c. The temperature regulation shall be adjusted for proper relationship between the controlling instruments and calibrated by the TAB Contractor. Advise Engineer of deficiencies or malfunctions.
- I. Contractor shall repair any insulation removed from piping system by TAB Contractor during water balancing.

### 3.2 SERVICES OF THE TAB FIRM

- A. The TAB firm will act as liaison between the Owner, Engineer, and the Contractor and inspect the installation of mechanical piping system, sheet metal work, temperature controls and other component parts of the heating, air conditioning and ventilating systems being retrofitted, repaired, or added under this Contract. The reinspection of the Work will cover that part related to proper arrangement and adequate provision for the testing and balancing and will be done when the Work is 80 percent complete.
- B. Upon completion of the installation and start-up of the mechanical equipment, to check, adjust, and balance system components to obtain optimum conditions in each conditioned space in the building. Prepare and submit to the Engineer complete reports on the balance and operations of the systems.
- C. Measurements and recorded readings of air, water, and electricity that appear in the reports will be done by the permanently employed technicians or engineers of the TAB firm.
- D. Make an inspection in the building during the opposite season from that in which the initial adjustments were made. At the time, make necessary modifications to the initial adjustments required to produce optimum operation of system components to affect the proper conditions as indicated on the Drawings. At time of opposite season check-out, the Owner's representative will be notified before readings or adjustments are made.
- E. In fan systems, the air quantities indicated on the Drawings may be varied as required to secure a maximum temperature variation of two degrees within each separately controlled space, but the total air quantity indicated for each zone must be obtained. It shall be the obligation of the Contractor to furnish or revise fan drive and motors if necessary, without cost to the Owner, to attain the specified air volumes.
- F. Contractor shall utilize ultrasonic flow meter to balance water flow of existing water system if the original pressure drop data is not available. Contractor shall remove insulation as necessary to use flow meter.
- G. Participate in the commissioning process, which shall include but not be limited to attending commissioning meetings, coordinating work with and completing checklists as required by the commissioning team.

### 3.3 PROFESSIONAL REPORT

- A. Before the final acceptance of the report is made, the TAB firm will furnish the Engineer the following data to be approved by the Owner and Engineer:

1. Summary of main supply, return and exhaust duct pitot tube traverses and fan settings indicating minimum value required to achieve specified air volumes.
2. A listing of the measured air quantities at each outlet corresponding to the temperature tabulation as developed by the Engineer and TAB firm.
3. Air quantities at each return and exhaust air handling device.
4. Static pressure readings entering and leaving each supply fan, exhaust fan, filter, coil, balancing dampers and other components of the systems. Including the retrofit Work. These readings will be related to performance curves in terms of the CFM handled if available.
5. Motor current readings at each equipment motor on load side of capacitors. The voltages at the time of the reading shall be listed.
6. The final report shall certify test methods and instrumentation used, final velocity reading obtained, temperatures, pressure drops, RPM of equipment, amperage of motors, air balancing problems encountered, recommendations and uncompleted punch list items. The test results will be recorded on standard forms.
7. A summary of actual operating conditions shall be included with each system outlining normal and ventilation cycles of operation. The final report will act as a reference of actual operating conditions for the Owner's operating personnel.

### 3.4 BALANCING AIR CONDITIONING SYSTEM

#### A. GENERAL:

1. Place all equipment into full operation, and continue operating during each working day of balancing and testing. If the air conditioning system is balanced during Off-Peak cooling season Contractor shall return to rebalance air side system as required to put system in proper balance at that season.
2. The Contractor shall submit detailed balancing and recording forms for approval. After approval by the Engineer, prepare complete set of forms for recording test data on each system. All Work shall be done under the supervision of a Registered Professional Engineer. All instruments used shall be accurately calibrated to within 1% of scale and maintained in good working order.
3. Upon completion of the balancing and testing, the TAB Contractor shall compile the test data in report forms, and forward five copies to the Engineer for evaluation.
4. The final report shall contain logged results of all tests, including such data as:
  - a. Tabulation of air volume at each outlet.
  - b. Outside dry bulb and wet bulb temperature.
  - c. Inside dry bulb and wet bulb temperatures in each conditioned space room or area.
  - d. Actual fan capacities and static pressures. Motor current and voltage readings at each fan.

#### B. AIR SYSTEMS: Perform the following operations as applicable to balance and test systems:

1. Check fan rotation.
2. Check filters (balancing shall be done with clean filters).
3. Test and adjust blower rpm to design requirements.
4. Test and record motor full load amperes.
5. Test and record system static pressures, suction and discharge.
6. Test and adjust system for design cfm, return air and outside air ( $\pm 2\%$ ). Change-out fan sheaves as required to balance system.
7. Test and record entering air temperatures, db and wb.
8. Test and record leaving air temperatures, db and wb.
9. Adjust all zones to design cfm ( $\pm 2\%$ ).
10. Test and adjust each diffuser, grille, and register to within 5% of design.

#### C. AIR DUCT LEAKAGE: (From SMACNA Duct Standards latest edition) Test all ductwork (designed to handle over 1000 CFM) as follows:

1. Test apparatus
  - a. The test apparatus shall consist of:
    - b. A source of high pressure air - a portable rotary blower or a tank type vacuum cleaner.
    - c. A flow measuring device consisting of straightening vanes and an orifice plate mounted in a straight tube with properly located pressure taps. Each orifice assembly shall be accurately calibrated with its own calibration curve. Pressure and flow readings shall be taken with U-tube manometers.
2. Test Procedures
  - a. Test for audible leaks as follows:

- 1) Close off and seal all openings in the duct section to be tested. Connect the test apparatus to the duct by means of a section of flexible duct.
  - 2) Start the blower with its control damper closed.
  - 3) Gradually open the inlet damper until the duct pressure reaches 1.5 times the standard designed duct operating pressure.
  - 4) Survey all joints for audible leaks. Mark each leak and repair after shutting down blower. Do not apply a retest until sealants have set.
- b. After all audible leaks have been sealed, the remaining leakage should be measured with the orifice section of the test apparatus as follows:
- 1) Start blower and open damper until pressure in duct reaches 50% in excess of designed duct operating pressure.
  - 2) Read the pressure differential across the orifice on manometer No. 2. If there is no leakage, the pressure differential will be zero.
  - 3) Total allowable leakage shall not exceed one (1) percent of the total system design air flow rate. When partial sections of the duct system are tested, the summation of the leakage for all sections shall not exceed the total allowable leakage.
  - 4) Even though a system may pass the measured leakage test, a concentration of leakage at one point may result in a noisy leak which must be corrected.
- D. DX SYSTEMS:
1. Test and record suction and discharge pressures at each compressor and record ambient air temperature entering the condensing coils.
  2. Test and record unit full load amps and voltage.
  3. Test and record staging and unloading of unit required by sequence of operation or drawing schedule.
- E. Automatic temperature controls shall be calibrated; and all thermostats and dampers adjusted so that the control system is in proper operating condition, subject to the approval of the Engineer/Owner.
- F. The TAB Contractor shall report to Engineer all air distribution devices or other equipment that operate noisily so that corrective measures may be implemented by the Contractor at no additional cost to the Owner or Architect/Engineer.

END OF SECTION



SECTION 23 07 13  
DUCT INSULATION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.
- B. Section 23 02 00 - Basic Materials and Methods for HVAC shall be included as a part of this Section as though written in full in this document.

1.2 WORK INCLUDED

- A. External Duct Insulation
  - 1. Fiberglass / Glass Mineral Fiber Flexible Blanket Insulation
  - 2. Fiberglass / Glass Mineral Fiber Rigid Board Insulation
  - 3. Fiberglass / Glass Mineral Fiber Segmented Board Pipe and Tank Insulation
  - 4. Fiberglass / Glass Mineral Fiber Continuous Mat Pipe and Tank Insulation
  - 5. Fire-Rated High-Temperature Ceramic Fiber Flexible Blanket Insulation
- B. Internal Duct Insulation
  - 1. Fiberglass / Glass Mineral Fiber Flexible Duct Liner Insulation
  - 2. Fiberglass / Glass Mineral Fiber Rigid Plenum Liner Insulation
- C. Adhesives
- D. Mastics
- E. Lagging Adhesives
- F. Sealants
- G. Glass Fiber Fabric Reinforcing Mesh
- H. Securements

1.3 RELATED SECTIONS

- A. Section 230529
- B. Section 230553
- C. Section 23 31 13 - Metal Ductwork

1.4 REFERENCE STANDARDS

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; Current Edition.
- B. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- C. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications; 2023a.

- D. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.
- E. ASTM C165 - Standard Test Method for Measuring Compressive Properties of Thermal Insulations; 2023.
- F. ASTM C1136 - Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation; 2023.
- G. ASTM C1290 - Standard Specification for Flexible Fibrous Glass Blanket Insulation Used to Externally Insulate HVAC Ducts; 2016 (Reapproved 2021).
- H. ASTM C1393 - Standard Specification for Perpendicularly Oriented Mineral Fiber Roll and Sheet Thermal Insulation for Pipes and Tanks; 2019.
- I. ASTM C1729 - Standard Specification for Aluminum Jacketing for Insulation; 2021.
- J. ASTM D1644 - Standard Test Methods for Nonvolatile Content of Varnishes; 2001.
- K. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013 (Reapproved 2019).
- L. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation; 2014 (Reapproved 2019).
- M. ASTM C916 - Standard Specification for Adhesives for Duct Thermal Insulation; 2020.
- N. ASTM E136 - Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750 Degrees C; 2024.
- O. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2023a.
- P. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems; 2015 (Reapproved 2019).
- Q. ASTM E2336 - Standard Test Methods for Fire Resistive Grease Duct Enclosure Systems; 2020.
- R. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.
- S. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2023.
- T. ICC (IECC) - International Energy Conservation Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- U. MIL-DTL-3316 - Adhesives, Fire-Resistant, Thermal Insulation; 2020d.
- V. NAIMA FGDLS - North American Insulation Manufacturers Association (NAIMA) Fibrous Glass Duct Liner Standards; Current Edition, Including All Revisions.
- W. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.
- X. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems; 2024.
- Y. SCAQMD 1168 - Adhesive and Sealant Applications; 1989, with Amendment (2022).
- Z. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.

- AA. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.
- BB. UL 2043 - Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces; Current Edition, Including All Revisions.

#### 1.5 QUALITY ASSURANCE

- A. Installer's Qualifications: Firm with at least 5 years successful installation experience on projects with mechanical insulations similar to that required for this project.
- B. All insulation shall be listed and labeled to have a composite (insulation, jacket or facing, and adhesive used to adhere the facing or jacket to insulation) flame spread index of not more than 25 and smoke-developed index of not more than 50 when tested in accordance with ASTM E84 and UL 723.
  - 1. Exception: Outdoor mechanical insulation may have flame spread index of 75 and smoke developed index of 150.
- C. Duct and plenum insulation shall comply with minimum R-value requirements of ICC (IECC) and ASHRAE Std 90.1 I-P unless greater values are indicated otherwise in the contract documents.
- D. Adhesive and other insulation materials shall comply with NFPA 90A and NFPA 90B. Additionally, all adhesives and sealants used on the interior of the building (i.e., inside of the weatherproofing system and applied on-site) shall be comprised of low-emitting materials that comply with VOC limits prescribed by SCAQMD 1168.
- E. Vapor retarder mastics used on the interior of the building shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D
- F. Insulations shall not contain formaldehyde, asbestos, lead, mercury, mercury compounds, or polybrominated diphenyl ether fire retardants.
- G. Fiberglass insulations shall have a minimum of 50 percent recycled glass content.
- H. Fiberglass insulations shall have a formaldehyde-free binder and shall be UL GREENGUARD Gold certified.

#### 1.6 WARRANTY

- A. Warrant the Work specified herein for one year against becoming unserviceable or causing an objectionable appearance resulting from either defective, or nonconforming materials and workmanship.
- B. Defects shall include, but not be limited to, the following:
  - 1. Mildewing.
  - 2. Peeling, cracking, and blistering.
  - 3. Condensation on exterior surfaces.

#### 1.7 SUBMITTALS

- A. SHOP DRAWINGS: Indicate size, material, and finish. Show locations and installation procedures. Include details of joints, attachments, and clearances.
- B. PRODUCT DATA: Submit schedules, charts, literature, and illustrations to indicate the performance, fabrication procedures, product variations, and accessories.



## 1.8 DELIVERY, STORAGE AND HANDLING

- A. Deliver insulation materials to site in unopened containers with manufacturer's product name, ASTM standard designation, type and grade, maximum use temperature, nominal dimensions, manufacturer lot or date code.
- B. Protect insulation against dirt, water, and chemical and mechanical damage. Do not install damaged or wet insulation; remove such from project site.

## PART 2 - PRODUCTS

### 2.1 GENERAL DESCRIPTION

- A. The type of insulation and its installation shall be in strict accordance with these specifications for each service, and the application technique shall be as recommended by the manufacturer. All insulation types, together with adhesives and finishes shall be submitted and approved before any insulation is installed.
- B. A sample quantity of each type of insulation and each type of application shall be installed and approval secured prior to proceeding with the main body of the Work.

### 2.2 ACCEPTABLE MANUFACTURERS

- A. Fiberglass/Glass mineral fiber materials shall be as manufactured by Knauf Insulation, Certain-Teed, Johns-Manville or Owens-Corning and shall have the same thermal properties, density, fire rating, vapor retarder, etc., as the types specified herein, subject to review by the Engineer.
- B. Adhesives, mastics, and sealants shall be as manufactured by 3M Company, Carlisle/Hardcast, Design Polymerics, Foster/Childers, Mon-Eco Industries, or Vimasco Corporation and shall have the same adhesive properties, fire rating, vapor seal, etc., as the types specified herein, subject to review by the Engineer.
- C. Ceramic fiber materials shall be as manufactured by 3M Company, Alkegen/Unifrax, or Morgan Advanced Materials/Thermal Ceramics.
- D. Metal jacketing and fitting covers shall be as manufactured by Johns Manville or RPR Products, Inc.

### 2.3 EXTERNAL INSULATIONS

- A. Fiberglass / Glass Mineral Fiber Flexible Blanket Insulation: Glass fibers bonded with a thermosetting resin, complying with ASTM C1290 and ASTM C553, Type I, II, and III. Provide insulation with factory applied FSK vapor retarding facing complying with ASTM C1136, Type I, II, VIII, X. Thermal conductivity (k-value) at 75 degrees F mean temperature shall be 0.27 Btu x in. /h x sq. ft. x degrees F, or less. Maximum service temperature of 250 degrees F with facing, 350 degrees F for unfaced material. Provide Knauf Insulation Atmosphere Duct Wrap with ECOSE Technology, Johns Manville Microlite FSK or approved equal.
- B. Fiberglass / Glass Mineral Fiber Rigid Board Insulation: Glass fibers bonded with a thermosetting resin, complying with ASTM C553 Type I, II, III, ASTM C612 Type IA, IB. Provide insulation with factory applied FSK facing vapor retarder facing complying with ASTM C1136, Type I, II. Thermal conductivity (k-value) at 75 degrees F mean temperature shall be 0.24 Btu x in. /h x sq. ft. x degrees F, or less. Maximum service temperature of 450 degrees F. Provide Knauf Insulation Earthwool Insulation Board with ECOSE Technology, Johns Manville 800 Series Spin-Glas or approved equal.

- C. Fiberglass / Glass Mineral Fiber Segmented Board Pipe and Tank Insulation: Glass fibers bonded with a thermosetting resin, complying with ASTM C1393, Category 1. Semi-rigid, segmented board in roll form with glass fibers adhered perpendicular to the vapor retarder facing. Provide insulation with factory applied FSK vapor retarder facing complying with ASTM C1136, Type II, IV, X. Compressive strength per ASTM C165 C165, not less than 120 PSF at 10% deformation. Thermal conductivity (k-value) at 100 degrees F mean temperature shall be 0.26 Btu x in. /h x sq. ft. x degrees F, or less. Maximum service temperature of 850 degrees F. Provide Knauf Insulation Earthwool Pipe & Tank Insulation with ECOSE Technology or approved equal.
- D. Fiberglass / Glass Mineral Fiber Continuous Mat Pipe and Tank Insulation: Glass fibers bonded with a thermosetting resin, complying with ASTM C1393; Type I, II, IIIA, IIIB Category 2. Semi-rigid, continuous mat in roll form. Provide insulation with factory applied FSK vapor retarder facing complying with ASTM C1136, Type II, IV, X. Compressive strength per ASTM C165, not less than 25 PSF at 10% deformation. Thermal conductivity (k-value) at 100 degrees F mean temperature shall be 0.25 Btu x in. /h x sq. ft. x degrees F, or less. Maximum service temperature of 850 degrees F. Provide Knauf Insulation KwikFlex Pipe & Tank Insulation, Johns Manville Micro-Flex or approved equal.
- E. Fire-Rated High-Temperature Ceramic Fiber Flexible Blanket Insulation: High-temperature ceramic fiber blanket thermal insulation encapsulated in a fiberglass reinforced aluminized polyester foil. Fire-rated blanket insulation shall have a nominal thickness of 1-1/2" and a nominal density of 6.0 pcf. Provide 3M Fire Barrier Duct Wrap 615+, Alkegen/Unifrax FyreWrap Elite 1.5, or Morgan Advanced Materials/Thermal Ceramics FireMaster FastWrap XL.

#### 2.4 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. Fiberglass / Glass Mineral Fiber Adhesive: Comply with MIL-DTL-3316C, Class 2, Grade A. Provide Childers CP-82 or approved equal.
- C. Duct Liner Adhesive: Duct Liner adhesives shall comply with ASTM C916.

#### 2.5 MASTICS

- A. Materials shall be compatible with insulation materials, jackets, and substrates.
- B. Vapor-Retarder Mastic: Water based; suitable for indoor and outdoor use on below ambient services. Water-Vapor Permeance shall be 0.09 perms at 55-mils dry film thickness when tested in accordance with ASTM E96/E96M, Procedure A. Service Temperature Range shall be -20 to +180 degrees F. Solids content shall be 59 percent by volume and 71 percent by weight per ASTM D1644. Provide Childers CP-35 or approved equal.

#### 2.6 LAGGING ADHESIVES

- A. Materials shall be compatible with insulation materials, jackets, and substrates.
- B. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over duct, equipment, and pipe insulation. Service Temperature Range shall be 0 to +180 degrees F. Provide Childers CP-52 or approved equal.

#### 2.7 SEALANTS

- A. Materials shall be compatible with insulation materials, jackets, and substrates.
- B. FSK and Metal Jacket Flashing Sealants shall be fire and water-resistant, flexible, elastomeric sealants with a service temperature range of -40 to +250 degrees F. Provide Childers CP-76 or approved equal.

- C. Fire Barrier Sealant shall be a latex-based, intumescent sealant that dries to form a monolithic firestop seal. Fire barrier sealant shall be firestop tested up to 4 hours in accordance with ASTM E814 and fire resistance tested in accordance with ASTM E1966. Provide 3M CP 25WB+ or approved equal.

## 2.8 GLASS FIBER FABRIC REINFORCING MESH

- A. Woven Glass Fiber Fabric: Approximately 2 oz./sq. yd. with a thread count of 10 strands by 10 strands/sq. inch. Provide Childers Chil-Glas No. 10 or approved equal.

## 2.9 SECUREMENTS

### A. Bands

1. Approved Manufacturers
  - a. Childers
  - b. PABCO
  - c. RPR Products
2. Stainless Steel: ASTM A240/A240M, Type 304 or Type 316; 0.015 inch thick, 3/4 inch wide with wing or closed seal.
3. Aluminum: ASTM B209/B209M, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 3/4 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

1. Approved Manufacturers
  - a. AGM Industries, Inc.
  - b. Midwest Fasteners, Inc.
  - c. GEMCO
  - d. Duro-Dyne
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.
3. Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, minimum 0.106-inch-diameter shank, length to suit depth of insulation indicated.
4. Insulation Retaining Washers: Self-locking washers formed from 0.016 inch thick, galvanized steel sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches (38 mm) in diameter.

### C. Staples

1. Outward-clinching insulation staples, nominal 1/2-inch-wide, stainless steel or Monel.

## PART 3 - EXECUTION

### 3.1 GENERAL

- A. To ensure that external fiberglass/glass mineral fiber flexible blanket and rigid board insulation will achieve its highest possible performance and serve its intended purpose, install all mechanical insulation materials and associated accessories in accordance with manufacturer's published instructions and industry practices detailed by the North American Commercial and Industrial Insulation Standards (NACIIS) Manual as published by the Midwest Insulation Contractors Association (MICA).
- B. To ensure that internal fiberglass/glass mineral fiber flexible duct and rigid plenum liner insulation will achieve its highest possible performance and serve its intended purpose, install duct liner, plenum liner, and all associated accessories in accordance with manufacturer's published instructions and industry practices detailed by NAIMA FGDLS and SMACNA (DCS).
- C. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

- D. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces, free of voids throughout the length of, ducts and fittings.
- E. All items required for a complete and proper installation are not necessarily indicated on the plans or in the specifications. Provide all items required as per manufacturer's requirements.

### 3.2 EXTERNAL DUCT INSULATION

- A. Fasten all longitudinal and circumferential laps with outward clinching staples 3" on center. On rectangular ducts over 24" wide apply as above and hold insulation in place on bottom side with mechanical pins and clips on 12" centers.
- B. Seal all joints, fastener penetrations and other breaks in vapor retarder with 3-inch wide strips of glass fiber fabric reinforcing mesh embedded between two coats of vapor retarder mastic.
- C. External duct wrap is required on all outside air ducts, supply and return air ducts that are not internally insulated. External duct wrap is also required on all exhaust and relief air ducts that are used in airside energy recovery systems. Any exhaust ductwork located in an unconditioned space that conveys air from conditioned spaces or vice versa shall also be provided with external duct wrap. Duct wrap shall be provided as follows:
  - 1. 1½" thick, 1.0 pcf density minimum; minimum installed R-value of 4.5 when ducts are located in directly conditioned spaces.
  - 2. 2" thick, 1.0 pcf density minimum; minimum installed R-value of 6.0 when ducts are located in indirectly conditioned spaces such as ceiling plenum space used for return air or located indoors concealed within chases or shafts.
  - 3. 3" thick, 0.75 pcf density minimum; minimum installed R-value of 8.3 when ducts are located in unconditioned spaces.
- D. Any ductwork located in an air plenum that is comprised of materials that do not comply with the 25/50 flame and smoke rating per ASTM E84 or UL 723 testing requirements or UL 2043 for discrete products in plenums shall be provided with a single layer of duct wrap to establish a noncombustible rating per ASTM E136. Duct wrap products which are approved for such non-compliant combustible duct materials located in air plenums shall be 3M Fire Barrier Plenum Wrap 5A+ or Alkegen/Unifrax FyreWrap 0.5 Plenum. Insulation products for this application shall be installed in strict accordance with the manufacturer's instructions.

### 3.3 DUCT LINER

- A. Duct liner shall be kept clean and dry during transportation, storage, installation, and throughout the construction process care should be taken to protect the liner from exposure to the elements or damage from mechanical abuse.
- B. Duct liner shall be adhered to the sheet metal with a full coverage of approved adhesive complying with ASTM C916. All exposed leading edges and transverse joints shall be coated with factory-applied or field-applied edge coating, Childers CP-50A HV2 Black or approved equal and shall be neatly butted without gaps. Shop or field cuts shall be liberally coated with an edge coating. All coatings and adhesives shall be designed for duct liner application.
- C. Metal nosings shall be securely installed over transversely oriented liner edges facing the airstream at forward discharge and at any point where lined duct is preceded by unlined duct.
- D. When velocity exceeds 4,000 fpm (20.3 m/sec), use metal nosing on every leading edge. Nosing may be formed on duct or be channel or zee attached by screws, rivets or welds.
- E. Line supply and return ductwork at connection of fan-powered HVAC units to a point of 15 feet upstream and downstream of the equipment, 15 feet downstream of fan powered terminal units, and in return air boots.

- F. Duct liner shall be provided as follows:
  - 1. 1" thick, 1.5 pcf density minimum, with a minimum installed R-value of 4.2 when ducts are located in directly conditioned spaces.
  - 2. 1 ½" thick, 1.5 pcf density minimum, with a minimum installed R-value of 6.0 when ducts are located in indirectly conditioned spaces such as ceiling plenum space used for return air.
  - 3. 2" thick, 1.5 pcf density minimum, with a minimum installed R-value of 8.0 when ducts are located in indoor, unconditioned spaces or located outdoors.
  - 4. 1 ½" thick, 3.0 pcf density minimum, with a minimum R-value of 6.3 for rigid plenum liner applications.

### 3.4 EXPOSED DUCTWORK LOCATED INDOORS

- A. Duct required to be insulated by any section of this specification that is routed exposed in occupied spaces shall be double wall.
- B. Duct routed exposed shall be double wall with perforated inner liner and fiberglass/glass mineral fiber insulation. Provide 1" thick insulation when ductwork is located in conditioned spaces and 2" thick in unconditioned spaces, insulation density shall be a minimum of 1.0 pcf. Double wall duct shall be United McGill model Acousti-k27 for round or oval ducts and Rectangular-k27 for rectangular ducts or approved equal.

### 3.5 EXPOSED DUCT LOCATED OUTDOORS OR IN UNINHABITED CRAWLSPACES

- A. All rectangular metal ductwork located outdoors or in uninhabited crawlspaces shall be internally lined with fiberglass Duct Liner as specified and externally insulated with 2" thick, 6.0 pcf density fiberglass insulation board with FSK facing. The protective finish system shall be aluminum jacketing complying with ASTM C1729. The aluminum layer of the jacketing shall be 0.016" minimum thickness.
- B. All round and flat oval metal ductwork located outdoors or in uninhabited crawlspaces shall be internally lined with fiberglass Duct Liner as specified and externally insulated with 2" thick fiberglass pipe and tank insulation with FSK facing. The protective finish system shall be aluminum jacketing complying with ASTM C1729. The aluminum layer of the jacketing shall be 0.016" minimum thickness.
- C. Paint non-insulated duct. Coordinate color with Architect.

### 3.6 AIR DEVICE AND MISCELLANEOUS DUCT INSULATION

- A. The backside of all supply air devices shall be insulated with taped and sealed external duct wrap matching the thickness, density, and R-value of the associated duct system.
- B. The contractor shall install an additional layer of 1-½ inch thick external fiberglass / glass mineral fiber duct wrap on any portion of the supply air, return air, outside air, or exhaust air system that has condensation forming during any period of operation. The insulation shall be taped and vapor-sealed and located until all evidence of the condensation has been eliminated, at no additional cost to the Owner.

### 3.7 KITCHEN GREASE HOOD EXHAUST DUCT

- A. All type I kitchen range hood exhaust duct shall be enclosed with 2-hour fire rated enclosure.
- B. The duct enclosure shall be sealed around the duct at the points of penetration with an approved fire barrier sealant. Refer to Division 7 for further requirements regarding "Through-Penetration Firestop Systems".
- C. The enclosure shall be separated from the duct by at least 3 inches and not more than 12 inches.
- D. Cleanout openings at exhaust duct with access openings at the fire rated enclosure and access doors shall be provided at each duct offset and as required for proper operation and maintenance.

- E. As an alternate method, the contractor may use two layers of 2-hour Fire-Rated High-Temperature Ceramic Fiber Flexible Blanket Insulation in lieu of the fire rated enclosure, provided that all the following constraints are satisfied:
  - 1. Duct insulation system shall be tested per ASTM E2336 internal fire testing and have an achieved minimum fire resistance rating of 2 hours.
  - 2. Product shall be approved by the local Authority Having Jurisdiction (AHJ).
  - 3. Duct wrap system shall be mechanically attached to the duct using steel banding and/or weld pins per manufacturer's instructions.
  - 4. Duct wrap system shall be installed in strict accordance with the manufacturer's instructions, including but not limited to zero clearance to combustibles at all locations on the wrap surface.
- F. Insulation and all other requirements shall be provided per local codes.

### 3.8 DRYER VENT DUCT

- A. All dryer vent duct routed within an air plenum shall be enclosed within a 1-hour fire rated enclosure.
- B. The duct enclosure shall be sealed around the duct at the points of penetration with an approved fire barrier sealant. Refer to Division 7 for further requirements regarding "Through-Penetration Firestop Systems".
- C. The enclosure shall be separated from the duct by at least 3 inches and not more than 12 inches.
- D. Cleanout openings at exhaust duct with access openings at the fire rated enclosure and access doors shall be provided at each duct offset and as required for proper operation and maintenance.
- E. As an alternate method, the contractor may use two layers of 2-hour Fire-Rated High-Temperature Ceramic Fiber Flexible Blanket Insulation in lieu of the fire rated enclosure, provided that all the following constraints are satisfied:
  - 1. Duct insulation system shall be tested per ASTM E2336 internal fire testing and have an achieved minimum fire resistance rating of 1 hour.
  - 2. Product shall be approved by the local Authority Having Jurisdiction (AHJ).
  - 3. Duct wrap system shall be mechanically attached to the duct using steel banding and/or weld pins per manufacturer's instructions.
  - 4. Duct wrap system shall be installed in strict accordance with the manufacturer's instructions, including but not limited to zero clearance to combustibles at all locations on the wrap surface.
- F. Insulation and all other requirements shall be provided per local codes.

END OF SECTION



SECTION 23 07 16

HVAC EQUIPMENT INSULATION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.
- B. Section 23 02 00 - Basic Materials and Methods for HVAC shall be included as a part of this Section as though written in full in this document.

1.2 SCOPE

- A. Scope of the Work shall include the furnishing and complete installation of the equipment covered by this Section, with all auxiliaries, ready for Owner's use.
- B. Work specified elsewhere.
  - 1. Basic materials and methods.
  - 2. Piping systems.
  - 3. Air distribution equipment.

1.3 REFERENCE STANDARDS

- A. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- B. ASTM C1136 - Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation; 2023.
- C. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013 (Reapproved 2019).
- D. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation; 2014 (Reapproved 2019).
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.
- F. ICC (IECC) - International Energy Conservation Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.
- H. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems; 2024.
- I. SCAQMD 1168 - Adhesive and Sealant Applications; 1989, with Amendment (2022).
- J. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.4 QUALITY ASSURANCE

- A. Installer's Qualifications: Firm with at least 5 years successful installation experience on projects with mechanical insulations similar to that required for this project.



- B. All insulation shall be listed and labeled to have a composite (insulation, jacket or facing, and adhesive used to adhere the facing or jacket to insulation) flame spread index of not more than 25 and smoke-developed index of not more than 50 when tested in accordance with ASTM E84 and UL 723.
- C. All HVAC equipment insulation shall comply with minimum requirements of ICC (IECC) and ASHRAE Std 90.1 I-P.
- D. Adhesives and other materials shall comply with NFPA 90A and NFPA 90B. Additionally, all adhesives and sealants used on the interior of the building (i.e., inside of the weatherproofing system and applied on-site) shall be comprised of low-emitting materials that comply with VOC limits prescribed by SCAQMD 1168.

#### 1.5 WARRANTY

- A. Warrant the Work specified herein for one year against becoming unserviceable or causing an objectionable appearance resulting from either defective or nonconforming materials and workmanship.
- B. Defects shall include, but not be limited to, the following:
  - 1. Mildewing.
  - 2. Peeling, cracking, and blistering.
  - 3. Condensation on exterior surfaces.

#### 1.6 SUBMITTALS

- A. SHOP DRAWINGS: Indicate size, material, and finish. Show locations and installation procedures. Include details of joints, attachments, and clearances.
- B. PRODUCT DATA: Submit schedules, charts, literature, and illustrations to indicate the performance, fabrication procedures, product variations, and accessories.

#### 1.7 DELIVERY AND STORAGE

- A. Deliver insulation, coverings, cements, adhesives, and coatings to site in unopened containers with manufacturer's stamp, clearly labeled with flame and smoke rating, affixed showing fire hazard indexes of products.
- B. Protect insulation against dirt, water and chemical and mechanical damage. Do not install damaged or wet insulation; remove such from project site.

### PART 2 - PRODUCTS

#### 2.1 EQUIPMENT INSULATION

- A. It is the intent of these specifications to secure superior quality workmanship resulting in an absolutely satisfactory installation of insulation from the standpoint of both function and appearance. Particular attention shall be given to valves, fittings, pumps, etc., requiring low temperature insulation to insure full thickness of insulation and proper application of the vapor seal. All flaps of vapor barrier jackets and/or canvas covering must be neatly and securely smoothed and sealed down.
- B. The type of insulation and its installation shall be in strict accordance with these specifications for each service, and the application technique shall be as recommended by the manufacturer. All insulation types, together with adhesives and finishes shall be submitted and reviewed before any insulation is installed.

- C. A sample quantity of each type of insulation and each type application shall be installed and reviewed prior to proceeding with the main body of the work. Condensation caused by improper installation of insulation shall be corrected by Installing Contractor. Any damage caused by condensation shall be made good at no cost to the Owner or Architect/Engineer.
- D. Glass mineral wool materials as manufactured by Knauf Insulation, Owens/Corning, Certain-Teed or Johns Manville will be acceptable, if they comply with the specifications.
- E. Accessories, such as adhesives, mastics and cements shall have the same component ratings as listed above. Additionally, all adhesives and sealants used on the interior of the building (i.e., inside of the weatherproofing system and applied on-site) shall be comprised of low-emitting materials that comply with VOC limits prescribed by SCAQMD 1168.
- F. All products or their shipping cartons shall have a label affixed, indicating flame and smoke ratings do not exceed the above requirements.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. All insulation shall be installed in accordance with the manufacturer's recommendations and printed installation instructions.
- B. All items required for a complete and proper installation are not necessarily indicated on the plans or in the specifications. Provide all items required as per manufacturer's requirements.

#### 3.2 CHILLED WATER PUMPS

- A. Shall be insulated with Knauf Insulation Board with ECOSE Technology, Certain-Teed IB-600 or equal, rigid insulation board, 2" thick, cut and formed into a box and secured in place with 3/4" wide x 0.020 galvanized bands spaced on 9" centers. Bands shall be pulled snug over sheets of insulation board. All joints shall be well and neatly fitted and so arranged that the assembly may be dismantled with ease permitting access to the pump. All voids on the interior of box shall be filled with glass mineral wool blanket insulation. Exterior shall be finished with a trowel coat of Foster's 30-35 vapor barrier mastic, a layer of 1" mesh galvanized wire, and a coat of Johns Manville CALCOAT-127 finishing cement. Final finish shall be an eight ounce canvas jacket, pasted and sealed in place with Foster's 30-36 Seafas.
- B. Insulation Board shall comply with ASTM C612 and ASTM C553. The associated FSK facing shall comply with ASTM C1136.
- C. Pipe insulation shall be extended over all cold parts of chilled water pumps not directly over drainage basin of pump base.

#### 3.3 BOILER EXHAUST SYSTEM

- A. Insulate boiler stack, breaching and induced draft fan housing in contact with flue gases, with 1-inch thick high temperature, spun glass mineral wool semi-rigid board. Knauf Insulation Elevated Temperature Board with ECOSE Technology, Johns-Manville 1000 Spin-Glass or approved equal, secured between outer facing of 1-inch galvanized wire mesh. Calcium silicate insulation, Johns-Manville Thermo-1200 or approved equal, may be applied at the contractor's option followed by application of 1-inch galvanized wire mesh.
- B. In exposed areas, apply 1 1/4-inch coat of insulating and finishing cement, Ryder "V" One Coat or approved equal, troweled to a smooth surface. After cement has dried, surfaces shall be weatherproofed using 2 coats of mastic, Childers CP-10, with a layer of white glass cloth reinforcing embedded between coats.

- C. Insulation Board for elevated temperature applications shall comply with ASTM C612.

END OF SECTION

SECTION 23 23 00  
REFRIGERANT PIPING

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.
- B. Section 23 02 00 - Basic Materials and Methods for HVAC shall be included as a part of this Section as though written in full in this document.

1.2 SCOPE

- A. Scope of the Work shall include the furnishing and complete installation of the equipment covered by this Section, with all auxiliaries, ready for Owner's use.

1.3 REFERENCES

- A. AHRI 710 - Performance Rating of Liquid-Line Driers; 2009.
- B. AHRI 730 (I-P) - Flow Capacity Rating of Suction Line Filters and Suction Line Filter Driers; 2013 (Reapproved 2014).
- C. ASHRAE Std 15 - Safety Standard for Refrigeration Systems; 2022, with Addendum (2024).
- D. ASHRAE Std 34 - Designation and Safety Classification of Refrigerants; 2022, with Errata (2024).
- E. ASHRAE Std 147 - Reducing the Release of Halogenated Refrigerants from Refrigerating and Air-Conditioning Equipment and Systems; 2019, with Addendum (2024).
- F. ASME A13.1 - Scheme for the Identification of Piping Systems; 2023.
- G. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2021.
- H. ASME B31.5 - Refrigeration Piping and Heat Transfer Components; 2022.
- I. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators; 2023.
- J. ASTM B280 - Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service; 2023.
- K. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding; 2019.
- L. AWS B2.2/B2.2M - Specification for Brazing Procedure and Performance Qualification; 2016.

1.4 SUBMITTALS

- A. Shop Drawings: Indicate layout of refrigeration piping system, including equipment, critical dimensions, and sizes.
- B. Piping: Submit data on pipe materials, fittings, and accessories.
- C. Valves: Submit manufacturers catalog information with valve data and ratings for each service.

- D. Refrigerant Specialties: Submit manufacturers catalog information including capacity, component sizes, rough-in requirements, and service sizes.
- E. Welding Certificates: Submit per AWS B2.2/B2.2M and ASME BPVC-IX.

## PART 2 - PRODUCTS

### 2.1 GENERAL

- A. Provide for the systems as shown. Submit shop drawings of piping systems showing all traps, pipe sizes, and accessories; drawing to be marked "Approved" and signed by a representative of the Application Engineering Department of the condensing unit manufacturer. Pipe sizes shall be as recommended by unit manufacturer. Refer to piping schematic on Drawings.

### 2.2 MATERIAL

- A. PIPE: Type ACR copper tubing, hard-drawn, per ASTM B280.
- B. FITTINGS: Wrought copper per ASME B16.22.
- C. JOINTS: Brazed joints with Sil-Fos filler metal per AWS A5.8M/A5.8.

### 2.3 ACCESSORIES

- A. All accessories shall be UL listed and rated in accordance with AHRI 710.
- B. On systems 7-1/2 tons and larger, each separate refrigerant circuit shall have a separate filter drier rated in accordance with AHRI 730 (I-P). Each filter drier shall have a replaceable core and a three valve bypass. The filter drier shall be full line size and installed in the refrigerant liquid line. The filter shall have a minimum 4-3/4 inches diameter shell with removable flange and gasket. Flange shall be tapped for 1/4 inch FPT access valve. Size filter-drier for maximum 2.0 psi pressure drop at evaporator operating temperature. Similar to Mueller Refrigeration model Drymaster micro-guard refillable filter series SD-485 through SD19217 or Sporlan catch-all.
- C. On systems less than 7-1/2 tons, the filter drier shall be the sealed type; sizes as above. One drier per refrigerant circuit.
- D. Liquid-Moisture Indicator shall be full line size, installed in liquid refrigerant line. Indicator shall be rated for the applicable refrigerant, system pressure and temperature; manufactured by Mueller Refrigeration or Sporlan.
- E. Thermostatic expansion valve shall have adjustable super heat and be as manufactured by Sporlan.
- F. Shut-off valves shall be bi-directional ball valves with welded body, brass ball with dual Teflon seals and integral relief port. Valves shall be rated for the applicable refrigerant, system pressure and temperature. Valves shall be manufactured by Mueller Refrigeration or Sporlan.

### 2.4 REFRIGERANT AND OIL

- A. Contractor shall leave the refrigeration system with a full charge of refrigerant and oil and shall be responsible for the maintenance of a full charge of refrigerant and oil in the systems for a period of one year from date of Substantial Completion.
- B. Should any leaks in the refrigeration system occur during the guarantee period, the Contractor shall eliminate such leaks and recharge system to a full charge of refrigerant and oil at no cost to the Owner.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. All equipment and piping shall be installed in accordance with the manufacturer's recommendations and printed installation instructions.
- B. All items required for a complete and proper installation are not necessarily indicated on the Drawings or in the Specifications. Provide all items required as per manufacturer's requirements.
- C. Refrigerant piping shall be installed in accordance with ASHRAE Std 15 and ASHRAE Std 34.
- D. Arrange refrigerant piping to return oil to compressor. Provide traps and loops in piping, and provide double risers as required.
- E. Braze joints per AWS B2.2/B2.2M and AWS A5.8M/A5.8 requirements.
- F. Pipe shall be cut square, reamed and chamfered, and shall be free from burrs and obstruction. Pipe ends shall have full-bore openings and shall not be undercut.
- G. Refrigerant piping located in areas other than the room or space where the refrigerating equipment is located shall be identified with pipe markers that meet labeling requirements of ASME A13.1. Markers shall be manufactured by W.H. Brady Company or approved equal. The pipe identification shall be located at intervals not exceeding 20 feet on the refrigerant piping or pipe insulation. The minimum height of the identification lettering shall be 1/2". The pipe identification shall indicate the refrigerant designation and safety group classification of the refrigerant used in the piping system. For Group A2, A3, B2, and B3 refrigerants, the identification shall also include the following statement: "DANGER – Risk of Fire or Explosion. Flammable Refrigerant." For any Group B refrigerant, the identification shall also include the following statement: "DANGER – Toxic Refrigerant".
- H. Refrigerant piping routed indoors shall be installed at a minimum of 7'-3" above finished floor when located above an area affording passage of occupants.
- I. Refrigerant piping located indoors shall be located within building elements such as a ceiling or wall space or within a protective enclosure unless installed a minimum of 7'-3" above finished floor, within 6'-0" of the associated equipment or within a refrigerant machinery room.
- J. Provide shield plates for refrigerant pipes containing Group A2L and B2L refrigerants that are located in concealed locations where piping is installed in studs, joists, rafters or similar member spaces, and are located less than 1-1/2 inches from the nearest edge of the member. Shield plates shall have a minimum thickness of 16 gage and shall extend two inches beyond the edge of the piping on each side.
- K. Refrigerant pipe and joints installed in the field shall be exposed for visual inspection and testing prior to being covered or enclosed.

### 3.2 FIELD QUALITY CONTROL

- A. Test piping and refrigeration system in accordance with ASME B31.5, ASHRAE Std 147, and this section.
- B. The refrigerant piping system shall be tested as a whole or separate tests shall be conducted for the low-pressure side and high-pressure side of the piping system.
  - 1. Pressure Test:
    - a. Pressure test shall be performed using dry nitrogen.

- b. The means used to pressurize the refrigerant piping system shall have on its outlet side a test pressure measuring device and either a pressure-limiting device or a pressure-reducing device. The test pressure measuring device shall have an accuracy of +/- 3% or less of the test pressure and shall have a resolution of 5% or less of the test pressure.
  - c. The system shall be pressurized for a period of not less than 60 minutes. Additional test gas shall not be added to the system after the start of the test.
  - d. Test pressure shall be at least 110% of the system design pressure.
  - e. Test pressure shall not exceed 130% of the design pressure of any component in the system.
  - f. The system shall not show loss of pressure on the on the test measuring device throughout the entirety of the test.
2. Evacuation and Leak Test:
- a. Evacuate moisture completely by applying a commercial vacuum pump. Moisture indicator shall indicate a completely moisture-free condition at time of final inspection.
  - b. The vacuum pump shall run until the system indicates a vacuum of 500 microns-
  - c. After achieving a vacuum, the system shall be isolated from the vacuum pump. The system pressure shall not rise for a minimum of 24 hours.
  - d. The system shall be flushed with the operating refrigerant and the vacuum pump connected and rerun to repeat the evacuation. Evaluation shall be performed under supervision of the Engineer.
- C. Repair any and all leaks and retest as required.

END OF SECTION

SECTION 23 31 13  
METAL DUCTWORK

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Low pressure ductwork.
- B. Medium and high pressure ductwork.
- C. Casings.
- D. Underground buried ducts.
- E. Exposed ductwork located indoors.
- F. Kitchen hood ductwork.
- G. Domestic range hood exhaust ductwork.
- H. Dishwasher/Shower/Locker room exhaust ductwork.
- I. Laboratory fume hood exhaust ductwork.
- J. Chlorine storage area ductwork.
- K. Duct exposed in pool room or pool equipment room.
- L. Welding exhaust ductwork.
- M. Paint hood exhaust ductwork.
- N. Commercial dryer vent.
- O. Duct leakage testing.
- P. Duct system protection.
- Q. Duct system cleaning.

1.2 RELATED SECTIONS

- A. Division 9 - Finishes: Weld priming, weather resistant, paint or coating.
- B. Section 23 02 00 - Basic Materials and Methods for HVAC
- C. Section 23 05 29 - Hangers and Supports for Piping and Equipment - HVAC
- D. Section 23 05 93 - Testing, Adjusting, And Balancing
- E. Section 23 07 13 - Duct Insulation
- F. Section 23 33 00 - Ductwork Accessories



G. Section 23 37 13 - Air Distribution Devices

1.3 REFERENCES

- A. ASTM A480/A480M - Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip; 2023b.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
- C. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- D. NADCA ACR - The NADCA Standard for Assessment, Cleaning, and Restoration of HVAC System; 2021.
- E. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.
- F. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors; Current Edition, Including All Revisions.
- G. SMACNA (LEAK) - HVAC Air Duct Leakage Test Manual.
- H. ASHRAE (FUND) ASHRAE Handbook - Fundamentals; Chapter 21 - Duct Design.
- I. ASHRAE (HVACS) ASHRAE Handbook - HVAC Systems and Equipment; Chapter 19 - Duct Construction.
- J. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings.
- K. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems.
- L. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems.
- M. ICC (IECC) - International Energy Conservation Code.

1.4 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of metal ductwork products of types, materials and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Installer's Qualifications: Firms with least 3 years of successful installation experience on projects with metal ductwork systems similar to that required for project.

1.5 GENERAL DESCRIPTION

- A. Extent of metal ductwork is indicated on drawings and in schedules, and by requirements of this section.

1.6 SUBMITTALS

- A. Submit shop drawings, duct fabrication standards and product data under provisions of Division One.
- B. Indicate duct fittings, particulars such as gauges, sizes, welds, and configuration prior to start of work.

- C. The contract documents are schematic in nature and are to be used only for design intent. The contractor shall prepare sheet metal shop drawings, fully detailed and drawn to scale, indicating all structural conditions, all plumbing pipe and light fixture coordination, and all offsets and transitions as required to permit the duct to fit in the space allocated and built. All duct revisions required as a result of the contractor not preparing fully detailed shop drawings will be performed at no additional cost.

## 1.7 DEFINITIONS

- A. Duct Sizes: Inside clear dimensions. For lined ducts, maintain indicated clear size inside lining. Where offsets or transitions are required, the duct shall be the equivalent size based on constant friction rate.
- B. Low Pressure: Low pressure ductwork shall be rated for an operating pressure of 2". Low pressure ductwork shall be defined as all return, exhaust, and outside air ducts, all supply ductwork associated with constant volume air handling units with a scheduled external static pressure of less than 2", and all supply ductwork downstream of terminal units in variable volume systems.
- C. Medium Pressure: Medium pressure ductwork shall be rated for an operating pressure of 4". Medium pressure ductwork shall be defined as all supply ductwork extending from variable volume air handling units to terminal units in variable volume systems with air handling units having a scheduled external static pressure of less than 4". The supply ductwork of constant volume air handling units having a scheduled external static pressure greater than 2" and less than 4" shall be rated for medium pressure.
- D. High Pressure: High pressure ductwork shall be rated for an operating pressure of 6", or the scheduled external pressure of the equipment it is connected to, whichever is greater. The supply ductwork of air handling units having a scheduled external static pressure greater than 4" shall be high pressure.

## 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Protection: Protect shop-fabricated and factory-fabricated ductwork, accessories and purchased products from damage during shipping, storage and handling. Prevent end damage and prevent dirt and moisture from entering ducts and fittings, use sheet metal end caps on any lined duct exposed to the weather.
- B. Storage: Where possible, store ductwork inside and protect from weather. Where necessary to store outside, store above grade and enclose with waterproof wrapping.

## PART 2 - PRODUCTS

### 2.1 DUCTWORK MATERIALS

- A. Exposed Ductwork Materials: Where ductwork is indicated to be exposed to view in occupied spaces, provide materials which are free from visual imperfections including pitting, seam marks, roller marks, stains and discolorations, and other imperfections, including those which would impair painting.
- B. Sheet Metal: Except as otherwise indicated, fabricate ductwork from galvanized sheet steel complying with ASTM A653/A653M.
- C. Stainless Steel Sheet: Where indicated, provide stainless steel complying with ASTM A480/A480M; Type 316; with No. 4 finish where exposed to view in occupied spaces, No. 1 finish elsewhere. Protect finished surfaces with mill-applied adhesive protective paper, maintained through fabrication and installation.
- D. Aluminum Sheet: Where indicated, provide aluminum sheet complying with ASTM B209, Alloy 3003, Temper H14.

### 2.2 MISCELLANEOUS DUCTWORK MATERIALS

- A. General: Non-combustible and conforming to UL 181, Class 1 air duct materials.

- B. Flexible Ducts: Flexmaster U.S.A., Inc. Type 5M, Thermaflex MKE, ATCO #036 or approved equal.
  - 1. Flexible ducts shall be corrosive resistant galvanized steel formed and mechanically locked to inner fabric with minimum 1-1/2" thick, R-6 insulation. Flexible duct shall be rated up to at least 10 in.w.g. positive pressure and shall have reinforced metalized outer jacket to comply with UL 181, Class 1 air duct.
- C. Sealants: Hard-Cast "iron grip" or approved equal, non-hardening, water resistant, fire resistive and shall not be a solvent curing product. Sealants shall be compatible with mating materials, liquid used alone or with tape or heavy mastic.
- D. Ductwork Support Materials: Except as otherwise indicated, provide hot-dipped galvanized steel fasteners, anchors, rods, straps, trim and angles for support of ductwork.
  - 1. For exposed stainless steel ductwork, provide matching stainless steel support materials.
  - 2. For aluminum ductwork, provide aluminum support materials.

### 2.3 LOW PRESSURE DUCTWORK

- A. Fabricate and support in accordance with latest SMACNA (DCS) Standards and ASHRAE handbooks, except as indicated. Provide duct material, gauges, reinforcing, and sealing for operating pressures indicated.
- B. Size round ducts installed in place of rectangular ducts in accordance with ASHRAE table of equivalent rectangular and round ducts. No variation of duct configuration or sizes permitted except by approved shop drawings. Obtain engineer's approval prior to using round duct in lieu of rectangular duct.
- C. Construct T's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows are used, provide airfoil-turning vanes. Where acoustical lining is indicated, provide turning vanes of perforated metal with glass fiber insulation.
- D. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible. Divergence upstream of equipment shall not exceed 30 degrees; convergence downstream shall not exceed 45 degrees.
- E. Use crimp joints with bead for joining round duct sizes 6 inch smaller with crimp in direction of airflow.
- F. Use double nuts and lock washers on threaded rod supports.

### 2.4 MEDIUM AND HIGH PRESSURE DUCTS

- A. Fabricate and support in accordance with SMACNA (DCS) Standards and ASHRAE handbooks, except as indicated. Provide duct material, gauges, reinforcing, and sealing for operating pressures indicated.
- B. Construct T's, bends, and elbows with radius of not less than 1½ times width of duct on centerline. Where not possible and where rectangular elbows are used, provide airfoil-turning vanes. Where acoustical lining is required, provide turning vanes of perforated metal with glass fiber insulation. Weld in place.
- C. Transform duct sizes gradually, not exceeding 15 degrees divergence and 30 degrees convergence.
- D. Fabricate continuously welded medium and high pressure round and oval duct fittings two gauges heavier than duct gauges indicated in SMACNA Standard. Joints shall be minimum 4 inch cemented slip joint, brazed or electric welded. Prime coat welded joints.
- E. Provide standard 45 degree lateral wye takeoffs unless otherwise indicated where 90 degree conical tee connections may be used.

## 2.5 CASINGS

- A. Fabricate casings in accordance with SMACNA (DCS) Standards and SMACNA High Pressure Duct Construction Standards and construct for operating pressures indicated.
- B. Mount floor mounted casings on 4 inch high concrete curbs. At floor, rivet panels on 8 inch centers to angles. Where floors are acoustically insulated, provide liner of 18 gauge galvanized expanded metal mesh supported at 12 inch centers, turned up 12 inches at sides with sheet metal shields.
- C. Reinforce doorframes with steel angles tied to horizontal and vertical plenum supporting angles. Install hinged access doors where indicated or required for access to equipment for cleaning and inspection. Provide clear wire glass observation ports, minimum 6 X 6 inch size.
- D. Fabricate acoustic casings with reinforcing turned inward. Provide 16 gauge back facing and 22 gauge perforated front facing with 3/32 inch diameter holes on 5/32 inch centers. Construct panels 3 inches thick packed with 4.5 lb./cubic foot minimum glass fiber media, on inverted channels of 16 gauge.

## 2.6 EXPOSED DUCTWORK LOCATED INDOORS

- A. Where ductwork is indicated to be exposed to view in occupied spaces, provide round or flat oval, double wall galvanized steel construction with spiral lockseam with perforated inner liner, United McGill Corporation model Acousti-k27 or approved equal.

## PART 3 - EXECUTION

### 3.1 GENERAL INSTALLATION REQUIREMENTS

- A. Obtain manufacturer's inspection and acceptance of fabrication and installation of ductwork at beginning of installation.
- B. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pitot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.
- C. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.
- D. Connect terminal units to medium or high pressure ducts with 18 inches maximum length of flexible duct. Do not use flexible duct to change direction.
- E. Connect diffusers or troffer boots to low pressure ducts with 5 feet maximum, 4 feet minimum, length of flexible duct. Hold in place with strap or clamp.
- F. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
- G. The interior surface of all ductwork shall be smooth. No sheet metal parts, tabs, angles, or anything else may project into the ducts for any reason, except as specified to be so. All seams and joints shall be external.
- H. All ductwork located exposed on roof shall be "crowned" to prevent water from ponding. Ref: Insulation for additional requirements.

- I. Where ducts pass through non-rated floors, provide structural angles for duct support. Where ducts pass through non-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. Where ducts pass through rated interior partitions, rated exterior walls, or rated floors, install fire dampers or smoke dampers as required. Provide sleeves for dampers not provided with factory sleeve. Refer to Section 23 33 00 - Ductwork Accessories for fire and smoke damper requirements.
- J. All angles shall be carried around all four sides of the duct or group of ducts. Angles shall overlap corners and be welded or riveted.
- K. All ductwork shall be fabricated in a manner to prevent the seams or joints being cut for the installation of grilles, registers, or ceiling outlets.
- L. All duct hangers shall be attached to building structure. Cutting slots in roof or floor decking for hanger straps to be cast in concrete is not acceptable.

### 3.2 INSTALLATION OF FLEXIBLE DUCTS

- A. Maximum Length: For any duct run using flexible ductwork, do not exceed 5'-0" extended length.
- B. Installation: Install in accordance with Section III of SMACNA (DCS).

### 3.3 REQUIREMENTS FOR DUCTS BURIED UNDERGROUND

- A. Slope underground ducts to plenums or low pump-out points at 1:500. Provide access doors for inspection.
- B. Coat buried, metal ductwork without factory jacket with one coat and seams and joints with additional coat of asphalt base protective coating.
- C. Insulate buried supply duct runs over 50 feet long with one inch thick insulation covered with plastic vapor barrier.
- D. Encase buried metal ductwork in 3 inch minimum of concrete. Provide adequate tie-down points to prevent ducts from floating during concrete placement. Introduce no heat into ducts for 20 days following placement of concrete.

### 3.4 REQUIREMENTS FOR UNIT CASINGS

- A. Set plenum doors 6 to 12 inches above floor. Arrange door swings so that fan static pressure holds door in closed position.

### 3.5 REQUIREMENTS FOR KITCHEN HOOD EXHAUST DUCTWORK

- A. Provide residue traps in kitchen hood exhaust ducts at base of vertical risers with provisions for cleanout.
- B. Provide access openings in each change in direction, located on sides of duct 1½" minimum from bottom, and fitted with grease-tight covers of same material as duct
- C. Use stainless steel for ductwork exposed to view.

### 3.6 DUCTWORK APPLICATION SCHEDULE

- A. Ductwork materials shall be provided to comply with the following:

AIR SYSTEM	MATERIAL
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Low Pressure Supply	Galvanized Steel, Aluminum
Buried Supply or Return	Concrete, Glass Fiber Reinforced Plastic
Medium and High Pressure Supply	Galvanized Steel
Return and Relief	Galvanized Steel, Aluminum
General Exhaust	Galvanized Steel, Aluminum
Kitchen Hood Exhaust	Carbon Steel, Stainless Steel
Domestic Range Hood Exhaust	Galvanized Steel
Dishwasher/Shower/Locker Room/Dryer Vent/Paint Hood Exhaust	Stainless Steel
Fume Hood Exhaust	Stainless Steel
Chlorine Storage Supply and Exhaust	Galvanized Steel
Pool Room or Pool Equipment Room Supply, Return, and Exhaust	Galvanized Steel
Welding Exhaust	Galvanized Steel
Outside Air Intake	Galvanized Steel
Combustion Air	Galvanized Steel
Emergency Generator Ventilation	Carbon Steel

3.7 DUCTWORK HANGERS AND SUPPORTS

- A. All ductwork shall be properly suspended or supported from the building structure. Hangers shall be galvanized steel straps or hot-dipped galvanized rod with threads pointed after installation. Strap hanger shall be attached to the bottom of the ductwork, provide a minimum of two screws one at the bottom and one in the side of each strap on metal ductwork. The spacing, size and installation of hangers shall be in accordance with the recommendations of the latest SMACNA edition.
- B. Wire shall not be used for permanent support or attachment components
- C. All duct risers shall be supported by angles or channels secured to the sides of the ducts at each floor with sheet metal screws or rivets. The floor supports may also be secured to ducts by rods, angles or flat bar to the duct joint or reinforcing. Structural steel supports for duct risers shall be provided under this Division.

3.8 AIR DUCT LEAKAGE: (FROM SMACNA DUCT STANDARDS LATEST EDITION) TEST ALL DUCTWORK (DESIGNED TO HANDLE OVER 1,000 CFM) AS FOLLOWS:

- A. Test apparatus
  - 1. A source of high pressure air-a portable rotary blower or a tank type vacuum cleaner.
  - 2. A flow measuring device consisting of straightening vanes and an orifice plate mounted in a straight tube with properly located pressure taps. Each orifice assembly shall be accurately calibrated with its own calibration curve. Pressure and flow readings shall be taken with U-tube manometers.
- B. Test Procedures
  - 1. Test for audible leaks as follows:
  - 2. Close off and seal all openings in the duct section to be tested. Connect the test apparatus to the duct by means of a section of flexible duct.
    - a. Start the blower with its control damper closed.
    - b. Gradually open the inlet damper until the duct pressure reaches 1.5 times the standard designed duct operating pressure.
    - c. Survey all joints for audible leaks. Mark each leak and repair after shutting down blower. Do not apply a retest until sealants have set.
  - 3. After all audible leaks have been sealed, the remaining leakage should be measured with the orifice section of the test apparatus as follows:
    - a. Start blower and open damper until pressure in duct reaches 50% in excess of designed duct operating pressure.
    - b. Read the pressure differential across the orifice on manometer No. 2. If there is no leakage, the pressure differential will be zero.

- c. Total allowable leakage shall not exceed one (1) percent of the total system design air flow rate. When partial sections of the duct system are tested, the summation of the leakage for all sections shall not exceed the total allowable leakage.
  - d. Even though a system may pass the measured leakage test, a concentration of leakage at one point may result in a noisy leak which, must be corrected.
4. Testing Report
- a. Contractor shall provide a testing report for each air system to the engineer. The report shall indicate the completion of testing and compliance with testing specification.
  - b. All duct testing reports shall be included in the final close out documents.

### 3.9 DUCT SYSTEM PROTECTION

- A. Provide temporary closures at the ends of ducts which are not connected to equipment or air distribution devices at time of ductwork installation; provide temporary closure of polyethylene film or other covering which will prevent entrance of dust and debris until time connections are to be completed.
- B. Provide temporary construction filters on air handling equipment and/or return air ductwork during construction to protect ductwork and equipment from dust.
- C. Any ductwork stored on site with observable dirt or debris inside shall be cleaned by a third party.
- D. If the air handling system has been operated without temporary construction filters or if the integrity of the temporary closures has been compromised, the contractor shall have the duct system cleaned per the following section.

### 3.10 DUCT SYSTEM CLEANING

- A. For renovation projects and HVAC retrofit applications wherein existing duct systems are scheduled to be re-used, or where required by the Duct System Protection section above, the contractor shall have the existing duct systems cleaned in accordance with the current published standards of ASHRAE, NADCA ACR and as indicated below.
- B. Duct system cleaning method used shall incorporate the use of vacuum collection devices that are operated continuously during cleaning. A vacuum device shall be connected to the downstream end of the section being cleaned through a predetermined opening. The vacuum collection device must be of sufficient power to render all areas being cleaned under negative pressure, such that containment of debris and the protection of the indoor environment is assured.
- C. All vacuum devices exhausting air inside the building shall be equipped with HEPA filters (minimum efficiency), including hand-held vacuums and wet-vacuums.
- D. All vacuum devices exhausting air outside the facility shall be equipped with Particulate Collection including adequate filtration to contain debris removed from the HVAC system. Such devices shall exhaust in a manner that will not allow contaminants to re-enter the facility. Release of debris outdoors must not violate any outdoor environmental standards, codes or regulations.
- E. Fibrous glass thermal or acoustical insulation elements present in any equipment or ductwork shall be thoroughly cleaned with HEPA vacuuming equipment, while the HVAC system is under constant negative pressure, and not permitted to get wet in accordance with applicable NADCA and NAIMA standards and recommendations.
- F. Duct cleaning method used shall not damage the integrity of the ductwork, nor damage porous surface materials such as liners inside the ductwork or system components.
- G. Replace the fiberglass material if there is any evidence of damage, deterioration, delamination, friable material, mold or fungus growth, or moisture such that fibrous glass materials cannot be restored by cleaning or resurfacing with an acceptable insulation repair coating.

- H. Clean external surfaces of foreign substances which might cause corrosive deterioration of metal or, where ductwork is to be painted, might interfere with painting or cause paint deterioration.
- I. Strip protective paper from stainless ductwork surfaces, and repair finish wherever it has been damaged.
- J. Cleaning Report: Contractor shall provide a report to the Owner indicating the completion of duct cleaning per specification and areas of the duct system found to be damaged and/or in need of repair.

### 3.11 DUCT JOINTS AND SEAMS

- A. All ductwork shall be constructed to Seal Class A, as referenced in SMACNA (DCS).
- B. All non-welded joints and seams shall be sealed. This includes but is not limited to:
  - 1. Transverse joints.
  - 2. Longitudinal seams.
  - 3. Duct wall penetrations.
  - 4. Spin-ins, taps, and other branch connections.
  - 5. Access doors, access panels, and duct connections to equipment.
- C. Openings for rotating shafts shall be sealed with bushings.

END OF SECTION





SECTION 23 33 00  
DUCTWORK ACCESSORIES

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Volume control dampers.
- B. Shutoff Dampers.
- C. Round Duct Taps.
- D. Conical Duct Taps.
- E. Fire dampers.
- F. Combination fire and smoke dampers.
- G. Back draft dampers.
- H. Air turning devices.
- I. Flexible duct connections.
- J. Duct access doors.
- K. Duct test holes.

1.2 RELATED WORK

- A. Section 23 02 00 - Basic Materials and Methods for HVAC
- B. Section 23 05 48 - Vibration and Seismic Controls for HVAC Piping and Equipment
- C. Section 23 31 13 - Metal Ductwork

1.3 REFERENCES

- A. AMCA 500-D - Laboratory Methods of Testing Dampers for Rating; 2018.
- B. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- C. ICC (IECC) - International Energy Conservation Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.
- E. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.
- F. UL 33 - Safety Heat Responsive Links for Fire-Protection Service; Current Edition, Including All Revisions.

- G. UL 555 - Standard for Fire Dampers; Current Edition, Including All Revisions.
- H. UL 555S - Standard for Smoke Dampers; Current Edition, Including All Revisions.

#### 1.4 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Division One.
- B. Provide shop drawings for shop fabricated assemblies indicated, including volume control dampers duct access doors duct test holes. Provide product data for hardware used.
- C. Submit manufacturer's installation instructions under provisions of Division 1, for fire dampers and combination fire and smoke dampers.

### PART 2 - PRODUCTS

#### 2.1 VOLUME CONTROL DAMPERS

- A. Fabricate in accordance with SMACNA (DCS), and as indicated.
- B. Fabricate splitter dampers of material same gauge as duct to 24 inches size in either direction, and two gauges heavier for sizes over 24 inches.
- C. Fabricate splitter dampers of double thickness sheet metal to streamline shape. Secure blade with continuous hinge or rod. Operate with minimum 1/2 inch diameter rod in self aligning, universal joint, action flanged bushing, with set screw.
- D. Fabricate single blade dampers for duct sizes to 9-1/2 x 24 inch.
- E. Fabricate multi-blade damper of opposed blade pattern with maximum blade sizes 12 x 72 inch.
  - 1. Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.
  - 2. On outside air, return air, and all other dampers required to be low leakage type, provide galvanized blades and frames, seven inches wide maximum, with replaceable vinyl, EPDM, silicone rubber seals on blade edges and stainless steel side seals. Provide blades in a double sheet corrugated type construction for extra strength. Provide hat channel shape frames for strength and blade linkage enclosure to keep linkage out of the air stream. Construction leakage not to exceed 1/2%, based on 2,000 fpm and 4 inch static pressure.
- F. Except in round ductwork 12 inches and smaller, provide end bearings. On multiple blade dampers, provide oil-impregnated nylon or sintered bronze bearings.
- G. Provide locking, indicating quadrant regulators on single and multi-blade dampers. Where rod lengths exceed 30 inches provide regulator at both ends.
- H. On insulated ducts mount quadrant regulators on stand-off mounting brackets, bases, or adapters.

#### 2.2 SHUTOFF DAMPERS

- A. Fabricate in accordance with SMACNA (DCS), and as indicated.
- B. Provide Class I multi-blade damper of parallel blade pattern for all ductwork systems which penetrate the building thermal envelope in accordance with ICC (IECC) and ASHRAE Std 90.1 I-P.
  - 1. Damper shall be constructed of one-piece 16 ga. roll-formed galvanized steel hat-shaped channel frame. Blades shall be 14 ga. roll-formed galvanized steel, airfoil type. Blade edge seals shall be neoprene gaskets mechanically locked to blade edge. Bearings shall be 304 stainless steel, oil-impregnated and self-lubricating sleeve type, turning in extruded holes in damper frame.

- C. Shutoff dampers shall have an air leakage rate not greater than 4 cfm/ft<sup>2</sup> of damper surface area at 1.0 in.w.g. and shall be labeled by an approved agency when tested in accordance with AMCA 500-D for such purpose.

### 2.3 ROUND DUCT TAPS

- A. Taps to trunk duct for round flexible duct shall be spin-in fitting with locking quadrant butterfly damper, model no. FLD-B03 by Flexmaster or approved equal.

### 2.4 CONICAL DUCT TAPS

- A. Taps to trunk duct for primary air inlet to all VAV terminal units shall be conical fitting, model no. CB by Flexmaster or approved equal.

### 2.5 ACCEPTABLE MANUFACTURERS - FIRE DAMPERS AND COMBINATION FIRE AND SMOKE DAMPERS

- A. Greenheck.
- B. Louvers and Dampers Inc.
- C. Ruskin.
- D. Nailor Industries.
- E. Pottorff.

### 2.6 FIRE DAMPERS

- A. Fabricate in accordance with NFPA 90A and UL 555, and as indicated.
- B. Provide curtain type dampers of galvanized steel with interlocking blades. Provide stainless steel closure springs and latches for horizontal installations. Configure with blades out of air stream. Provide factory sleeve for each damper.
- C. Fabricate multiple blade fire dampers per UL with 16 gauge minimum galvanized steel frame and blades, oil-impregnated bronze or stainless steel sleeve bearings and plated steel axles, 1/8 x 1/2 inch plated steel concealed linkage, stainless steel closure spring, blade stops, and lock.
- D. Fusible links, UL 33, shall separate at 165 degrees F. Provide adjustable link straps for combination fire/balancing dampers.

### 2.7 COMBINATION FIRE AND SMOKE DAMPERS

- A. Fabricate in accordance with NFPA 90A, UL 555, UL 555S and as indicated.
- B. Provide factory sleeve for each damper. Install damper operator on exterior of sleeve and link to damper operating shaft.
- C. Fabricate with multiple blades with 16 gauge galvanized steel frame and blades, oil-impregnated bronze or stainless steel sleeve bearings and plated steel axles, stainless steel jamb seals, 1/8 x 1/2 inch plated steel concealed linkage, stainless steel closure spring, blade stops, and lock, and 1/2 inch actuator shaft.
  1. Operators shall be spring return electric type suitable to operate on 120 VAC, 60 cycle.
  2. Operators shall be UL listed and labeled.

## 2.8 SMOKE DAMPERS

- A. Fabricate in accordance with NFPA 90A and UL 555, UL 555S and as indicated.
- B. Motorized Smoke Dampers: multi-blade type, normally open with power on, close automatically when power is interrupted, UL-listed and labeled damper and damper operator.

## 2.9 ACCEPTABLE MANUFACTURERS - BACKDRAFT DAMPERS

- A. Greenheck.
- B. American Warming and Vent.
- C. Louvers and Dampers Inc.
- D. Ruskin.
- E. Pottorff.
- F. Substitutions: Under provisions of Division One.

## 2.10 BACKDRAFT DAMPERS

- A. Gravity back draft dampers, size 18 x 18 inches or smaller, furnished with air moving equipment, may be air moving equipment manufacturers standard construction.
- B. Fabricate multi-blade, parallel action gravity balanced back draft dampers of 16 gauge galvanized steel, or extruded aluminum, with blades of maximum 6 inch width, with felt or flexible vinyl sealed edges, linked together in rattle-free manner with 90 degree stop, steel ball bearings, and plated steel pivot pin; adjustment device to permit setting for varying differential static pressure.
- C. Gravity backdraft dampers shall have an air leakage not greater than 20 cfm/ft<sup>2</sup> where not less than 24 inches in either dimension and 40 cfm/ft<sup>2</sup> where less than 24 inches in either dimension. The rate of air leakage shall be determined at 1.0 in.w.g. when tested in accordance with AMCA 500-D for such purpose.

## 2.11 ACCEPTABLE MANUFACTURERS - AIR TURNING DEVICES

- A. Young Regulator.
- B. Titus.
- C. Tuttle and Bailey.
- D. Substitutions: Under provisions of Division One.

## 2.12 AIR TURNING DEVICES

- A. On duct sizes less than 12 x 12, multi-blade device with blades aligned in short dimension; steel or aluminum construction; with individually adjustable blades, mounting straps.
- B. Multi-blade device with radius blades attached to pivoting frame and bracket, steel or aluminum construction, with worm drive mechanism with 18 inch long removable key operator.

2.13 ACCEPTABLE MANUFACTURERS - FLEXIBLE DUCT CONNECTIONS

- A. Metaledge.
- B. Ventglass.
- C. Substitutions: Under provisions of Division One.

2.14 FLEXIBLE DUCT CONNECTIONS TO AIR MOVING EQUIPMENT

- A. Fabricate in accordance with SMACNA (DCS) and as indicated.
- B. UL listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 20 oz. per sq. yd., approximately 6 inches wide, crimped into metal edging strip.

2.15 ACCEPTABLE MANUFACTURERS - DUCT ACCESS DOORS

- A. Greenheck.
- B. American Warming and Vent.
- C. Ruskin.
- D. Titus.
- E. Substitutions: Under provisions of Division One.

2.16 DUCT ACCESS DOORS

- A. Fabricate in accordance with SMACNA (DCS) and as indicated.
- B. Review locations prior to fabrication.
- C. Fabricate rigid and close-fitting doors of galvanized steel with sealing gaskets and quick fastening locking devices. For insulated ductwork, install minimum one inch thick insulation with sheet metal cover. Insulation shall be replaceable without field cutting or patching.
- D. Access doors smaller than 12 inches square may be secured with sash locks.
- E. Provide two hinges and two sash locks for sizes up to 18 inches square, three hinges and two compression latches with outside and inside handles for sizes up to 24 x 48 inches. Provide an additional hinge for larger sizes.
- F. Access doors with sheet metal screw fasteners are not acceptable.

2.17 DUCT TEST HOLES

- A. Cut or drill temporary test holes in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.
- B. Permanent test holes shall be factory fabricated, air tight flanged fittings with screw cap. Provide extended neck fittings to clear insulation.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install accessories in accordance with manufacturer's instructions.
- B. Balancing Dampers
  1. Provide at points on low pressure supply, return, and exhaust systems where branches are taken from larger ducts and as required for air balancing. Use splitter dampers only where indicated.
  2. All regulators mounted on externally insulated ductwork shall have 16 gauge elevated platforms at least 1/8 inch higher than the thickness of the insulation. Damper shaft shall have Ventlock No. 607 bearing mounted on ductwork within elevated platform. If duct is inaccessible the operating handle shall be extended and the regulator installed on the face of the wall or ceiling. Where regulators are exposed in finished parts of the building, they shall be flush type, Ventlock No. 666. All regulators shall be manufactured by Ventlock, or approved equal.
  3. All dampers in lined ductwork shall have bushing to prevent damper damage to liner.
- C. Provide fire dampers at locations indicated, where ducts and outlets pass through fire rated components, and where required by authorities having jurisdiction. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.
- D. Demonstrate re-setting of fire dampers to authorities having jurisdiction and Owner's representative.
- E. Provide gravity backdraft dampers or motorized shutoff dampers in accessible location nearest to exterior wall/roof penetrations and where indicated for all outdoor air intake and exhaust systems to automatically shut when the associated systems or spaces served are not in use.
- F. Provide flexible duct connections immediately adjacent to equipment in ducts associated with fans and motorized equipment. Provide at least one inch slack at all flexible duct connections.
- G. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, and elsewhere as indicated. Provide minimum 8 x 8 inch size for hand access, 18 x 18 inch size for shoulder access, and as indicated.
- H. Provide duct access doors for inspection and maintenance of all fire dampers, smoke dampers, and combination fire/smoke dampers. Provide minimum 12 x 12 inch size access opening where duct size permits. All duct sizes that cannot accommodate a minimum 12 x 12 inch access opening shall be provided with a removable duct section to permit inspection and maintenance of the damper and its operating parts. Removable duct sections shall match the pressure class of the associated duct system, maintain 100 percent of the duct free area, and utilize gaskets and clamp type draw latches to allow removal and reinstallation without the use of tools.
- I. Provide duct test holes where indicated and required for testing and balancing purposes.

END OF SECTION

SECTION 23 41 00

AIR FILTERS

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.
- B. Section 23 02 00 - Basic Materials and Methods for HVAC are included as a part of this Section as though written in full in this document.

1.2 SCOPE

- A. Scope of the Work shall include the furnishing and complete installation of the equipment covered by this Section, with all auxiliaries, ready for owner's use.

1.3 REFERENCES

- A. ASHRAE Std 52.2 - Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size; 2017, with Addendum (2022).
- B. ASHRAE Std 62.1 - Ventilation for Acceptable Indoor Air Quality; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

PART 2 - PRODUCTS

2.1 FILTERS

- A. Air filters shall be high efficiency ASHRAE pleated panels consisting of synthetic media, welded wire media support grid, and beverage board enclosing frame, AAF PREpleat M13, 2-inch thick or approved equal.
- B. APPROVED MANUFACTURERS
  - 1. American Air Filter.
  - 2. Camfil.
  - 3. Airguard Industries, Inc.
  - 4. Cambridge.
  - 5. Filtration Group

2.2 LOW VELOCITY FILTER SECTION

- A. Filters shall be of the throwaway cartridge type in 2-inch frames. When installing multiple filters into slide-in frames tape adjacent filters together with duct tape to prevent bypassing of air around the filter. Media shall be rated at 500 feet per minute.
- B. Filtering media shall be formed of non-woven reinforced synthetic type filtering media bonded to 96% open area media support grid folded into a non-creased radial pleat design. The filter pack shall be bonded to the enclosing frame to prevent air bypass. Minimum Efficiency Reporting Value of MERV 13 when evaluated under the guidelines of ASHRAE Std 52.2. Initial resistance shall not exceed 0.30 inches water gauge at 500 fpm face velocity.



PART 3 - EXECUTION

3.1 INSTALLATION

- A. Filters shall be provided upstream of all cooling coils or other devices with wetted surfaces through which air is supplied to occupiable spaces per ASHRAE Std 62.1.
- B. Install differential pressure switch to activate "Filter Dirty" light when pressure difference across filters reaches 0.5 inches w.g. (adjustable). Locate "filter dirty" lights in mechanical rooms with identifying label.
- C. Refer to Section 23 02 00 for additional filter information.

END OF SECTION

SECTION 23 62 13

AIR COOLED CONDENSING UNITS

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.
- B. Section 23 02 00 - Basic Materials and Methods for HVAC is included as a part of this Section as though written in full in this document.

1.2 SCOPE

- A. Scope of the Work shall include the furnishing and complete installation of the equipment covered by this Section, with all auxiliaries, ready for Owner's use.

1.3 REFERENCES

- A. AHRI 210/240 - Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment; 2023.
- B. AHRI 340/360 (I-P) - Standard for Performance Rating of Commercial and Industrial Unitary Air-Conditioning and Heat Pump Equipment; 2022.
- C. ASHRAE Std 15 - Safety Standard for Refrigeration Systems; 2022, with Addendum (2024).
- D. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. ICC (IECC) - International Energy Conservation Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.4 QUALITY ASSURANCE

- A. Unit shall be factory tested, shall be UL-labeled and rated in accordance with AHRI 340/360 (I-P).
- B. Unit construction shall comply with ASHRAE Std 15.
- C. Unit wiring shall comply with NFPA 70.
- D. Unit shall meet or exceed minimum efficiency requirements in accordance with ICC (IECC) and ASHRAE Std 90.1 I-P.

1.5 SUBMITTALS

- A. Submit Shop drawings and product data under provisions of Division One.
- B. Shop drawings shall indicate components, dimensions, weights, required service clearances, and location and sizes of field connections. Indicate equipment, piping and connections and accessories required for complete system.

- C. Product data shall include rated capacities, weights, specialties and accessories, electrical requirements and wiring diagrams.
- D. Submit manufacturer's installation instructions.
- E. For roof mounted units provide delegated design submittal for equipment anchorage as required in specification 23 02 00 – Part 1.

#### 1.6 OPERATION AND MAINTENANCE DATA

- A. Submit operation data.
- B. Include start-up instructions, maintenance data, controls, and accessories. Include trouble-shooting guide.
- C. Submit maintenance data.

#### 1.7 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect and handle products to site. Comply with manufacturer's installation instructions for rigging, unloading and transporting units.
- B. Accept products on site and inspect for damage.
- C. Protect units from physical damage. Factory shipping covers and skids shall be kept in place until installation. Store in a clean dry place and protect from weather and construction traffic.

#### 1.8 WARRANTY

- A. Provide the entire condensing unit with parts and labor warranty by the equipment manufacturer for one year from start-up or 18 months from date received on site.
- B. Provide all components of the refrigeration circuit with parts and labor warranty by the equipment manufacturer for five years.

#### 1.9 OPERATIONS PERSONNEL TRAINING

- A. Provide a training session for the owner's operations personnel. Training session shall be performed by a qualified person who is knowledgeable in the subject system/equipment. Submit a training agenda two (2) weeks prior to the proposed training session for review and approval. Training session shall include at the minimum:
  - 1. Purpose of equipment.
  - 2. Principle of how the equipment works.
  - 3. Important parts and assemblies.
  - 4. How the equipment achieves its purpose and necessary operating conditions.
  - 5. Most likely failure modes, causes and corrections.
  - 6. On site demonstration.

### PART 2 - PRODUCTS

#### 2.1 AIR-COOLED CONDENSING UNITS

- A. Air-cooled condensing unit shall be designed for use with split system having a remote direct-expansion (DX) cooling coil mounted in evaporator fan unit and rated in accordance with either AHRI 210/240 or AHRI 340/360 (I-P). Capacity shall be as called for on the Drawings when matched to the appropriate evaporator coil.

- B. Condensing unit shall consist of high-efficiency hermetic compressor, air-cooled condenser with quiet fan, factory wired controls, R410A or R407C refrigerant and refrigeration circuit and valves.
- C. Cabinet shall be heavy-gauge galvanized steel with bonding primer and baked-enamel finish coat. The entire cabinet shall be protected from rust.
- D. Compressor shall be protected from excessive current and temperatures and shall be provided with a thermostatically controlled crankcase heater to operate only when needed for protection of the compressor. Compressor shall be mounted on resilient rubber isolators. Compressor shall be located in compartment isolated from condenser fan and coil. Provide a high-capacity dryer in the system to remove moisture and dirt.
- E. Condenser fan shall be directly connected to a weather-protected, quiet, high-efficiency motor. Fan guard shall be provided and shall be protected from rust by PVC finish. Condenser coil shall be aluminum fin with copper tube.
- F. Connections for refrigerant suction and liquid lines shall be extended outside the cabinet and provided with service valves with gauge connections.
- G. Power connections shall be made to the connectors located inside the electrical connection box.
- H. Standard operating and safety controls shall include high-pressure switch, low pressure switch, compressor overload service, and solid-state timed-off control.

## 2.2 AUXILIARY EQUIPMENT

- A. Auxiliary equipment shall consist of refrigerant lines prepared for the unit involved. These lines shall be cleaned, dried, and pressurized at the factory.
- B. Low ambient kit to allow operation at outside temperature below 35 deg. F (2 deg. C) shall be provided.
- C. Expansion valve shall be provided with the evaporator coil.
- D. Provide thermostat to match the requirements of the job. Thermostat shall provide subbase with Heat-Cool-Off and Fan On-Auto switch. See section on controls for other related requirements.
- E. Provide polyethylene structural base designed for that service, and intended to support the unit and eliminate vibration transmission.
- F. Provide hard-start kit with unit.
- G. Provide guards for condenser coils.

## 2.3 ACCEPTABLE MANUFACTURERS

- A. Lennox
- B. Carrier
- C. York
- D. Trane
- E. Aaon
- F. Daikin

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. All HVAC equipment shall be installed as per manufacturer's printed installation instructions.
- B. Refer to specification 23 02 00 – Part 1 for anchorage requirements for roof mounted equipment.
- C. All items required for a complete and proper installation are not necessarily indicated on the Drawings or in the Specifications. Provide all items required as per manufacturer's requirements.
- D. Install the condensing unit on proper foundation as shown on the Drawings, and in location that will not restrict the air entry or discharge from the unit.
- E. Install refrigerant lines as recommended by the manufacturer, taking care not to lose the refrigerant charge contained in the lines, or allow air to enter the lines or equipment. Locate the lines in such a way as to not obstruct access to the condensing unit or other equipment. Lines located underground or under concrete shall be installed in a PVC sleeve for protection.
- F. Provide electrical connections as required by the applicable codes. Provide control wiring required. All power wiring and control wiring shall be in conduit and located so as not to obstruct access to the unit or other equipment.

### 3.2 TESTING

- A. Operate the condensing unit and the system to assure that unit is operating properly and without excessive noise and vibration.
- B. Read and record the power draw and the refrigeration suction and liquid pressures as required by Section 23 05 93 - Testing, Adjusting, And Balancing.

END OF SECTION

SECTION 23 73 13

MODULAR INDOOR CENTRAL STATION AIR HANDLING UNITS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Indoor central station air handling unit.

1.2 RELATED SECTIONS

- A. Section 23 02 00 - Basic Materials and Methods for HVAC
- B. Section 230516
- C. Section 23 05 13 - Common Motor Requirements for HVAC Equipment
- D. Section 230526
- E. Section 23 05 48 - Vibration and Seismic Controls for HVAC Piping and Equipment
- F. Section 23 07 13 - Duct Insulation
- G. Section 23 31 13 - Metal Ductwork
- H. Section 23 33 00 - Ductwork Accessories
- I. Section 233400
- J. Section 23 41 00 - Air Filters

1.3 REFERENCES

- A. AHRI 260 - Sound Rating of Ducted Air Moving and Conditioning Equipment; 2011.
- B. AHRI 410 - Forced-Circulation Air-Cooling and Air-Heating Coils; 2001, with Addenda (2011).
- C. AHRI 430 (I-P) - Performance Rating of Central Station Air-handling Unit Supply Fans; 2020.
- D. AMCA 210 - Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating; 2016, with Errata (2018).
- E. AMCA 300 - Reverberation Room Methods of Sound Testing of Fans; 2024.
- F. ASHRAE Std 111 - Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems; 2008, with Errata (2019).
- G. ASHRAE Std 15 - Safety Standard for Refrigeration Systems; 2022, with Addendum (2024).
- H. ASHRAE Std 62.1 - Ventilation for Acceptable Indoor Air Quality; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

- J. ICC (IECC) - International Energy Conservation Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- K. NEMA MG 1 - Motors and Generators; 2021.
- L. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- M. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.

#### 1.4 QUALITY ASSURANCE

- A. Unit performance shall be certified in accordance with AHRI 430 (I-P) for central station air handling units.
- B. Coil performance shall be certified in accordance with AHRI 410.
- C. Direct-expansion coils shall be designed and tested in accordance with ASHRAE Std 15 Safety Code for Mechanical Refrigeration.
- D. Insulation and insulation adhesive shall comply with NFPA 90A requirements or flame spread and smoke generation.
- E. Unit shall be rated for sound performance in accordance with AHRI 260 and AMCA 300.
- F. Unit shall be provided to comply with the maximum allowable fan horsepower per ICC (IECC) and ASHRAE Std 90.1 I-P.

#### 1.5 GENERAL DESCRIPTION

- A. Indoor mounted, central station air handling unit designed to provide air to a conditioned space as required to meet specified performance requirements for ventilation, heating, cooling, filtration, and distribution. Unit shall be assembled for horizontal/vertical application and arranged to discharge conditioned air as shown on the drawings. Units shall be supplied by the specified manufacturer.

#### 1.6 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Division One.
- B. Shop drawings shall indicate assembly, unit dimensions, weight loading, required clearances, construction details, and field connection details.
- C. Product data shall indicate dimensions, weights, capacities, ratings, fan performance, motor electrical characteristics, and gauges and finishes of materials.
- D. Provide fan curves with specified operating point clearly plotted.
- E. Submit product data of filter media, filter performance data, filter assembly, and filter frames.
- F. Submit electrical requirements for power supply wiring including wiring diagrams for interlock and control wiring, clearly indicating factory installed and field installed wiring.
- G. Submit manufacturer's installation instructions under provisions of Division One.
- H. Submit operation and maintenance data under provisions of Section 23 02 00.

- I. Include instructions for lubrication, filter replacement, motor and drive replacement, spare parts lists, and wiring diagrams.

#### 1.7 WARRANTY

- A. The air handling unit manufacturer shall warrant parts and labor for a period of eighteen (18) months from date of shipment, or twelve (12) months from date of start-up, whichever occurs first.

#### 1.8 DELIVERY, STORAGE AND HANDLING

- A. Unit shall be stored and handled in accordance with the unit manufacturer's instructions.

#### 1.9 ENVIRONMENTAL REQUIREMENTS

- A. Do not operate units for any purpose, temporary or permanent, until ductwork is clean, filters are in place, and fan has been test-run under observation.

#### 1.10 OPERATIONS PERSONNEL TRAINING

- A. Provide a training session for the owner's operations personnel. Training session shall be performed by a qualified person who is knowledgeable in the subject system/equipment. Submit a training agenda two (2) weeks prior to the proposed training session for review and approval. Training session shall include at the minimum:
  1. Purpose of equipment.
  2. Principle of how the equipment works.
  3. Important parts and assemblies.
  4. How the equipment achieves its purpose and necessary operating conditions.
  5. Most likely failure modes, causes and corrections.
  6. On site demonstration.

### PART 2 - PRODUCTS

#### 2.1 ACCEPTABLE MANUFACTURERS

- A. Carrier
- B. Trane
- C. JCI
- D. Daikin
- E. Temtrol
- F. Custom Air Products

#### 2.2 GENERAL DESCRIPTION

- A. Unit shall be factory supplied, central station air handler suitable for the capacities and configurations as shown on drawings. Unit may consist of a fan and coil section with a factory installed chilled water or direct-expansion coil, heating coil section, electric heat section, face and bypass section, angled filter section, access section, mixing box or combination filter-mixing box, return fan, diffuser, or air blender as indicated on the drawings.
- B. All sections, whether assembled into a unit or supplied as separate components, shall have mating flanges for bolted assembly. The flange shall extend around the complete perimeter of each section. The manufacturer shall supply bolts and sufficient closed cell gasket for full perimeter coverage.



## 2.3 CASING

- A. All unit sections shall be supplied with a formed galvanized steel perimeter base rail of at least 6 inches in height designed to support the weight and structural integrity of the unit. Condensate drain connection will not penetrate the base rail. If external isolators are not used, provide 6 inch minimum height housekeeping pads or sufficient overall height to provide p-trap with 1 inch greater than unit total static pressure.
- B. Unit panels for all sections shall be double wall construction and shall be constructed of minimum 18 gauge G90 mill galvanized steel. Casing panels shall be fully removable for easy access to the unit, and shall be secured to structural frame with aluminized or cadmium plated screws. Removal of panels must not affect the structural integrity of the unit. All panels shall have a minimum of 2-inch thick foam insulation (R-13). All panels shall be completely gasketed prior to shipping.
- C. Casing air leakage shall not exceed Leakage Class 6 per ASHRAE Std 111 at +/- 8" w.g. Specified air leakage shall be accomplished without the use of caulk. Total estimated air leakage shall be reported for each unit in CFM, as a percentage of supply air, and as an ASHRAE Std 111 Leakage Class in the submittal. Unit casing (wall/floor/roof panels and doors) shall be able to withstand up to 1.5 times design static pressure, or 8" w.g., whichever is less, and shall not exceed 0.0042" per inch of panel span (L/240). Floor panels shall be double-wall construction and designed to support a 300 lb. load during maintenance activities and shall deflect no more than 0.0042" per inch of panel span.
- D. Double wall hinged removable access doors with multiple handles shall be provided in the fan, coil, and filter sections on the drive side of the unit. Access doors must also be provided in all sections where the removal of sheet metal screws is required for unit access. Doors shall be of the same thickness and construction as the wall panels. A gasket shall be provided around the entire door perimeter. Access sections shall be installed where indicated on the drawings and shall be double walled hinged door.

## 2.4 FANS

- A. Units shall be provided with direct-driven, single-width, single-inlet (SWSI) airfoil plenum fans constructed per AMCA requirements for the duty specified. Class I fans are not acceptable. Fan wheels shall be aluminum construction and rated in accordance with and certified by AMCA 210. All fans shall be selected to deliver the specified airflow quantity at the specified operating Total Static Pressure and specified fan/motor speed. The fan shall be selected to operate at a system Total Static Pressure that does not exceed 90% of the specified fan's peak static pressure producing capability at the specified fan/motor speed. Fans shall be selected such that the operating speed at peak design airflow conditions is not greater than 25% above the associated motor synchronous speed. Fans driven by motors operated by variable frequency drive shall not exceed the maximum fan RPM allowed by the manufacturer under a bypass condition. Each fan/motor assembly shall include a minimum 14 gauge spun steel fan inlet funnel, and a G90 galvanized steel motor support plate and fan base with 2" spring type vibration isolation. Provide horizontal spring type thrust restraints between the unit casing and each fan/motor assembly.
- B. Units delivering supply airflow rates of significant magnitude shall be equipped with multiple supply fans in an array configuration. Refer to scheduled values to verify motor quantity per unit. Where multiple fans are provided, backdraft dampers shall be mounted upstream of each fan for isolation and a single source power motor control panel shall be factory installed. All fans shall be factory-wired to motor control panel which shall consist of individual motor overload relays and on-off disconnect switch for power isolation.
- C. All belt-driven air handling equipment shall have two drive belts on all motors.

## 2.5 MOTORS

- A. All motors shall be premium efficiency, totally enclosed fan-cooled (TEFC), selected at the specified operating voltage, RPM, and efficiency as specified or as scheduled elsewhere. Motors shall meet the requirements of NEMA MG 1 Part 30 and 31, section 4.4.2. Motor HP shall not exceed the scheduled HP as indicated in the AHU equipment schedules.

- B. All fan motors shall be operated from variable frequency drives. Variable frequency drives shall be furnished, installed, and wired by the installing Contractor. Reference Section 230526 for additional VFD requirements. A factory inverter drive balance shall be performed on all air handling units to identify resonant frequencies. A report of the results shall be provided for unit startup purposes.
- C. All motors operated by variable frequency drive shall be equipped with a maintenance free, conductive microfiber, shaft grounding ring with a minimum of two rows of circumferential microfibers to discharge electrical shaft currents within the motor and/or its bearings.

## 2.6 COILS

- A. All coils shall be tested at 300 psig air pressure, under water.
- B. All coils shall be installed on tracks for easy removal from the air handling unit. Units that require disassembly of the unit for coil removal are not acceptable.
- C. Coils shall be aluminum plate fin type with belled collars and shall be bonded to 1/2 inch or 5/8 inch OD copper tubes by mechanical expansion. Coils shall have headers with steel MPT connections. Working pressure shall be 250 psig at 300°F.
- D. All coil segments shall be furnished with 304 stainless steel coil casings and 304 stainless steel coil supports.
- E. Coils shall be drainable and have non-trapping circuits. Headers shall have drain and vent connections extended to the outside of the unit casing and be stainless steel. Supply and return headers shall be clearly labeled on the outside of the unit. Provide grommets at all pipe penetrations through cabinet.
- F. Main drain pan shall be double wall stainless steel with minimum 2 inch insulation, sloped toward drain fitting, with integral elbow for side discharge and FPT connection, and shall comply with ASHRAE Std 62.1. A maximum of one drain shall be supplied for each cooling coil section which shall extend at least 18" downstream of the coil. The unit design shall not require a drain pan in any downstream section to contain the coil condensate. Moisture shall not carry over past the coil. Moisture eliminators are not acceptable for moisture carryover prevention.
- G. Direct expansion coils shall be furnished with a brass distributor with solder type connections. Suction and discharge connections shall be on the same end regardless of rows deep. Coils shall have intertwined circuits for equal operation on each circuit. Provide the number of distributors equal to the amount of refrigerant circuits to the associated condensing unit. Direct expansion coil shall be selected to match the saturated suction temperature and capacity of the associated condensing unit.
- H. Maximum face velocity across cooling coils shall be 500 FPM, unless noted otherwise on equipment schedule.
- I. Coils in series shall have a minimum of 14 inch access section between coil casings.
- J. In units larger than 10,000 cfm, coils shall be removable through a service panel without disassembly of the unit.

## 2.7 FILTERS

- A. Filter section shall accept 2 inch or 4 inch angled filters of standard sizes as indicated on drawings and shall be designed and constructed to house the type of filter specified. Section shall include side access slide rails.
- B. A magnahelic differential pressure gauge shall be factory installed and flush mounted on drive side to measure the pressure drop across the filter.

- C. A dirty filter allowance of 0.50" w.g. shall be incorporated into the total static pressure calculation of each air handling unit filter section.
- D. Reference Section 23 41 00 - Air Filters for additional requirements.

## 2.8 MIXING BOXES AND INLET PLENUMS

- A. Mixing boxes and inlet plenums shall be factory installed unless otherwise indicated on the Mechanical Drawings.
- B. Field fabricated mixing boxes and sheet metal plenums shall be provided by the installing Contractor where indicated on the Mechanical Drawings. When field fabricated mixing boxes are provided, the installing Contractor and EMCS Contractor shall provide outside air and return air motorized control dampers and actuators.
- C. Factory installed mixing boxes, economizer, and/or inlet plenums shall have factory mounted motorized control dampers. Dampers shall be opposed blades and interconnecting outside air, return air, and mixed air (if applicable) type. Installing EMCS Contractor shall furnish damper actuators. All factory installed mixing boxes shall have a double wall hinged access door on the drive side of the unit.

## 2.9 ACCESSORIES

- A. All damper blades shall be galvanized steel, double skin airfoil type, housed in a galvanized steel frame and mechanically fastened to a hex axle rod rotating in stainless steel bearings. Dampers shall be sectionalized to limit blade length to no more than 48 inches so as to minimize blade warpage. Blade seals are required to assure tight closure. The damper shall be rated for a maximum leakage rate of 1 percent of nominal airflow at 1 inch w.g.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. If floor mounted air handling units are furnished with internal vibration isolation option, provide 2" thick Amber/Booth type NRC ribbed neoprene pads or approved equal to address high frequency breakout and provide additional unit elevation with overall sufficient height to provide p-trap with one inch greater than the unit total static pressure. Ribbed neoprene pads shall be located in accordance with the air handling unit manufacturer's recommendations. Condensate drain connection shall not penetrate the base air handling unit's rail.
- B. Install in accordance with manufacturer's instructions.
- C. All items required for a complete and proper installation are not necessarily indicated on the plans or in the specifications. Provide all items required as per manufacturer's requirements.
- D. Make electrical connections, taking care that these do not block access to any part of the equipment requiring service.
- E. Unit wiring shall comply with NFPA 70 and all applicable UL standards.
- F. Connect full size condensate drain pipe to air handling unit and extend to nearest drain. Pipe shall be schedule 40 galvanized steel with malleable iron screwed fittings.
- G. Unit installation shall comply with NFPA 90A requirements.
- H. System Startup Requirements: The installing Contractor service technician shall startup all air handling units. Technician shall at a minimum perform the following steps for each unit:
  - 1. Energize the unit disconnect switch.

2. Verify correct voltage, phases and cycles.
  3. Energize fan motor and verify correct direction of rotation.
  4. Re-check damper operation: verify that unit cannot and will not operate with all dampers in the closed position.
  5. Energize fan motors and verify that motor FLA is within manufacturer's tolerance of nameplate FLA for each phase.
  6. Program unit VFD to skip or lockout resonant frequencies that were identified by the manufacturer's factory inverter drive balance to prevent the VFD from continuously operating at these frequencies.
- I. Do not operate units for any purpose, temporary or permanent, until ductwork is clean, filters are in place, bearings lubricated, and fans have been test run under observation.
- J. The installing Contractor shall comply with manufacturer's start-up requirements to ensure safe and correct operation.

END OF SECTION



SECTION 26 02 00

BASIC MATERIALS AND METHODS FOR ELECTRICAL

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. The requirements of the General Conditions and Supplementary Conditions apply to all Work herein.
- B. The Contract Drawings indicate the extent and general arrangement of the systems. If any departure from the Contract Drawings are deemed necessary by the Contractor, details of such departures and the reasons therefore, shall be submitted to the Architect for approval as soon as practicable. No such departures shall be made without the prior written approval of the Architect.

1.2 SCOPE OF WORK

- A. The Work included under this Contract consists of the furnishing and installation of all equipment and material necessary and required to form the complete and functioning systems in all of its various phases, all as shown on the accompanying Drawings and/or described in these Specifications. The contractor shall review all pertinent drawings, including those of other contracts prior to commencement of Work.
- B. This Division requires the furnishing and installing of all items Specified herein, indicated on the Drawings or reasonably inferred as necessary for safe and proper operation; including every article, device or accessory (whether or not specifically called for by item) reasonably necessary to facilitate each system's functioning as indicated by the design and the equipment specified. Elements of the work include, but are not limited to, materials, labor, supervision, transportation, storage, equipment, utilities, all required permits, licenses and inspections. All work performed under this Section shall be in accordance with the Project Manual, Drawings and Specifications and is subject to the terms and conditions of the Contract.
- C. The approximate locations of Electrical items are indicated on the Drawings. These Drawings are not intended to give complete and accurate details in regard to location of outlets, apparatus, etc. Exact locations are to be determined by actual measurements at the building, and will in all cases be subject to the Review of the Owner or Engineer, who reserves the right to make any reasonable changes in the locations indicated without additional cost to the Owner.
- D. Items specifically mentioned in the Specifications but not shown on the Drawings and/or items shown on Drawings but not specifically mentioned in the Specifications shall be installed by the Contractor under the appropriate section of work as if they were both specified and shown.
- E. All discrepancies within the Contract Documents discrepancies between the Contract Documents and actual job-site conditions shall be reported to the Owner or Engineer so that they will be resolved prior to the bidding, where this cannot be done at least 7 working days prior to bid; the greater or more costly of the discrepancy shall be bid. All labor and materials required to perform the work described shall be included as part of this Contract.
- F. It is the intention of this Section of the Specifications to outline minimum requirements to furnish the Owner with a turn-key and fully operating system in cooperation with other trades.
- G. It is the intent of the above "Scope" to give the Contractor a general outline of the extent of the Work involved; however, it is not intended to include each and every item required for the Work. Anything omitted from the "Scope" but shown on the Drawings, or specified later, or necessary for a complete and functioning electrical system shall be considered a part of the overall "Scope".
- H. The Contractor shall rough-in fixtures and equipment furnished by others from rough-in and placement drawings furnished by others. The Contractor shall make final connection to fixtures and equipment furnished by others.

- I. Contractor shall participate in the commissioning process; including but not limited to meeting attendance, completion of checklists and participation in functional testing.

### 1.3 RELATED SECTIONS

- A. General Conditions
- B. Supplementary Conditions
- C. Division One

### 1.4 COOPERATION WITH TRADES

- A. Cooperation with trades of adjacent, related, or affected materials or operations shall be considered a part of this work in order to affect timely and accurate placing of work and bring together in proper and correct sequence, the work of such trades.

### 1.5 REFERENCES

- A. National Electrical Code (NEC)
- B. American Society for Testing and Materials (ASTM)
- C. Underwriter's Laboratories, Inc. (UL)
- D. Insulated Cable Engineer's Association (ICEA).
- E. National Electrical Manufacturer's Association (NEMA).
- F. Institute of Electrical and Electronic's Engineers (IEEE).
- G. American National Standards Institute (ANSI).
- H. National Fire Protection Association (NFPA).
- I. International Energy Conservation Code (IECC).

### 1.6 COMPLETE FUNCTIONING OF WORK

- A. All work fairly implied as essential to the complete functioning of the electrical systems shown on the Drawings and Specifications shall be completed as part of the work of this Division unless specifically stated otherwise. It is the intention of the Drawings and Specifications to establish the types of the systems, but not set forth each item essential to the functioning of the system. In case of doubt as to the work intended, or in the event of amplification or clarification thereof, the Contractor shall call upon the Architect for supplementary instructions, Drawings, etc.
- B. Contractor shall review all pertinent Drawings and adjust his work to all conditions shown there on. Discrepancies between Plans, Specifications, and actual field conditions shall be brought to the prompt attention of the Architect.
  1. Approximate location of transformers, feeders, branch circuits, outlets, lighting and power panels, outlets for special systems, etc., are indicated on the Drawings. However, the Drawings, do not give complete and accurate detailed locations of such outlets, conduit runs, etc., and exact locations must be determined by actual field measurement. Such locations will, at all times, be subject to the approval of the Architect.

2. Communicate with the Architect and secure his approval of any outlet (light fixture, receptacle, switch, etc.) location about which there may be the least question. Outlets obviously placed in a location not suitable to the finished room or without specific approval, shall be removed and relocated when so directed by the Architect. Location of light fixtures shall be coordinated with reflected ceiling plans.
- C. Additional coordination with mechanical contractor may be required to allow adequate clearances of mechanical equipment, fixtures and associated appurtenances. Contractor to notify Architect and Engineer of unresolved clearances, conflicts or equipment locations.

#### 1.7 SCHEMATIC NATURE OF CONTRACT DOCUMENTS

- A. The contract documents are schematic in nature in that they are only to establish scope and a minimum level of quality. They are not to be used as actual working construction drawings. The actual working construction drawings shall be the approved shop drawings.

#### 1.8 CONTRACTOR'S QUALIFICATIONS

- A. An approved contractor for the work under this division shall be:
  1. A specialist in this field and have the personnel, experience, training, and skill, and the organization to provide a practical working system.
  2. Able to furnish evidence of having contracted for and installed not less than 3 systems of comparable size and type that have served their Owners satisfactorily for not less than 3 years.
  3. Perform work by persons qualified to produce workmanship of specified quality. Persons performing electrical work shall be required to be licensed. Onsite supervision, journeyman shall have minimum of journeyman license. Helpers, apprentices shall have minimum of apprentice license.

#### 1.9 DATE OF FINAL ACCEPTANCE

- A. The date of final acceptance shall be the date of owner occupancy, or the date all punch list items have been completed or final payment has been received. Refer to Division One for additional requirements.
- B. The date of final acceptance shall be documented in writing and signed by the architect, owner and contractor.

#### 1.10 DEFINITIONS AND SYMBOLS

- A. General Explanation: A substantial amount of construction and Specification language constitutes definitions for terms found in other Contract Documents, including Drawings which must be recognized as diagrammatic and schematic in nature and not completely descriptive of requirements indicated thereon. Certain terms used in Contract Documents are defined generally in this article, unless defined otherwise in Division 1.
- B. Definitions and explanations of this Section are not necessarily either complete or exclusive, but are general for work to the extent not stated more explicitly in another provision of the Contract Documents.
- C. Indicated: The term "Indicated" is a cross-reference to details, notes or schedules on the Drawings, to other paragraphs or schedules in the Specifications and to similar means of recording requirements in Contract Documents. Where such terms as "Shown", "Noted", "Scheduled", "Specified" and "Detailed" are used in lieu of "Indicated", it is for the purpose of helping the reader locate cross-reference material, and no limitation of location is intended except as specifically shown.
- D. Directed: Where not otherwise explained, terms such as "Directed", "Requested", "Accepted", and "Permitted" mean by the Architect or Engineer. However, no such implied meaning will be interpreted to extend the Architect's or Engineer's responsibility into the Contractor's area of construction supervision.



- E. Reviewed: Where used in conjunction with the Engineer's response to submittals, requests for information, applications, inquiries, reports and claims by the Contractor the meaning of the term "Reviewed" will be held to limitations of Architect's and Engineer's responsibilities and duties as specified in the General and Supplemental Conditions. In no case will "Reviewed" by Engineer be interpreted as a release of the Contractor from responsibility to fulfill the terms and requirements of the Contract Documents.
- F. Furnish: Except as otherwise defined in greater detail, the term "Furnish" is used to mean supply and deliver to the project site, ready for unloading, unpacking, assembly, installation, etc., as applicable in each instance.
- G. Install: Except as otherwise defined in greater detail, the term "Install" is used to describe operations at the project site including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protection, cleaning and similar operations, as applicable in each instance.
- H. Provide: Except as otherwise defined in greater detail, the term "Provide" is used to mean "Furnish and Install", complete and ready for intended use, as applicable in each instance.
- I. Installer: Entity (person or firm) engaged by the Contractor or its subcontractor or Sub-contractor for performance of a particular unit of work at the project site, including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protection, cleaning and similar operations, as applicable in each instance. It is a general requirement that such entities (Installers) be expert in the operations they are engaged to perform.
- J. Imperative Language: Used generally in Specifications. Except as otherwise indicated, requirements expressed imperatively are to be performed by the Contractor. For clarity of reading at certain locations, contrasting subjective language is used to describe responsibilities that must be fulfilled indirectly by the Contractor, or when so noted by other identified installers or entities.
- K. Minimum Quality/Quantity: In every instance, the quality level or quantity shown or specified is intended as minimum quality level or quantity of work to be performed or provided. Except as otherwise specifically indicated, the actual work may either comply exactly with that minimum (within specified tolerances), or may exceed that minimum within reasonable tolerance limits. In complying with requirements, indicated or scheduled numeric values are either minimums or maximums as noted or as appropriate for the context of the requirements. Refer instances of uncertainty to Owner or Engineer via a request for information (RFI) for decision before proceeding.
- L. Abbreviations and Symbols: The language of Specifications and other Contract Documents including Drawings is of an abbreviated type in certain instances, and implies words and meanings which will be appropriately interpreted. Actual word abbreviations of a self-explanatory nature have been included in text of Specifications and Drawings. Specific abbreviations and symbols have been established, principally for lengthy technical terminology and primarily in conjunction with coordination of Specification requirements with notations on Drawings and in Schedules. These are frequently defined in Section at first instance of use or on a Legend and Symbol Drawing. Trade and industry association names and titles of generally recognized industry standards are frequently abbreviated. Singular words will be interpreted as plural and plural words will be interpreted as singular where applicable and where full context of Contract Documents so indicate. Except as otherwise indicated, graphic symbols and abbreviations used on Drawings and in Specifications are those recognized in construction industry for indicated purposes. Where not otherwise noted symbols and abbreviations are defined by 1993 ASHRAE Fundamentals Handbook, chapter 34 "Abbreviations and Symbols", ASME and ASPE published standards.

#### 1.11 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to the project properly identified with names, model numbers, types, grades, compliance labels, and other information needed for identification.

- B. Deliver products to the project at such time as the project is ready to receive the equipment, pipe or duct properly protected from incidental damage and weather damage.
- C. Damaged equipment shall be promptly removed from the site and new, undamaged equipment shall be installed in its place promptly with no additional charge to the Owner.

#### 1.12 SUBMITTALS

- A. Coordinate with Division 01 for submittal timetable requirements, unless noted otherwise within thirty (30) days after the Contract is awarded. The Contractor shall submit an electronic copy of a complete set of shop drawings and complete data covering each item of equipment or material. The submittal of each item requiring a submittal must be received by the Architect or Engineer within the above thirty day period. The Architect or Engineer shall not be responsible for any delays or costs incurred due to excessive shop drawing review time for submittals received after the thirty (30) day time limit. The Architect and Engineer will retain a copy of all shop drawings for their files. All literature pertaining to items subject to Shop Drawing submittal shall be submitted at one time. Submittals shall be placed in one electronic file in PDF 8.0 format and bookmarked for individual specification sections. Individual electronic files of submittals for individual specifications shall not be permitted. Each submittal shall include the following items:
  - 1. A cover sheet with the names and addresses of the Project, Architect, MEP Engineer, General Contractor and the Subcontractor making the submittal. The cover sheet shall also contain the section number covering the item or items submitted and the item nomenclature or description.
  - 2. An index page with a listing of all data included in the Submittal.
  - 3. A list of variations page with a listing all variations, including unfurnished or additional required accessories, items or other features, between the submitted equipment and the specified equipment. If there are no variations, then this page shall state "NO VARIATIONS". Where variations affect the work of other Contractors, then the Contractor shall certify on this page that these variations have been fully coordinated with the affected Contractors and that all expenses associated with the variations will be paid by the submitting Contractor. This page will be signed by the submitting Contractor.
  - 4. Equipment information including manufacturer's name and designation, size, performance and capacity data as applicable. All applicable Listings, Labels, Approvals and Standards shall be clearly indicated.
  - 5. Dimensional data and scaled drawings as applicable to show that the submitted equipment will fit the space available with all required Code and maintenance clearances clearly indicated and labeled at a minimum scale of 1/4" = 1'-0", as required to demonstrate that the alternate or substituted product will fit in the space available.
  - 6. Identification of each item of material or equipment matching that indicated on the Drawings.
  - 7. Sufficient pictorial, descriptive and diagrammatic data on each item to show its conformance with the Drawings and Specifications. Any options or special requirements or accessories shall be so indicated. All applicable information shall be clearly indicated with arrows or another approved method.
  - 8. Additional information as required in other Sections of this Division.
  - 9. Certification by the General Contractor and Subcontractor that the material submitted is in accordance with the Drawings and Specifications, signed and dated in long hand. Submittals that do not comply with the above requirements shall be returned to the Contractor and shall be marked "REVISE AND RESUBMIT".
- B. Refer to Division 1 for additional information on shop drawings and submittals.
- C. Equipment and materials submittals and shop drawings will be reviewed for compliance with design concept only. It will be assumed that the submitting Contractor has verified that all items submitted can be installed in the space allotted. Review of shop drawings and submittals shall not be considered as a verification or guarantee of measurements or building conditions.
- D. Where shop drawings and submittals are marked "REVIEWED", the review of the submittal does not indicate that submittals have been checked in detail nor does it in any way relieve the Contractor from his responsibility to furnish material and perform work as required by the Contract Documents.

- E. Shop drawings shall be reviewed and returned to the Contractor with one of the following categories indicated:
  - 1. REVIEWED: Contractor need take no further submittal action, shall include this submittal in the O&M manual and may order the equipment submitted on.
  - 2. REVIEWED AS NOTED: Contractor shall submit a letter verifying that required exceptions to the submittal have been received and complied with including additional accessories or coordination action as noted, and shall include this submittal and compliance letter in the O&M manual. The contractor may order the equipment submitted on at the time of the returned submittal providing the Contractor complies with the exceptions noted.
  - 3. NOT APPROVED: Contractor shall resubmit new submittal on material, equipment or method of installation when the alternate or substitute is not approved, the Contractor will automatically be required to furnish the product, material or method named in the Specifications and/or drawings. Contractor shall not order equipment that is not approved. Repetitive requests for substitutions will not be considered.
  - 4. REVISE AND RESUBMIT: Contractor shall resubmit new submittal on material, equipment or method of installation when the alternate or substitute is marked revise and resubmit, the Contractor will automatically be required to furnish the product, material or method named in the Specifications and/or provide as noted on previous shop drawings. Contractor shall not order equipment marked revise and resubmit. Repetitive requests for substitutions will not be considered.
  - 5. CONTRACTOR'S CERTIFICATION REQUIRED: Contractor shall resubmit submittal on material, equipment or method of installation. The Contractor's stamp is required stating the submittal meets all conditions of the contract documents. The stamp shall be signed by the General Contractor. The submittal will not be reviewed if the stamp is not placed and signed on all shop drawings.
  - 6. MANUFACTURER NOT AS SPECIFIED: Contractor shall resubmit new submittal on material, equipment or method of installation when the alternate or substitute is marked manufacturer not as specified, the Contractor will automatically be required to furnish the product, material or method named in the specifications. Contractor shall not order equipment where submittal is marked manufacturer not as specified. Repetitive requests for substitutions will not be considered.
  
- F. Materials and equipment which are purchased or installed without shop drawing review shall be at the risk of the Contractor and the cost for removal and replacement of such materials and equipment and related work which is judged unsatisfactory by the Owner or Engineer for any reason shall be at the expense of the Contractor. The responsible Contractor shall remove the material and equipment noted above and replace with specified equipment or material at his own expense when directed in writing by the Architect or Engineer.
  
- G. Shop Drawing Submittals shall be complete and checked prior to submission to the Engineer for review.
  
- H. Furnish detailed shop drawings, descriptive literature, table of contents listing all items being submitted at the beginning of each submittal package, physical data and a specification critique for each section indicating "compliance" and/or "variations" for the following items:
  - 1. Lighting Fixtures
  - 2. Lighting Contactors
  - 3. Conduit and Fittings
  - 4. Wire
  
- I. Refer to each specification section for additional requirements.

#### 1.13 OPERATION AND MAINTENANCE MANUALS

- A. Prepare maintenance manuals in accordance with Division 1 and in addition to the requirements specified in Division 1, include the following information for equipment items:
  - 1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.
  - 2. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.

3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
4. Servicing instructions and lubrication charts and schedules.

#### 1.14 COORDINATION DRAWINGS

- A. Prepare coordination drawings to a scale of 1/4"=1'-0" or larger; detailing major elements, components, and systems of mechanical equipment and materials in relationship with other systems, installations, and building components. Indicate locations where space is limited for installation and access and where sequencing and coordination of installations are of importance to the efficient flow of the Work, including (but not necessarily limited to) the following:
  1. Indicate the proposed locations of pipe, duct, equipment, and other materials. Include the following:
    - a. Wall and type locations.
    - b. Clearances for installing and maintaining insulation.
    - c. Locations of light fixtures and sprinkler heads.
    - d. Clearances for servicing and maintaining equipment, including tube removal, filter removal, and space for equipment disassembly required for periodic maintenance.
    - e. Equipment connections and support details.
    - f. Exterior wall and foundation penetrations.
    - g. Routing of storm and sanitary sewer piping.
    - h. Fire-rated wall and floor penetrations.
    - i. Sizes and location of required concrete pads and bases.
    - j. Valve stem movement.
    - k. Structural floor, wall and roof opening sizes and details.
  2. Indicate scheduling, sequencing, movement, and positioning of large equipment into the building during construction.
  3. Prepare floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.
  4. Prepare reflected ceiling plans to coordinate and integrate installations, air distribution devices, light fixtures, communication systems components, and other ceiling-mounted items.
- B. This Contractor shall be responsible for coordination of all items that will affect the installation of the work of this Division. This coordination shall include, but not be limited to: voltage, ampacity, capacity, electrical and piping connections, space requirements, sequence of construction, building requirements and special conditions.
- C. By submitting shop drawings on the project, this Contractor is indicating that all necessary coordination has been completed and that the systems, products and equipment submitted can be installed in the building and will operate as specified and intended, in full coordination with all other Contractors and Subcontractors.

#### 1.15 RECORD DRAWINGS

- A. Prepare Record Documents in accordance with the requirements of Division 00 and Division 01, in addition to the requirements specified in Division 26.
- B. The Contractor shall maintain a separate set of clearly and legibly marked Record Drawings on the job site to record all changes and modifications, including, but not limited to the following: work details, alterations to meet site conditions, and changes made by "Change Order" notices. Mark the drawings with colored pencil(s). These shall be available for review by the Owner, Architect or Engineer during the entire construction stage.
- C. The Record Drawings shall be updated concurrently as construction progresses, and in no case less frequently than a daily basis. They shall indicate accurate dimensions for all buried or concealed work, precise locations of all concealed pipe or duct, locations of all concealed valves, controls and devices and any deviations from the work shown on the Construction Documents. All dimensions shall include at least two dimensions to permanent structure points.

- D. Engage the services of a Land Surveyor or Professional Engineer registered in the state in which the project is located as specified herein to record the locations and invert elevations of underground installations.
- E. If the Contractor does not keep an accurate set of Record Drawings, the pay request may be altered or delayed at the request of the Architect. Delivery of Record Documents is a condition of final acceptance. Record Drawings shall be furnished in addition to Shop Drawings.
- F. The Contractor shall submit an electronic copy of the record documents in PDF format and one (1) full size set of Record Drawing prints to the Architect or Engineer for review prior to scheduling the final inspection at the completion of the work. The drawings shall have the name(s) and seal(s) of the Engineer(s) removed or blanked out and shall be clearly marked and signed on each sheet as follows:

CERTIFIED RECORD DRAWINGS

DATE:

(NAME OF GENERAL CONTRACTOR)

BY: \_\_\_\_\_

(SIGNATURE)

(NAME OF SUBCONTRACTOR)

BY: \_\_\_\_\_

(SIGNATURE)

1.16 CERTIFICATIONS AND TEST REPORTS

- A. Submit a detailed schedule for completion and testing of each system indicating scheduled dates for completion of system installation and outlining tests to be performed and schedule date for each test. This detailed completion and test schedule shall be submittal at least 90 days before the projected Project completion date.
- B. Test result reporting forms shall be submitted for review no later than the date of the detailed schedule submitted.
- C. Submit 4 copies of all certifications and test reports to the Architect or Engineer for review adequately in advance of completion of the Work to allow for remedial action as required to correct deficiencies discovered in equipment and systems.
- D. Certifications and test reports to be submitted shall include, but not be limited to those items outlined in Section of Division 26.

#### 1.17 MAINTENANCE MANUALS

- A. Coordinate with Division 1 for maintenance manual requirements, unless noted otherwise bind together in "D ring type" binders by National model no. 79-883 or equal, binders shall be large enough to allow 1/4" of spare capacity. Three (3) sets of all approved shop drawing submittals, fabrication drawings, bulletins, maintenance instructions, operating instructions and parts exploded views and lists for each and every piece of equipment furnished under this Specification. All sections shall be typed and indexed into sections and ed for easy reference and shall utilize the individual specification section numbers shown in the Electrical Specifications as an organization guideline. Bulletins containing information about equipment that is not installed on the project shall be properly marked up or stripped and reassembled. All pertinent information required by the Owner for proper operation and maintenance of equipment supplied by Division 26 shall be clearly and legibly set forth in memoranda that shall, likewise, be bound with bulletins.
- B. Prepare maintenance manuals in accordance with Special Project Conditions, in addition to the requirements specified in Division 26, include the following information for equipment items:
  - 1. Identifying names, name tags designations and locations for all equipment.
  - 2. Fault Current calculations and Coordination Study.
  - 3. Reviewed shop drawing submittals with exceptions noted compliance letter.
  - 4. Fabrication drawings.
  - 5. Equipment and device bulletins and data sheets clearly highlighted to show equipment installed on the project and including performance curves and data as applicable, i.e., description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and model numbers of replacement parts.
  - 6. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
  - 7. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions, servicing instructions and lubrication charts and schedules.
  - 8. Equipment name plate data.
  - 9. Wiring diagrams.
  - 10. Exploded parts views and parts lists for all equipment and devices.
  - 11. Color coding charts for all painted equipment and conduit.
  - 12. Location and listing of all spare parts and special keys and tools furnished to the Owner.
  - 13. Furnish recommended lubrication schedule for all required lubrication points with listing of type and approximate amount of lubricant required.
- C. Refer to Division 1 for additional information on Operating and Maintenance Manuals.
- D. Operating and Maintenance Manuals shall be turned over to the Owner or Engineer a minimum of 14 working days prior to the beginning of the operator training period.

#### 1.18 OPERATOR TRAINING

- A. The Contractor shall furnish the services of factory trained specialists to instruct the Owner's operating personnel. The Owner's operator training shall include 12 hours of onsite training in three 4 hour shifts.
- B. Before proceeding with the instruction of Owner Personnel, prepare a typed outline in triplicate, listing the subjects that will be covered in this instruction, and submit the outline for review by the Owner. At the conclusion of the instruction period obtain the signature of each person being instructed on each copy of the reviewed outline to signify that he has a proper understanding of the operation and maintenance of the systems and resubmit the signed outlines.
- C. Refer to other Division 26 Sections for additional Operator Training requirements.

#### 1.19 SITE VISITATION

- A. Visit the site of the proposed construction in order to fully understand the facilities, difficulties and restriction attending the execution of the work.
- B. Before submitting a bid, it will be necessary for each Contractor whose work is involved to visit the site and ascertain for himself the conditions to be met therein in installing his work and make due provision for same in his bid. It will be assumed that this Contractor in submitting his bid has visited the premises and that his bid covers all work necessary to properly install the equipment shown. Failure on the part of the Contractor to comply with this requirement shall not be considered justification for the omission or faulty installation of any work covered by these Specifications and Drawings.
- C. Understand the existing utilities from which services will be supplied; verify locations of utility services, and determine requirements for connections.
- D. Determine in advance that equipment and materials proposed for installation fit into the confines indicated.

#### 1.20 WARRANTY

- A. The undertaking of the work described in this Division shall be considered equivalent to the issuance, as part of this work, of a specific guarantee extending one year beyond the date of completion of work and acceptance by Owner, against defects in materials and workmanship. Materials, appliances and labor necessary to effect repairs and replacement so as to maintain said work in good functioning order shall be provided as required. Replacements necessitated by normal wear in use or by Owner's abuse are not included under this guarantee.
- B. All normal and extended warranties shall include parts, labor, miscellaneous materials, travel time, incidental expenses, freight/shipping, refrigerant, oils, lubricants, belts, filters and any expenses related to service call required to diagnose warranty problems.

#### 1.21 TRANSFER OF ELECTRONIC FILES

- A. Project documents are not intended or represented to be suitable for reuse by Architect/Owner or others on extensions of this project or on any other project. Any such reuse or modification without written verification or adaptation by Engineer, as appropriate for the specific purpose intended, will be at Architect/Owner's risk and without liability or legal exposure to Engineer or its consultants from all claims, damages, losses and expense, including attorney's fees arising out of or resulting thereof.
- B. Because data stored in electric media format can deteriorate or be modified inadvertently, or otherwise without authorization of the data's creator, the party receiving the electronic files agrees that it will perform acceptance tests or procedures within sixty (60) days of receipt, after which time the receiving party shall be deemed to have accepted the data thus transferred to be acceptable. Any errors detected within the sixty (60) day acceptance period will be corrected by the party delivering the electronic files. Engineer is not responsible for maintaining documents stored in electronic media format after acceptance by the Architect/Owner.
- C. When transferring documents in electronic media format, Engineer makes no representations as to the long-term compatibility, usability or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by Engineer at the beginning of the Project.
- D. Any reuse or modifications will be Contractor's sole risk and without liability or legal exposure to Architect, Engineer or any consultant.
- E. The Texas Board of Architectural Examiners (TBAE) has stated that it is in violation of Texas law for persons other than the Architect of record to revise the Architectural drawings without the Architect's written consent.

1. It is agreed that "MEP" hard copy or computer-generated documents will not be issued to any other party except directly to the Architect/Owner. The contract documents are contractually copyrighted and cannot be used for any other project or purpose except as specifically indicated in AIA B-141 Standard Form of Agreement Between Architect and Owner.
2. If the client, Architect or Owner of the project requires electronic media for "record purposes", then AutoCAD/ Revit documents will be prepared by Engineer on electronic media such as removable memory devices, flash drives or CD's. These documents can also be submitted via file transfer protocols. AutoCAD/ Revit files will be submitted with all title block references intact to permit the end user to only view and plot the drawings. Revisions will not be permitted in this configuration.
3. At the Architect/Owner's request, Engineer will assist the Contractor in the preparation of the submittals and prepare one copy of AutoCAD/ Revit files on electronic media or submit through file transfer protocols. The electronic media will be prepared with all indicia of documents ownership removed. The electronic media will be prepared in a ".rvt" or ".dwg" format to permit the end user to revise the drawings.

## PART 2 - PRODUCTS

### 2.1 SUBSTITUTIONS

- A. The names and manufacturers and model numbers have been used in the Contract documents to establish types of equipment and standards of quality. Where more than one manufacturer is named for a specific item of equipment, only one of the specified manufacturers will be considered for approval. Where only one manufacturer is mentioned with the phrase "or approved equal", Contractor may submit an alternate manufacturer for consideration, provided the following conditions are met:
  1. Submit alternate equipment with complete descriptive data in shop drawing form. Provide sample of equipment upon request for review by Architect. Samples will be returned if requested in writing.
  2. Alternate equipment must be equal from the standpoint of materials, construction and performance.
  3. Alternate submittal must be presented to the Engineer/Architect ten (10) days prior to bid date for approval.
- B. The Architect and Engineer shall be the sole judge of quality and equivalence of equipment, materials and methods.

### 2.2 PRODUCT LISTING

- A. Products used on this project shall be listed by Underwriters' Laboratories.

### 2.3 ACCESS DOORS

- A. Wherever access is required in walls or ceilings to concealed junction boxes, pull boxes, equipment, etc., installed under this Division, furnish a hinged access door and frame with flush latch handle to another Division for installation. Doors shall be as follows:
  1. Plaster Surfaces: Milcor Style K.
  2. Ceramic Tile Surfaces: Milcor Style M.
  3. Drywall Surfaces: Milcor Style DW.
  4. Install panels only in locations approved by the Architect.

### 2.4 ESCUTCHEONS

- A. Provide heavy chrome or nickel plated plates, of approved pattern, on conduit passing through walls, floors and ceilings in finished areas. Where conduit passes through a sleeve, no point of the conduit shall touch the building construction. Caulk around such conduit with sufficient layers of two hour rated firesafing by Thermafiber 4.0 P.C.F. density, U.S.G. fire test 4/11/78 and seal off openings between conduit and sleeves with non-hardening mastic prior to application of escutcheon plate. Escutcheons shall be Gravler Sure-Lock, or approved equal.



## 2.5 SPACE LIMITATIONS

- A. Equipment shall be chosen which shall properly fit into the physical space provided and shown on the drawings, allowing ample room for access, servicing, removal and replacement of parts, etc. Adequate space shall be allowed for clearances in accordance with Code requirements. Physical dimensions and arrangement of equipment shall be subject to the approval of the Architect.

## 2.6 ELECTRICAL SYSTEM IDENTIFICATION

- A. Underground Cable Identification: Bury a continuous, preprinted, bright colored plastic ribbon cable marker with each underground cable (or group of cables), regardless of whether conductors are in conduit, duct bank, or direct buried. Locate each directly over cables, 6 to 8 inches below finished grade.
- B. Identification of Equipment:
1. All major equipment shall have a manufacturer's label identifying the manufacturer's address, equipment model and serial numbers, equipment size, and other pertinent data. Care shall be taken not to obliterate this nameplate in any way. Provide black back plate with white letters and numbers for normal equipment. Provide red back plate with white letters and numbers for optional emergency equipment. Provide yellow back plate with white letters and numbers for Life safety equipment.
  2. A black-white-black laminated plastic engraved identifying nameplate shall be secured by stainless steel screws to each automatic transfer switch, switchboard, distribution panel, motor control center, motor starter panels and panelboards.
    - a. Identifying nameplates shall have ¼ inch high engraved letters and shall contain the following information:
      - 1) Name
      - 2) Voltage
      - 3) Phase
      - 4) "3" or "4" wire, and
      - 5) Where it is fed from.
    - b. An example of a panelboard nameplate is:  
Center Panel – 1HB  
480/277 volt, 3 phase, 4 wire  
Center Fed from DP2
    - c. An example of an automatic transfer switch nameplate is:  
Center ATS #2  
480/277 volt, 3 phase, 4 wire, 4 pole  
Center Fed from MSB and DPE
  3. Each feeder device in a switchboard, distribution panel, and motor control center device shall have a nameplate showing the load served in ½ inch high engraved letters.
  4. A black-white-black laminated plastic engraved identifying nameplate shall be secured by screws to each transformer, safety switch, disconnect switch, individual motor starter, enclosed circuit breaker, wireway, and terminal cabinet.
    - a. Identifying nameplates shall have 1/4 inch high engraved letters and shall indicate the equipment served.
    - b. An example of a disconnect switch is: AHU-1.
  5. Prohibited Markings: Markings which are intended to identify the manufacturer, vendor, or other source from which the material has been obtained are prohibited for installation within public, tenant, or common areas within the project. Also, prohibited are materials or devices which bear evidence that markings or insignias have been removed. Certification, testing (example, Underwriters' Laboratories, Inc.), and approval labels are exceptions to this requirement.
  6. Warning Signs: Provide warning signs where there is hazardous exposure associated with access to or operation of electrical facilities. Provide text of sufficient clarity and lettering of sufficient size to convey adequate information at each location; mount permanently in an appropriate and effective location. Comply with recognized industry standards for color and design.
  7. Operational Tags: Where needed for proper and adequate information on operation and maintenance of electrical system, provide tags of plasticized card stock, either preprinted or hand printed. Tags shall convey the message, example: "DO NOT OPEN THIS SWITCH WHEN BURNER IS OPERATING."

- C. Identification of Wiring Devices
  - 1. Contractor shall indicate the circuit serving each wiring device. Provide a typewritten label located on the inside face of the coverplate for all recessed mounted devices and on the outside face of the coverplate on all surface mounted devices.

### PART 3 - EXECUTION

#### 3.1 EXCAVATING AND BACKFILLING

- A. Trenching and backfilling and other earthwork operations required to install the facilities specified herein shall conform to the applicable requirements of Division 2 (95% of maximum standard density). Where trenching or excavation is required in improved areas, the backfill shall be compacted to a condition equal to that of adjacent undisturbed earth and the surface of the area restored to the condition existing prior to trenching or excavating operations. Provide a minimum of 3" of sand underneath all conduits. The plans indicate information pertaining to surface and sub-surface obstructions; however, this information is not guaranteed. Should obstructions be encountered whether or not shown, the Contractor shall alter routing of new work, reroute existing lines, remove obstructions where permitted, or otherwise perform whatever work is necessary to satisfy the purpose of new work and leave existing surfaces and structures in a satisfactory and serviceable condition. All work shall comply with OSHA Standards.

#### 3.2 WORKMANSHIP AND CONCEALMENT

- A. The work of this Section shall be performed by workman skilled in their trade. Installation shall be consistent in completeness whether concealed or exposed. Each item of electrical work shall be concealed in walls, chases, under floors and above ceilings except:
  - 1. Where shown to be exposed.
  - 2. Where exposure is necessary to the proper function.

#### 3.3 SLEEVES, CUTTING AND PATCHING

- A. This section shall be responsible for placing sleeves for all conduit passing through walls, partitions, sound walls, beams, floors, roof, etc. Sleeves through below-grade walls shall use water-tight fitting manufactured by O-Z/Gedney.
- B. Contractor shall install underground raceways including but not limited to feeders, service laterals, branch circuit and telecommunications. Contractor shall saw cut existing hard surfaces, when required for installation. Contractor shall patch surface to match existing conditions. Contractor shall replace all landscaping material when raceways are installed in these areas. Submit proposed method for patching for review.
- C. All cutting and patching will be done under another Division, but this Section will be responsible for timely performance of this work and layout of holes and setting sleeves.
- D. All un-used sleeves shall be sealed with 2 hour UL approved fire sealant manufactured by "3M" or approved equal.
- E. Refer to 26 05 33 for additional requirements.

#### 3.4 ELECTRICAL GEAR

- A. Install all electrical equipment in accordance with the National Electrical Code and as shown on the drawings.

- B. Lighting contactors, time clocks, fire alarm equipment, security equipment disconnect switches, etc. mounted in mechanical/electrical rooms shall be mounted at a working height not requiring a ladder, when wall space is available. Installation of these devices at greater elevations shall be approved by the Engineer. Contractor shall provide a coordination sketch of each mechanical/electrical room noting locations and mounting heights of all electrical devices (note bottom and top elevations) shown to be installed. Sketches shall be provided to the Engineer for review and the general contractor for coordination with other trades working in these rooms.
- C. Fire retardant back boards secured to drywall studs may be used for contactors, time clocks, fire alarm equipment, security equipment, and disconnect switches 60 amp or smaller. All other wall mounted devices shall be mounted to unistrut. Unistrut shall be securely mounted to the floor and structural ceiling. Toggle bolts or anchor bolts attached to drywall is not acceptable.

### 3.5 CLEANING

- A. Clean lighting fixtures and equipment.
- B. Touch-up and refinish scratches and marred surfaces on panels, switches, starters, and transformers.

### 3.6 CORROSIVE AREAS

- A. In areas of a corrosive nature, which include but are not limited to the following: pool equipment rooms, cooling towers and areas subject to salt air, etc., provide NEMA 4 X stainless steel or fiberglass reinforced enclosures for contactors, panel boards, controllers, starters, disconnects and materials used as supporting means (i.e. plastibond unistrut, pipe, fittings). The use of spray on coating may be acceptable in some applications.

### 3.7 TESTS AND INSPECTIONS

- A. Tests and inspection requirements shall be coordinated with Division I.
- B. Date for final acceptance test shall be sufficiently in advance of completion date of contract to permit alterations or adjustments necessary to achieve proper functioning of equipment prior to contract completion date.
- C. Conduct re-tests as directed by Architect on portions of work or equipment altered or adjusted as determined to be necessary by final acceptance test. No resultant delay or consumption of time as a result of such necessary re-test beyond contract completion date shall relieve Contractor of his responsibility under contract.
- D. Put circuits and equipment into service under normal conditions, collectively and separately, as may be required to determine satisfactory operation. Demonstrate equipment to operate in accordance with requirements of these specifications. Perform tests in the presence of Architect. Furnish instruments and personnel required for tests.
- E. Final Inspection:
  - 1. At the time designated by the Architect, the entire system shall be inspected by the Architect and Engineer. The contractor or his representative shall be present at this inspection.
  - 2. Panelboards, switches, fixtures, etc., shall be cleaned and in operating condition.
  - 3. Certificates and documents required hereinbefore shall be in order and presented to the Architect prior to inspection.
  - 4. Panel covers, junction box covers, etc., shall be removed for visual inspection of the wire, bus bars, etc.
  - 5. After the inspection, any items which are noted as needing to be changed or corrected in order to comply with these specifications and the drawings shall be accomplished without delay.

- F. The contractor shall provide a thermographic test using an independent testing laboratory using an infrared scanning device. This test shall include but not limited to all switchboards, distribution panelboards, panelboards, automatic transfer switches and other electrical distribution devices. This test shall be conducted to locate high temperature levels. This test shall be conducted between 3 to 8 months after occupancy, but not beyond the one year warranty period. Submit test to the architect and engineer using test reporting forms. All unacceptable conditions shall be corrected prior to the end of the warranty period.

END OF SECTION



SECTION 26 05 19

WIRE, CABLE AND RELATED MATERIALS

PART 1 - GENERAL

1.1 SCOPE

- A. Provide 600 volt building wire, cable and connectors and 300 volt wire, cable and connectors.
- B. WORK INCLUDED: Include the following Work in addition to items normally part of this Section.
  - 1. Wiring for lighting, dimming controls and power.
  - 2. Automatic Control Wiring.
  - 3. Connection of equipment shown.
  - 4. Fire Alarm System.
  - 5. Voice Communications and Sound System.
  - 6. Mineral Insulated Cable (MI)
- C. WORK SPECIFIED ELSEWHERE:
  - 1. Heating, ventilating, and air conditioning equipment.
  - 2. Structured cabling system.
  - 3. Coaxial cables

1.2 REFERENCE STANDARDS

- A. UL 83 - Thermoplastic-Insulated Wires and Cables
- B. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire
- C. NFPA 70 - National Electrical Code
- D. All wire cable and connectors shall be UL approved.
- E. NEMA
- F. NEMA Bulletin 119

1.3 ACCEPTABLE MANUFACTURERS

- A. 600 VOLT WIRE AND CABLE
  - 1. Southwire
  - 2. Encore
  - 3. Cerro
- B. 300 VOLT WIRE AND CABLE
  - 1. Westpenn
  - 2. Beldon
  - 3. Alpha
  - 4. Tappan - Southwire
- C. FLEXIBLE CABLE SYSTEMS
  - 1. AFC Modular Cable Systems
  - 2. Kaf-Tech
- D. CONNECTORS
  - 1. IlSCO
  - 2. Cooper

3. AMP - TYCO
4. Burndy
5. Ideal
6. 3M
7. O.Z. Gedney
8. Thomas & Betts
9. Buchanan

#### 1.4 SUBMITTALS

- A. Shop drawings shall include, but not limited to:
1. Cutsheets of wire, cable and connectors to indicate the performance, fabrication procedures, product variations, and accessories.

#### 1.5 REQUIREMENTS OF REGULATORY AGENCIES WORK IN ACCORDANCE WITH:

- A. National Electrical Code.
- B. Local, municipal, or state codes that have jurisdiction.

### PART 2 - PRODUCTS

#### 2.1 WIRING

- A. All wire shall be new and continuous without weld, splice, or joints throughout its length. It must be uniform in cross-section, free from flaws, scales and other imperfections.
- B. WIRE MATERIAL: Conductors shall be soft drawn, annealed copper. Aluminum wiring is not acceptable unless otherwise noted on drawings.
- C. TYPES:
1. Provide type "THHN/THWN-2" insulation for all buried feeders and service entrance conductors.
  2. Provide type "THHN/THWN-2" insulation for all branch circuits and above grade feeders.
  3. All wire No. 8 and larger shall be stranded. All wire No. 10 and smaller shall be stranded or solid.
  4. Provide type "XHHW" or other 90 degrees insulation wiring for branch circuit wiring installed through continuous rows of fixture bodies.
  5. All 300-volt cable including but not limited to telephone, fire alarm, data, CATV and security shall be UL listed for use in return air plenums.
  6. All dimming conductors shall be 300 volt, 75 C plenum rated. Dimming conductors shall be solid. Stranded conductors are not acceptable.
- D. CONDUCTOR SIZES
1. Feeder conductors shall be sized for a maximum of 2% drop in rated voltage at scheduled load.
  2. Branch circuit conductors shall be sized for a maximum 3% drop in the rated voltage to the longest outlet on the circuit.
  3. Minimum wire shall be 12 AWG, unless otherwise shown on Drawings or required by Code.
  4. Minimum wire size for 0-10v dimming controls shall be 18 AWG for conductors not exceeding 300 feet circuit length (one-way) and 16 AWG for those exceeding 300 feet (one-way).
- E. COLOR CODING: No. 6 or larger shall use tape for color coding. No. 8 and smaller wire shall be color coded in accordance with the governing authority requirements or as follows:
- 120/208 Volt  
Neutral: White  
Phase A: Black  
Phase B: Red  
Phase C: Blue  
Ground: Green
- 277/480 Volt  
Neutral: Gray

Phase A: Brown  
Phase B: Purple  
Phase C: Yellow  
Ground: Green  
120/240 Volt  
Neutral: White  
Phase A: Black  
Phase B: Orange  
Phase C: Blue  
Ground: Green  
0-10 Volt dimming conductors  
Purple (source)  
Pink (common)

## 2.2 GROUNDING

- A. Permanently connect all conduit work, motors, starters, and other electrical equipment to grounding system in accordance with NFPA 70.

## PART 3 - EXECUTION

### 3.1 WIRE

- A. Do not pull wire into conduit until Work of an injurious nature is completed. Where two or more circuits run to a single outlet box, each circuit shall be properly tagged. Wyreze or approved equal may be used as a lubricant where necessary.
- B. Splices shall be fully made up in outlet boxes with compression crimp-on type splice connectors.
- C. Joints and splices will not be permitted in service entrance or in feeders. Joints in branch circuits will be permitted where branch circuits divide, and then shall consist of one through-circuit to which the branch shall be spliced. Joints shall not be left for the fixture hanger to make. Connect joints and splices with Buchanan Series "2000" solderless connectors complete with insulating caps or properly sized twist on wire nuts. "Wago" push-in connectors are not acceptable.
- D. All stranded conductors shall be furnished with lugs or connectors.
- E. Connectors furnished with circuit breakers or switches shall be suitable for copper wire termination.
- F. "Sta-Cons" shall be used to terminate stranded conductors on all switches and receptacles.
- G. All stranded #10 and small conductors shall be terminated with an approved solderless terminal if the device or light fixture does not have provisions for clamp type securing of the conductor.
- H. The jacket for all travelers used on 3-way and 4-way switches shall be pink.
- I. Route conductors for 480Y/277 systems in a separate raceway. Do not combine with 208Y/120 volt or 120/240 volt systems.
- J. Emergency circuits shall not be routed with normal conductors.

### 3.2 BALANCING SYSTEM

- A. The load on each distribution and lighting panel shall be balanced to within 10% by proper arrangement of branch circuits on the different phase legs. Provide written documentation showing results. Submit with O & M manuals.



### 3.3 LOW VOLTAGE WIRING

- A. Low voltage wiring, including dimming conductors, shall be plenum rated. All wiring in mechanical rooms, electrical rooms, drywall ceiling, inaccessible areas, underground, plaster ceiling, inside concealed walls areas exposed to occupant view, and other areas subject to physical damage shall be run in conduit.
- B. Low voltage wiring shall be routed in separate raceways from power wiring systems.
- C. Sleeves shall be placed in the forms of concrete, masonry and fire rated walls, floor slabs and beams, for the passage of wiring. Sleeves should be set in place a sufficient time ahead of the concrete work so as not to delay the work. Sleeves shall be rigid galvanized steel.
- D. Provide Caddy J-hooks supported independently from other system to support cable at 4-foot on center or closer if required by manufacturer.
- E. Provide a junction box to make up all joints and splices.
- F. Provide dimming conductors for all lighting circuits located in spaces with dimmer switches and theatrical lighting as indicated on the drawings and as specified.

### 3.4 CABLE SUPPORTS

- A. Provide cable supports in all vertical raceways in accordance with Article 300-19 of NFPA 70.

### 3.5 DEFECTS

- A. Defects shall include, but are not to limited to, the following:
  - 1. Tripping circuit breakers under normal operation.
  - 2. Improperly connected equipment.
  - 3. Damaged, torn, or skinned insulation.

END OF SECTION

SECTION 26 05 26

GROUNDING

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

1.2 SCOPE

- A. WORK COMBINED WITH OTHER SECTIONS: Combine the work specified herein with the following Sections to form a single responsibility for the Work:
  - 1. Electrical.
  - 2. Basic materials and methods.
- B. Provide electrical service, equipment and wiring device grounding as shown, scheduled and as specified.
- C. The types of grounding include, but not limited to, the grounding bonding of all equipment devices, building steel piping, and as required by the National Electrical Code, Local Inspection Department and Power Company.

1.3 STANDARDS

- A. National Electrical Code (NFPA-70)
- B. Local municipal and State codes that have jurisdiction.
- C. NECA

1.4 ACCEPTABLE MANUFACTURES

- A. Provide grounding products manufactured by Copperweld and Cadweld.

1.5 SUBMITTALS

- A. Shop drawings shall include, but not limited to the following:
  - 1. Cut sheets of ground rods, clamps and connectors.
  - 2. Grounding system diagram.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Provide all materials required to construct a complete grounded electrical system.
- B. GROUND RODS: Ground rods shall be 3/4" inch diameter by 10 feet long construction with copper jacket and a steel core.
- C. CLAMPS: Ground clamps shall be copper except for steel or iron pipes in which the clamps shall be galvanized iron.
- D. CONDUCTORS: Conductors shall be connected by means of an approved pressure connector or clamp.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. GENERAL: Install grounding system as shown and specified to ensure a properly grounded system.
- B. GROUNDING SEPARATELY DERIVED ALTERNATING CURRENT SYSTEM
- C. GROUNDING CONDUCTOR: A grounding conductor and metallic conduit system shall bond all equipment served by the electrical system. Provide a flexible bonding jumper for isolated metallic piping and ductwork and around expansion fittings and joints.
- D. CONDUIT GROUNDING BUSHING: Conduit terminating in equipment that has a ground bus such as switchboards, panelboards, etc., shall have grounding bushings installed. Ground each conduit by means of a grounding bushing and to the ground bus in the equipment.
- E. LIGHTING FIXTURES: Flexible fixture whips containing a green grounding conductor shall be used to connect light fixtures. Flexible fixture whips shall not exceed ten feet.

### 3.2 TESTING

- A. Perform a ground resistance test using a biddle analog or digital portable earth/ground resistance tester. The system resistance shall not exceed 5 Ohms. Provide additional electrodes as required (refer to 250-84 and 250-56 of the most current edition NEC). Test shall not be conducted following wet weather. Provide personal instruments to conduct these tests and submit certified test for review. Test shall be verified by Engineer.

END OF SECTION

SECTION 26 05 33

RACEWAYS

PART 1 - GENERAL

1.1 SCOPE

- A. Provide electrical raceways and fittings as shown, scheduled and specified.
- B. The types of raceways and fittings required are as follows:
  - 1. Rigid hot-dipped galvanized steel conduit (GRC) (RMC)
  - 2. Intermediate hot-dipped galvanized steel conduit (IMC)
  - 3. Electrical metallic tubing (EMT)
  - 4. PVC (Sch. 40 & 80)
  - 5. Flexible metal conduit (FMC)
  - 6. Liquid-tight flexible metal conduit (LFMC)
  - 7. PVC coated rigid galvanized steel conduit (GRCC)
  - 8. Rigid Aluminum Conduit (RAC)

1.2 REFERENCE STANDARDS

- A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); 2020.
- B. ANSI C80.3 - American National Standard for Electrical Metallic Tubing -- Steel (EMT-S); 2020.
- C. ANSI C80.5 - American National Standard for Electrical Rigid Metal Conduit -- Aluminum (ERMC-A); 2020.
- D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. UL 6 - Electrical Rigid Metal Conduit-Steel; Current Edition, Including All Revisions.
- F. UL 6A - Electrical Rigid Metal Conduit-Aluminum, Red Brass, and Stainless Steel; Current Edition, Including All Revisions.
- G. UL 797 - Electrical Metallic Tubing-Steel; Current Edition, Including All Revisions.
- H. NEMA FB-1
- I. NEMA TC3

1.3 ACCEPTABLE MANUFACTURERS

- A. Raceways
  - 1. Allied
  - 2. Republic
  - 3. Prime Conduit (Carlton)
  - 4. Wheatland Tube
  - 5. Cantex
  - 6. Western Tube
  - 7. Robroy Industries
- B. Fittings
  - 1. Appleton
  - 2. Crouse Hinds

- 3. Steel City
  - 4. O.Z. Gedney
  - 5. Carlon
  - 6. Raco, Inc.
  - 7. Bridgeport
- C. Boxes
- 1. RACO
  - 2. Thomas and Betts
  - 3. EATON
  - 4. Crouse-Hinds
  - 5. Appleton
- D. Surface
- 1. Hubbell
  - 2. Wiremold

#### 1.4 SUBMITTALS

- A. Product data shall include but not be limited to:
- 1. Cutsheets for raceways, fitting, solvents, primers, etc.

#### 1.5 REQUIREMENTS OF REGULATORY AGENCIES WORK IN ACCORDANCE WITH

- A. NFPA 70
- B. Local, municipal, or state codes that have jurisdiction.

### PART 2 - PRODUCTS

#### 2.1 CONDUIT AND FITTINGS

- A. Rigid Galvanized Steel Conduit (GRC/RMC)
- 1. Construction, Materials, Codes, Standards:
    - a. Article 344 - NFPA 70.
    - b. Hot-dip galvanized rigid steel conduit, galvanized after fabrication. Products shall comply with UL 6 and ANSI C80.1. All threads shall be galvanized after cutting. A uniform zinc coating shall be applied to the inner and outer walls.
    - c. Fittings shall be threaded and shipped with thread protectors. Set Screw are not acceptable. Die Cast Fittings are not acceptable.
  - 2. Permitted for use in the following locations:
    - a. Outdoor or Exterior (Exposed)
    - b. Indoors, Conditioned Spaces
    - c. Unconditioned Spaces
    - d. Underslab (Void Form Slab): where not in contact with earth – only permitted where indicated on plan.
    - e. Underslab (Suspended Slab): Permitted – only where indicated on plan.
  - 3. Prohibited Locations: Underground, Corrosive environments, Underslab (Slab on Grade), Foundation penetrations.
  - 4. Specific Uses: Exposed Exterior installations, where within or attached to masonry or concrete, where subject to damage.
- B. Electrical Metallic Tubing (EMT)
- 1. Construction, Materials, Codes, Standards:
    - a. Article 358 - NFPA 70.
    - b. EMT shall be made of hot-dip galvanized strip steel. The interior shall be coated with a corrosion-resistant lubricant for ease of wiring pulling.
    - c. Shall utilize steel insulated throat, set-screw connectors and steel set-screw couplings in all indoor conditioned spaces.

- d. Shall utilize steel insulated throat, threadless, watertight compression type connectors and steel threadless watertight compression type coupling in all non-conditioned spaces and in grout filled CMU walls.
  - e. Products shall comply with UL 797 and ANSI C80.3.
  2. Permitted for use in the following locations:
    - a. Indoors, Conditioned Spaces
    - b. Unconditioned Spaces
  3. Prohibited Locations: Corrosive Environment, Underground, Underslab (all types), Wet or Damp Locations, Exteriors, Within Concrete, foundation penetrations.
  4. Specific Uses: Primary use conduit for indoor spaces, where conditioned. Unconditioned locations shall require use of insulated throat water tight fittings.
- C. PVC Coated Rigid Galvanized Steel Conduit (GRCC/Plastibond)
1. Construction, Materials, Codes, Standards:
    - a. Article 344 and 300.6 - NFPA 70.
    - b. Conduit shall be same as rigid metal conduit with a factory-applied 40-mil-thick covering of polyvinyl chloride (PVC) bonded to the metal, coated inside and outside.
  2. Permitted for use in the following locations:
    - a. Outdoor or Exterior (Exposed): except for stub-ups and penetrations.
    - b. Corrosive Environment: required throughout
      - 1) Where corrosive environments exist, such as pools, pool pump room, corrosive chemical storage, GRCC shall be provided throughout, up to the point of sealed penetration into a non-corrosive environment.
    - c. Underground (Earth, outside foundation perimeter): Required at bends of 15° or greater, Penetrations through concrete, Stub-ups through foundation or grade at concrete.
    - d. Foundation Penetrations
  3. Prohibited Locations: extended runs exposed to sunlight, Plenums, Underslab except for penetrations (all foundation types).
  4. Specific Uses: For use at Cooling Towers, Pools, Pool Decks, Pool pump rooms, chemical storage, corrosive environments.
- D. Rigid Aluminum Conduit (RAC)
1. Construction, Materials, Codes, Standards:
    - a. Article 344 - NFPA 70.
    - b. Rigid aluminum (alloy 6063-T1) conduit shall be manufactured using 6063 Alloy in temper designation T-1.
    - c. Fittings for rigid aluminum conduit shall be threaded aluminum shipped with thread protectors. Set Screw or Die Cast Fittings are not acceptable
    - d. Products shall comply with UL 6A and ANSI C80.5.
  2. Permitted for use in the following locations:
    - a. Outdoor or Exterior (Exposed)
    - b. Indoors, Conditioned Spaces
    - c. Unconditioned Spaces
  3. Prohibited Locations: Corrosive environments, underground, within concrete, underslab (all types), foundation penetrations.
  4. Specific Uses and Applications: Exposed Exterior such as rooftops or canopies.

## PART 3 - EXECUTION

### 3.1 PROVIDE CONDUIT AS FOLLOWS:

- A. GENERAL: The Drawings are diagrammatic and are intended to show the general location of outlets, devices, fixtures, and arrangement and control of circuits. The Contractor shall determine exact locations by actual measurement of the building or by reference to the Architectural Drawings.
- B. Raceways shall not be routed below or within slab-on-grade, foundations, or below grade of suspended slab structures, unless specifically noted or indicated otherwise on plan.
- C. EMT in sizes up to 4 inches when concealed or not exposed to damage and located indoors only. (EMT is not acceptable in wet and damp location.)

- D. MINIMUM SIZE: 3/4 inch.
- E. Flexible conduit of any type shall not be used except for connections to rotating or vibrating equipment, or where use for low voltage raceways. All conduit shall be provided as a rigid type conduit for homeruns, runs between termination boxes, outlets, etc.
- F. Fixture whips: Refer to 26 51 19 for additional information.
- G. Of such size, and so installed that conductors may be drawn in without injury or excessive strain.
- H. Where entering panels, pull boxes, junction boxes, or outlet boxes, shall be secured in place with lock nuts inside and outside, and insulated bushings inside.
- I. Have Red seal type VCC or approved equal cable supports in risers, as required by NFPA 70.
- J. Have ends reamed after cutting and application of die.
- K. Keep conduit corked and dry during construction and swab out before conductors are pulled.
- L. Have bends and offsets made with approved tools. Bends or offsets in which the pipe is crushed or deformed shall not be installed.
- M. Have O.Z. Gedney or approved equal expansion fittings where crossing building expansion joints.
- N. Fixtures in finished areas having suspended acoustical ceilings shall be connected to outlet boxes of lighting grid by flexible metal conduit; length not to exceed ten feet (six feet if using 3/8" manufactured fixture "whips").
- O. Outlet boxes in partitions shall never be set back-to-back. They shall be offset to prevent undue noise transmission from room to room.
- P. Each entire conduit system shall be installed complete before any conductors are drawn in. Every run of conduit shall be finished before covering up to guard against obstructions and omissions.
- Q. Sleeves shall be placed in the forms of concrete, masonry and fire rated walls, floor slabs and beams, for the passage of conduits. Sleeves should be set in place a sufficient time ahead of the concrete work so as not to delay the work. Sleeves shall be rigid galvanized steel with a minimum thickness of 1.07MM and set to extend 4" above slab.
- R. All pipe penetrations through walls and concrete floors shall be fire rated by applying USG Thermafiber in the space between the concrete and the pipe. The fire rating shall be additionally sealed by using 3M brand model CP 25 or 303 fire barrier caulk and putty. All fire rating material shall be installed in accordance with manufacturer's printed instructions.
- S. All conduit shall be cleaned and swabbed to remove all foreign matter and moisture prior to pulling wire and cable. All boxes in which conduits terminate shall be cleaned of all concrete mortar and other foreign matter.
- T. Provide #30 nylon pulling line in all conduits in which permanent wiring is not installed.
- U. All conduit shall be securely fastened and supported using hot galvanized malleable iron one-hole pipe straps, clamps, hanger or other means approved by the engineer. Supports shall be as required per NEC. Tie wire shall not be used as support or securing means. Support conduit independently of ceiling hanger wire. Use all thread rods to support outlet boxes, junction boxes and conduit.
- V. Contact the Architect and Engineer for an installation review before covering any below grade or above grade conduit.

- W. All new outlets shall be flush mounted. In remodeled areas where wall construction prohibits flush mounting, provide Hubbell 2400 series, unless noted otherwise. Verify exact location and routing with architect before installation.
- X. Contractor shall not penetrate waterproof barriers without using proper fitting to maintain barriers. This shall include exterior walls and slabs. Coordinate with Architect for proper methods.

### 3.2 CONDUIT ROUTING

- A. Conduit shall be concealed and by using the shortest practicable route between outlets, including where located on CMU walls.
- B. Conduit may be exposed in electrical and mechanical rooms, and central plants, or other industrial type facilities such as warehouses or production plants.
- C. Install risers, drops, offsets to avoid ductwork and structural components. Ductwork and structural systems shall take precedence to conduit.
- D. Any exposed and visible conduit shall be parallel and perpendicular based on the lines of the building (such as ceiling lines, wall blocking lines, or architectural feature lines) using structural systems to conceal conduit visibility at all opportunities.
- E. Concealed conduit shall be run in as direct manner as possible, using long bends. All bend radii shall be 12x conduit diameter. Condulets in lieu of elbows where ease of installation and appearance warrant their use – confirmation with architect is required for this use.
- F. Conduit shall be continuous, with no more than (4) quarter bends between terminals, cabinets, boxes, or pullboxes is acceptable. Contractor is expected to provide wireway or boxes at appropriate intervals, in accordance with NFPA 70 for wire bending space. All conduit shall be electrically continuous throughout, including across boxes and cabinets. Terminals of all conduit shall be provided with double lock nuts and bushing, or terminated on conduit hubs. Use of Running Threads prohibited.

### 3.3 CONDUIT CORROSION PROTECTION

- A. Branch circuit conduits installed in concrete slabs on fill or grade shall be positioned in a manner to ensure complete concrete cover. In no case shall such conduits be exposed below or above the slab surfaces, or penetrate the waterproof membrane.
- B. At locations where metallic conduits pass through slabs on grade or transitions below grade, PVC coated rigid galvanized conduit shall be used.
- C. Conduit installed in the air gap between the water-resistant barrier and finish brick shall not exceed 2-ft. in length.

### 3.4 EXPANSION JOINTS

- A. Install approved expansion fitting in all conduit runs in excess of 150 feet or when crossing building expansion joints.

### 3.5 OUTLET AND JUNCTION BOXES

- A. Provide an approved galvanized outlet box with adequate volume for number of conductors installed.
- B. Provide standard galvanized switch boxes of the required number of gangs. Switch boxes where conduit is exposed shall be handy boxes or approved equal.



- C. Outlet boxes for receptacles shall be similar to Universal 52151 with suitable raised cover. Receptacle boxes where conduit is exposed shall be handy boxes or approved equal.
- D. Weatherproof boxes shall be FS or FD. Provide these boxes in all non-conditioned areas, exterior areas and natatoriums.
- E. Outdoor boxes shall be NEMA 3R, with conduit connections made by Myers Hubs.
- F. See notes and details on Drawings for special box requirements.
- G. Provide junction boxes required to facilitate installation of the various conduit systems. Provide support boxes required for risers, each complete with approved cable supports as described elsewhere in this Division.
- H. Outlet boxes for drywall shall be standard galvanized 4" square boxes with the appropriate device cover. Secure all outlet boxes with a backing brace connected to two adjacent studs. Mounting brackets with a single ear to rest against the backing sheet rock are not acceptable.
- I. Provide floor outlet fittings for telephone to match fittings for duplex floor receptacles.
- J. Provide 3-1/2" deep gangable masonry boxes in all masonry wall (CMU). Steel City GW-135-G or approved equal.
- K. Provide shallow 4"x4" boxes in all demountable partitions.
- L. Metallic boxes located in fire rated walls or partitions shall be separated by a minimum horizontal distance of 24 in. This minimum separation distance between metallic boxes may be reduced when "Wall Opening Protective Materials" (CLIV) are installed according to the requirements of their Classification. Metallic boxes shall not be installed on opposite side of walls or partitions of staggered stud construction unless "Wall Opening Protective Materials" are installed with the metallic boxes in accordance with Classification requirements for the protective materials.
- M. Junction, pull boxes, condulets, gutters, disconnects, contactors, etc., above 2-foot x 2-foot grid ceilings shall be mounted within 18-inches of ceiling grid. Above 2-foot x 4-foot grid ceiling they shall be mounted within 30-inches of ceiling grid. All junction box, pull box, gutter openings shall be side or bottom accessible.
- N. Junction boxes are prohibited above drywall or plaster ceilings except for lighting; and those must be mounted directly over light fixture opening. Route power, PA, fire alarm conduits to nearest lay-in ceiling.

### 3.6 THRU-WALL SEALS

- A. Provide O.Z. Gedney "Thru-wall" seals for all conduits passing through concrete structure below grade, above grade, and floor penetrations below grade. These prevent moisture from entering the building.
- B. Straight sleeves are not acceptable.

### 3.7 PULL BOXES

- A. Interior Pull boxes shall be provided for conduit systems as required and shall be constructed of galvanized steel of not less than gauge and size specified by National Electrical Code. Size pull boxes per Article 314.28 - NFPA 70.
- B. Where two or more feeders pass through a common pull box, they shall be tagged to indicate clearly their electrical characteristics, circuit number, and panel designation.

- C. Exterior in-ground pull boxes shall have open bottoms with sand and rock beds below box for drainage of water. Provide closed bottom boxes where specified. Closed bottom boxes shall be provided with sumps for portable pump to allow for extracting water. Refer to details on the drawings.
- D. Pull boxes mounted in pole bases shall be coordinated with the pour of the pole base and shall be flush with finished footing.

### 3.8 WIREWAYS

- A. Wireways shall be installed as indicated or required and locations shall be coordinated with architect.
- B. Wiring in wireways shall be neatly bundled, tied and suitably tagged.

### 3.9 UNDERGROUND DUCTBANK SYSTEM

#### A. DUCT SYSTEM

1. The duct system shall consist of Schedule 40 PVC or type 1-EB PVC conduits encased in red concrete as detailed on the drawings. Use rigid conduit for stub-ups and the last ten feet at the end of each ductbank. Duct lines shall be laid to a minimum grade of 4 inches per 100 feet and shall be free from either horizontal or vertical waves. Duct lines shall be straight unless otherwise noted on the drawings. Duct lines shall be installed so that the top of concrete in encased duct lines is not less than 24 inches below finished grade or finished paving at any point. Changes in direction or runs exceeding a total of 10 degrees, either vertical or horizontal, shall be accomplished by long sweep bends having a minimum radius of curvature of 5 feet. The long sweep bends may be made up of one or more curved or straight sections and/or combinations thereof using five degree angle couplings. Conduit shall be thoroughly cleaned before using or laying. During construction and after the duct line is completed, the ends of the conduit shall be plugged to prevent water washing mud into the conduits. Particular care shall be taken to keep the conduits clean of concrete, dirt, and any other substance during the course of construction.
  2. Each single conduit of the duct bank shall be completely encased in steel reinforced concrete as indicated. The thickness of concrete encasement indicated is the minimum thickness, and may be increased to fit the actual shape of trench.
  3. Concrete for duct bank envelopes shall be standard 2000 psi concrete mix as described in Division 03, and be colored deep red for permanent marking of underground electrical work. The concrete red pigment shall be pure inorganic natural metallic base pigment, approved by the Engineer before use. Organic pigments will not be permitted. The approved pigments shall be mixed four pounds per yard of cement.
    - a. Envelopes may be poured directly against sides of trenches if the "cut" is clean, even and free of loose material. All loose dirt and extraneous material shall be removed from the trenches before and during the pouring of concrete to ensure sound envelopes. Concrete shall be carefully spaded during pouring to eliminate all voids under and between the conduit and honeycombing of the exterior surfaces. Power driven tampers or agitators shall not be used, unless specifically designed for the application, in order to ensure that the water-tightness of the conduits is not destroyed.
    - b. Generally, each run of envelopes shall be poured in one continuous operation. Where more than one pour is necessary, each pour shall terminate in a vertical plane. Partial pours shall not terminate in horizontal or angular planes.
- B. For normal underground installation see Section 26 02 00, paragraph 3.1 for Excavating and Backfilling.

END OF SECTION



SECTION 26 51 19

LIGHTING FIXTURES - LIGHT EMITTING DIODE (LED)

PART 1 - GENERAL

1.1 SCOPE

- A. Provide general and emergency lighting fixtures as noted on the drawings. Fixtures shall be completely wired with lamps installed and shall be in perfect operating condition at the time of substantial completion.
- B. The types of lighting fixtures required for this project include:
  - 1. LED

1.2 REFERENCE STANDARDS

- A. 47 CFR 15 - Radio Frequency Devices; current edition.
- B. NEMA JSC 10410 - Performance Testing for Lighting Controls and Switching Devices with Electronic Drivers and Discharge Ballasts; 2023.
- C. UL 1012 - Safety Power Units Other Than Class 2; 2010.
- D. UL 1310 - Class 2 Power Units; Current Edition, Including All Revisions.
- E. NFPA 101
- F. NEMA-LE
- G. TM-21
- H. LM-80
- I. LM-79
- J. L70
- K. DLC

1.3 QUALITY ASSURANCE

- A. All fixtures shall conform to all applicable UL standards and shall be UL label including damp and wet location ratings. "ETL listed" is an acceptable listing.
- B. All LED drivers shall be UL recognized Class 2 per UL 1310 or non-Class 2 per UL 1012 as applicable.
- C. All LED drivers shall comply with applicable requirements of the Federal Communications Commission (FCC) rules and regulations, Title 47 CFR 15, for Non-Consumer Equipment.
- D. All LED drivers shall be RoHS compliant.

1.4 ACCEPTABLE MANUFACTURERS

- A. Provide lighting fixtures produced by manufacturers as shown and scheduled.
- B. LED DRIVER:

1. Provide one of the following manufacturers
  - a. Eldo
  - b. Lutron
  - c. Osram
  - d. Philips

C. LAMPS:

1. Provide one of the following LED Chip manufacturers
  - a. Cree
  - b. Nichia
  - c. North American Philips
  - d. Seoul
  - e. Lumileds

1.5 SUBMITTALS

- A. Shop drawings shall include a brochure with a separate cut sheet for each fixture type arranged in alphabetical order with fixture and all accessories/options clearly labeled. Provide performance data for each fixture. Provide an independent test lab report for each fixture if requested by the Architect/Engineer.
- B. Provide driver and LED module data brochures for each fixture type.
- C. Provide air handling and heat removal data for light fixtures specified with these requirements.

1.6 REQUIREMENTS OF REGULATORY AGENCIES

- A. WORK IN ACCORDANCE WITH:
  1. National Electrical Code.
  2. Local, municipal, or state codes that have jurisdiction.
  3. UL fire resistance directory.

PART 2 - PRODUCTS

2.1 MATERIALS AND COMPONENTS

- A. General:
  1. Provide the size, type and rating of each light fixture shown and scheduled. All light fixtures shall complete with reflectors, lens, trim rings, flanges, LED modules, lamp holders, drivers, fuses, wiring, earthquake clips, etc. to provide a complete functioning light fixture.
- B. Lighting Fixture Types:
  1. LED Fixtures
    - a. Fixtures shall be pre-wired with frame-in kit and integral thermal management system for fixtures. Driver shall be encased in metal-can construction for optimal thermal performance.
    - b. Total fixture lumen output is dependent on the chip, thermal management, driver current and optical system. LED fixtures shall be tested as a complete unit or system. Only DOE recognized CALiPER testing laboratory results shall be utilized.
    - c. Interior LED fixtures shall have integral common mode and differential mode surge protection of 3kV(1.2/50 $\mu$ s, 2 ohm combination wave).
    - d. Exterior LED fixtures shall have integral common mode and differential mode surge protection of 10kV/10kA(1.2/50 $\mu$ s, 2 ohm combination wave).

2.2 LED MODULES AND DRIVERS - COORDINATE WITH LIGHT FIXTURE SCHEDULE

- A. LED
  1. Driver manufacturer shall have a 10-year history producing electronic drivers for the North American market.

2. Driver shall carry a five year limited warranty from date of manufacture against defects in material or workmanship (including replacement) for operation at a maximum case temperature of 80 degrees Celsius.
3. Drivers shall not contain any Polychlorinated Biphenyl (PCB).
4. Provide driver with integral color-coded leads.
5. Driver shall operate from 50/60 Hz input source of 120 Volt through 277 Volt or 347 Volt through 480 Volt with sustained variations of +/- 10% (voltage) with no damage to the driver.
6. Driver output shall be regulated to +/- 5% across published load range. And shall have a power factor greater than .90 for primary application to 50% of full load rating with an input current Total Harmonic Distortion (THD) of less than 20% to 50% of full load rating.
7. Provide drivers with a Class A sound rating.
8. Provide LED drivers for outdoor fixtures with a minimum operating temperature of -40 degrees Celsius (-40 F). Provide LED drivers for indoor fixtures with a minimum operating temperature of -20 degrees Celsius (-2F).
9. Drivers shall tolerate sustained open circuit and short circuit output conditions without fail and auto-resetting without need for external fuses or trip devices.
10. Driver output ripple current shall be less than 15% measured peak-to-average, with ripple frequency being greater than 100Hz.
11. Driver performance requirements shall be met when operated to 50% of full load rating.
12. Driver shall have integral thermal foldback to reduce driver power above rated case temperature to protect the driver if temperatures reach unacceptable levels.
13. Drivers shall comply with NEMA JSC 10410 for in-rush current limits.
14. Dimmable drivers shall be controlled by a Class 2 low voltage 0-10VDC controller with dimming range controlled between 1 and 8VDC with source current 150µA.

### 2.3 LAMPS - COORDINATE WITH LIGHT FIXTURE SCHEDULE

- A. LED Lamps shall be appropriately matched to the driver with junction-down design for improved thermal management. Maximum DC Forward Current.

## PART 3 - EXECUTION

### 3.1 INSTALLATIONS

- A. General
  1. Install the type of lighting fixture where shown and indicated in accordance with manufacturer's written instructions.
  2. Provide earthquake clips on all recessed lay-in lighting fixtures as required by building code.
  3. Adjust all adjustable lighting fixtures, as directed by the Architect.
  4. Provide safety chains and wire guards for lighting fixtures located in gymnasium, multi-purpose rooms, play areas, etc.
- B. Coordination
  1. The contractor shall verify the type of fixtures with the ceiling types as indicated on the drawings. Any discrepancies shall immediately be brought to the architect's attention before the contractor places his order and accepts delivery. Fixtures shall fit exact in the type of ceiling scheduled. Provide plaster frames, trim rings and other accessories required for a correct fit.
  2. Provide supports attached to structural member to support fixtures when the ceiling system cannot maintain support. Provide separate supports for all recessed ceiling mounted HID fixtures.
  3. Refer to architectural reflected ceiling plan for the exact location of all lighting fixtures. Notify the architect for any discrepancies or conflicts with structural, architectural, mechanical piping or ductwork before installation.
- C. Mounting
  1. Provide support channels to support outlet boxes used support surface mounted lighting fixtures such as exit signs or downlights.

2. Pendant or surface mounted fixture shall be provided with required mounting devices and accessories, including hickey and stud-extensions, ball-aligners, canopies and stems. Locations of fixtures in mechanical areas shall be coordinated with mechanical contractor. Mounting stems of pendant fixtures shall be of the correct length to uniformly maintain the fixture heights shown on the drawings or established in the field. The allowable variation tolerance in mounting individual fixtures shall not exceed 1/4 inch and shall not vary more than 1/2 inch from the floor mounting height shown on the Drawings. Fixtures hung in continuous runs shall be installed absolutely level and in line with each other. Hanging devices shall comply with Code requirements. Fixtures shall employ single - not twin - stem hangers unless otherwise noted.
3. All structure mounted fixtures (i.e. bracket mounted, pipe mounted and surface mounted) shall be provided with cables of suitable size and weight to support the weight of the fixture. Cables shall be fastened around or fastened to the housing of the fixture. On pendant fixtures, one safety cable of suitable size and weight to support the weight of the fixture assembly shall connect the top of the pendant to the supporting structure by means of welding or bolting, and one safety cable shall connect the housing of the fixture to the bottom of the pendant. Where more than one pendant per fixture occurs, only one pendant must be cabled. Track fixtures for pendant mounted track shall also be supplied with clip-on safety cables of suitable size and weight to support the weight of the fixture.

D. Electrical Connection

1. All light fixtures shall be connected from a branch circuit junction box using 1/2" flexible metal conduit or MC cable fixture pigtails not exceeding 8'- 0". Provide #12 AWG conductors. All fixtures must be grounded by using a grounding conductor. Fixture to fixture wiring of fixtures installed in accessible ceiling is not permitted. Fixture whips shall not lay-on ceiling tile or grid. Provide caddy clips to provide additional support.

3.2 FINAL INSPECTION

- A. Remove all plastic and protective coating from all fixtures. Fixtures shall be thoroughly cleaned. Replace any damaged fixture or fixture parts including reflectors, louvers, lens and metal parts that show signs of corrosion.
- B. Replace all other defective fixtures showing signs of excessive usage.
- C. Demonstrate proper operation of all fixtures and controls. Refer to other sections and details on the drawings for lighting controls.

END OF SECTION

SECTION 27 02 00

BASIC MATERIALS AND METHODS FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. The requirements of the General Conditions and Supplementary Conditions apply to all Work herein.
- B. The Contract Drawings indicate the extent and general arrangement of the systems. If any departure from the Contract Drawings are deemed necessary by the Contractor, details of such departures and the reasons therefore, shall be submitted to the Architect and Engineer for approval as soon as practicable. No such departures shall be made without the prior written approval of the Architect and Engineer.

1.2 SCOPE OF WORK

- A. The Work included under this Contract consists of the furnishing and installation of all labor, material, tools, equipment and services necessary and required to form the complete and functioning systems in all of its various phases, all as shown on the accompanying Drawings and/or described in these Specifications. The contractor shall review all pertinent drawings, including those of other contracts prior to commencement of Work.
- B. This Division requires the furnishing and installing of all items Specified herein, indicated on the Drawings or reasonably inferred as necessary for safe and proper operation; including every article, device or accessory (whether or not specifically called for by item) reasonably necessary to facilitate each system's functioning as indicated by the design and the equipment specified. Elements of the work include, but are not limited to, materials, labor, supervision, transportation, storage, equipment, utilities, all required permits, licenses and inspections. All work performed under this Section shall be in accordance with the Project Manual, Drawings and Specifications and is subject to the terms and conditions of the Contract.
- C. The approximate locations of Communications items are indicated on the Drawings. These Drawings are not intended to give complete and accurate details in regard to location of outlets, apparatus, etc. Exact locations are to be determined by actual measurements at the building, and will in all cases be subject to the Review of the Owner or Engineer, who reserves the right to make any reasonable changes in the locations indicated without additional cost to the Owner.
- D. Items specifically mentioned in the Specifications but not shown on the Drawings and/or items shown on Drawings but not specifically mentioned in the Specifications shall be installed by the Contractor under the appropriate section of work as if they were both specified and shown.
- E. All discrepancies within the Contract Documents discrepancies between the Contract Documents and actual job-site conditions shall be reported to the Owner or Engineer so that they will be resolved prior to the bidding, where this cannot be done at least seven (7) working days prior to bid; the greater or more costly of the discrepancy shall be bid. All labor and materials required to perform the work described shall be included as part of this Contract.
- F. It is the intention of this Section of the Specifications to outline minimum requirements to furnish the Owner with a turn-key and fully operating system in cooperation with other trades.
- G. It is the intent of the above "Scope" to give the Contractor a general outline of the extent of the Work involved; however, it is not intended to include each and every item required for the Work. Anything omitted from the "Scope" but shown on the Drawings, or specified later, or necessary for a complete and functioning Communications system shall be considered a part of the overall "Scope".



- H. Coordinate with other contractors on items required for the proper functioning of communications system and indicated as provided by others, such as power, backboxes, conduits, sleeves, air conditioning, structural support, etc..
- I. Contractor shall participate in the commissioning process; including but not limited to meeting attendance, completion of checklists and participation in functional testing.

### 1.3 RELATED SECTIONS

- A. Div 1 and conditions of the contract
- B. Div 26 Electrical
- C. Div 28 Electronic Safety and Security

### 1.4 COOPERATION WITH TRADES:

- A. Cooperation with trades of adjacent, related, or affected materials or operations shall be considered a part of this work in order to affect timely and accurate placing of work and bring together in proper and correct sequence, the work of such trades.

### 1.5 REFERENCES

- A. National Electrical Code (NEC)
- B. American Society for Testing and Materials (ASTM)
- C. Underwriter's Laboratories, Inc. (UL)
- D. Insulated Cable Engineer's Association (ICEA).
- E. National Electrical Manufacturer's Association (NEMA).
- F. Institute of Electrical and Electronics Engineers (IEEE).
- G. American National Standards Institute (ANSI).
- H. National Fire Protection Association (NFPA).
- I. International Energy Conservation Code (IECC).
- J. BICSI (Building Industry Consulting Services International)
- K. Owner's Design Guidelines and Construction Standards
- L. Local, county, state and federal regulations and codes in effect as of date of installation.

### 1.6 COMPLETE FUNCTIONING OF WORK

- A. All work fairly implied as essential to the complete functioning of the electrical systems shown on the Drawings and Specifications shall be completed as part of the work of this Division unless specifically stated otherwise. It is the intention of the Drawings and Specifications to establish the types of the systems, but not set forth each item essential to the functioning of the system. In case of doubt as to the work intended, or in the event of amplification or clarification thereof, the Contractor shall call upon the Architect for supplementary instructions, Drawings, etc.

- B. Contractor shall review all pertinent Drawings and adjust his work to all conditions shown there on. Discrepancies between Plans, Specifications, and actual field conditions shall be brought to the prompt attention of the Architect.
  - 1. Approximate location of communications outlets, devices, equipment cabinets, cable trays, conduits and sleeves, etc., are indicated on the Drawings. However, the Drawings, do not give complete and accurate detailed locations of such items and exact locations must be determined by actual field measurement. Such locations will, at all times, be subject to the approval of the Architect.
  - 2. Communicate with the Architect and secure his approval of any location about which there may be the least question. Outlets obviously placed in a location not suitable to the finished room or without specific approval, shall be removed and relocated when so directed by the Architect. Location of ceiling devices shall be coordinated with reflected ceiling plans.
- C. Additional coordination with mechanical, electrical, plumbing contractor may be required to allow adequate clearances for all building components. Contractor to notify Architect and Engineer of unresolved clearances, conflicts or equipment locations.

#### 1.7 SCHEMATIC NATURE OF CONTRACT DOCUMENTS

- A. The contract documents are schematic in nature in that they are only to establish scope and a minimum level of quality. They are not to be used as actual working construction drawings. The actual working construction drawings shall be the approved shop drawings.

#### 1.8 QUALITY ASSURANCE

- A. Contractor shall have a complete working knowledge of the communications system being installed.
- B. Contractor shall have installed similar-sized systems in at least ten (10) other projects in the last five (5) years prior to this bid and be regularly engaged in the business of installation of the types of systems specified in this document.
- C. Contractor and individual installation crew members shall be experienced and qualified to perform the work specified herein at time of bid submission. All onsite supervision personnel that will be assigned to this project shall be listed in the Pre-Installation Submittal.
  - 1. 80% shall have a minimum of three (3) years of experience in the installation of the types of systems, equipment, and cables specified in this document prior to this bid.
  - 2. All installation team members must demonstrate knowledge and compliance with all applicable methods, standards, and codes.
  - 3. All members of the Structured Cabling System installation team shall be certified by the Structured Cabling System Assurance Warranty provider as having completed the necessary training to complete their part of the installation and capable of an installation that falls under manufacturer's guidelines necessary to obtain the Manufacturer's System Assurance Warranty.
  - 4. Any personnel substitutions shall be noted in writing to the Owner.
- D. A BICSI RCDD shall supervise and approve all on-site structured cabling work as a recognized member of the Contractor's installation team.
- E. Contractor shall obtain Communications system product manufacturer's certification if applicable.
- F. Refer to General Conditions for other requirements.

#### 1.9 CONTRACTOR REQUIREMENTS

- A. In order to accomplish the conditions of this agreement, the Contractor shall perform the specific duties listed herein.
- B. Contractor shall provide and pay for all labor, supervision, tools, equipment, test equipment, tests and services to provide and install a complete communications cabling infrastructure system. Pay all required sales, gross receipts, and other taxes.

- C. Insurance
  1. The Contractor shall procure, submit for review, and maintain for the duration of this agreement, insurance against claims for injuries to persons or damages to property which may arise from, or in connection with, the performance of work hereunder by the Contractor, his agents, representatives, employees or subcontractor. The Contractor shall pay the cost of such insurance.
  2. The Owner, its directors, officers, representatives, agents and employees, respectively, shall have no responsibility to the Contractor with respect to any insurance in accordance with the provisions set forth herein.
  
- D. Regulatory Requirements
  1. Communications Contractor shall supply all city, county, and state telecommunication cabling permits required by Authority Having Jurisdiction (AHJ).
  2. Communications Contractor shall be licensed and/or bonded as required for telecommunications/low voltage cabling systems.
  
- E. Privacy and Confidentiality
  1. The Contractor will respect and protect the privacy and confidentiality of Owner, its employees, processes, products, and intellectual property to extent necessary, consistent with the legal responsibilities of the Owner policies.
  2. Contractors shall sign a non-disclosure agreement and abide by the requirements to keep confidential all information concerning bid documents and this project.
  
- F. Use of Subcontractors
  1. Successful bidder shall inform the Owner's contact and General Contractor in writing about the intention to use Subcontractors and the scope of work for which they are being hired.
  2. The Owner or Owner's designated contact must approve the use of Subcontractors in writing prior to the Subcontractor's hiring and start of any work.
  
- G. The Contractor's designated Project Manager will be recognized as the single point of contact. The Project manager shall oversee all work performed to ensure compliance with specifications as outlined in bid documents (which includes all specifications, references, and drawings) to ensure a quality installation and attend project meetings with the telecommunication consultant, the Owner and others.
  
- H. Coordination
  1. Coordinate installation work with other trades (examples include ceiling grid contractors, HVAC and sheet metal contractors, etc.) to resolve procedures and installation placement for cable trays and cable bundle pathways.
  2. The goal of this coordination will be to establish priority pathways for critical data/voice network cable infrastructure, materials, associated hardware, as well as mitigate delays to the project and to allow service access for communications components.
  3. Exchange information and agree on details of equipment arrangements and installation interfaces.
  4. Coordinate with electrical contractors and plan for the pathway routes used communications cabling to minimize cable lengths. Report any potential over distance cable runs for approval before pulling the cables.
  5. Record agreements with other trades and distribute record to other participants, Owner and telecommunication consultant.

#### 1.10 DATE OF FINAL ACCEPTANCE

- A. The date of final acceptance shall be the date of owner occupancy, or the date all punch list items have been completed or final payment has been received. Refer to Division One for additional requirements.
  
- B. The date of final acceptance shall be documented in writing and signed by the architect, owner and contractor.

## 1.11 DEFINITIONS AND SYMBOLS

- A. General Explanation: A substantial amount of construction and Specification language constitutes definitions for terms found in other Contract Documents, including Drawings which must be recognized as diagrammatic and schematic in nature and not completely descriptive of requirements indicated thereon. Certain terms used in Contract Documents are defined generally in this article, unless defined otherwise in Division 1.
- B. Definitions and explanations of this Section are not necessarily either complete or exclusive, but are general for work to the extent not stated more explicitly in another provision of the Contract Documents.
- C. Indicated: The term "Indicated" is a cross-reference to details, notes or schedules on the Drawings, to other paragraphs or schedules in the Specifications and to similar means of recording requirements in Contract Documents. Where such terms as "Shown", "Noted", "Scheduled", "Specified" and "Detailed" are used in lieu of "Indicated", it is for the purpose of helping the reader locate cross-reference material, and no limitation of location is intended except as specifically shown.
- D. Directed: Where not otherwise explained, terms such as "Directed", "Requested", "Accepted", and "Permitted" mean by the Architect or Engineer. However, no such implied meaning will be interpreted to extend the Architect's or Engineer's responsibility into the Contractor's area of construction supervision.
- E. Reviewed: Where used in conjunction with the Engineer's response to submittals, requests for information, applications, inquiries, reports and claims by the Contractor the meaning of the term "Reviewed" will be held to limitations of Architect's and Engineer's responsibilities and duties as specified in the General and Supplemental Conditions. In no case will "Reviewed" by Engineer be interpreted as a release of the Contractor from responsibility to fulfill the terms and requirements of the Contract Documents.
- F. Furnish: Except as otherwise defined in greater detail, the term "Furnish" is used to mean supply and deliver to the project site, ready for unloading, unpacking, assembly, installation, etc., as applicable in each instance.
- G. Install: Except as otherwise defined in greater detail, the term "Install" is used to describe operations at the project site including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protection, cleaning and similar operations, as applicable in each instance.
- H. Provide: Except as otherwise defined in greater detail, the term "Provide" is used to mean "Furnish and Install", complete and ready for intended use, as applicable in each instance.
- I. Installer: Entity (person or firm) engaged by the Contractor or its subcontractor or Sub-contractor for performance of a particular unit of work at the project site, including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protection, cleaning and similar operations, as applicable in each instance. It is a general requirement that such entities (Installers) be expert in the operations they are engaged to perform.
- J. Imperative Language: Used generally in Specifications. Except as otherwise indicated, requirements expressed imperatively are to be performed by the Contractor. For clarity of reading at certain locations, contrasting subjective language is used to describe responsibilities that must be fulfilled indirectly by the Contractor, or when so noted by other identified installers or entities.
- K. Minimum Quality/Quantity: In every instance, the quality level or quantity shown or specified is intended as minimum quality level or quantity of work to be performed or provided. Except as otherwise specifically indicated, the actual work may either comply exactly with that minimum (within specified tolerances) or may exceed that minimum within reasonable tolerance limits. In complying with requirements, indicated or scheduled numeric values are either minimums or maximums as noted or as appropriate for the context of the requirements. Refer instances of uncertainty to Owner or Engineer via a request for information (RFI) for decision before proceeding.

- L. Abbreviations and Symbols: The language of Specifications and other Contract Documents including Drawings is of an abbreviated type in certain instances and implies words and meanings which will be appropriately interpreted. Actual word abbreviations of a self-explanatory nature have been included in text of Specifications and Drawings. Specific abbreviations and symbols have been established, principally for lengthy technical terminology and primarily in conjunction with coordination of Specification requirements with notations on Drawings and in Schedules. These are frequently defined in Section at first instance of use or on a Legend and Symbol Drawing. Trade and industry association names and titles of generally recognized industry standards are frequently abbreviated. Singular words will be interpreted as plural and plural words will be interpreted as singular where applicable and where full context of Contract Documents so indicate. Except as otherwise indicated, graphic symbols and abbreviations used on Drawings and in Specifications are those recognized in construction industry for indicated purposes. Where not otherwise noted symbols and abbreviations are defined by 1993 ASHRAE Fundamentals Handbook, chapter 34 "Abbreviations and Symbols", ASME and ASPE published standards.

#### 1.12 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to the project properly identified with names, model numbers, types, grades, compliance labels, and other information needed for identification.
- B. Deliver products to the project at such time as the project is ready to receive the equipment, pipe or duct properly protected from incidental damage and weather damage.
- C. Damaged equipment shall be promptly removed from the site and new, undamaged equipment shall be installed in its place promptly with no additional charge to the Owner.

#### 1.13 SUBMITTALS

- A. Coordinate with Division 01 for submittal timetable requirements, unless noted otherwise within thirty (30) days after the Contract is awarded. The Contractor shall submit an electronic copy of a complete set of shop drawings and complete product data covering each item of equipment or material. The submittal of each item requiring a submittal must be received by the Architect or Engineer within the above thirty-day period. The Architect or Engineer shall not be responsible for any delays or costs incurred due to excessive shop drawing review time for submittals received after the thirty-day (30) time limit. The Architect and Engineer will retain a copy of all shop drawings for their files. All literature pertaining to items subject to Shop Drawing submittal shall be submitted at one time. Submittals shall be placed in one electronic file in PDF format and bookmarked for individual specification sections. Individual electronic files of submittals for individual products shall not be permitted. Each submittal shall include the following items:
  - 1. A cover sheet with the names and addresses of the Project, Architect, Engineer, General Contractor and the Subcontractor making the submittal. The cover sheet shall also contain the section number covering the item or items submitted and the item nomenclature or description.
  - 2. An index page with a listing of all data or drawings included in the Submittal.
  - 3. Product Data and Shop Drawings shall be submitted in separate submittals, to avoid rejection of one due to errors in the other.
- B. Shop Drawings
  - 1. Communications Contractor shall submit, for approval, floor plans that identify all device locations, device ID, cable routes and quantities, cable types, riser locations, and references to installation details and diagrams.
    - a. Communication Contractor shall notify A&E team of any cable routes that will exceed the permanent link distance limit and get approval before work to start. Without advance notice and approval from A&E team, the contractor shall be fully responsible for make corrections as needed to bring all installed cables within the distance limit.
  - 2. Communications Contractor shall submit, for approval, diagrams that show communications room layouts, rack layouts (including wall and rack elevations), cabling riser and interconnection diagrams, etc.

3. Communications Contractor shall submit, for approval, labelling scheme for all communications devices and cabling components (faceplates, horizontal cables, riser cables, inter-building cables, racks, patch panels, etc.) installed.
  4. The Contractor shall make any corrections as required by the Engineer and submit revised shop drawings to the team for approval.
  5. Approval by the Engineer of such drawings or schedules shall not relieve the Contractor from responsibility for deviations from the drawings or specifications, nor shall it relieve the Contractor from responsibility for errors of any sort in shop drawings or schedules. Requests to deviate shall be submitted in writing to the Architect.
  6. Drawings shall show the proposed firestop systems and locations, (stamped/embossed by the PE) to restore/maintain the designed fire rating of the building structure (walls, ceilings, floors, etc).
  7. Shop Drawings shall be newly prepared and not reproduced from the Contract Documents. Drawings shall be prepared by a draftsman skilled in this type of work. Submitting copy of the engineering drawings or engineering drawings with contractor's markup as shop drawings is NOT ACCEPTABLE.
  8. Shop drawings shall be developed in coordination with other trades (MEP, Architecture, Structural, etc.) to avoid any collision or conflict and to meet all industry standards best practices, codes and regulation requirements. By submitting shop drawings on the project, this Contractor is indicating that all necessary coordination has been completed and that the systems, products and equipment submitted can be installed in the building and will operate as specified
  9. Additional coordination with other trade contractors may be required to allow adequate clearances and meet code requirements. All transitions, offsets and relocations as required by actual field conditions shall be performed by the contractor at no additional cost to the owner
- C. Product Data Submittals
1. Communications Contractor shall submit catalogue cutsheets that include manufacturer, trade name, and complete model number for each product specified. Model number shall be handwritten and/or highlighted to indicate exact selection.
  2. Communications Contractor shall identify applicable specification section reference for each product performance for each component specified for approval prior to purchase and installation.
  3. Product information sheets for the proposed system test equipment to include certification of test equipment calibration. Installer is to use test equipment with a calibration date within one year of test date. Installer is to recalibrate and resubmit if necessary.
  4. All data sheets shall be organized by specification sections and provided with table of contents. All products required in the spec section shall be included in one submittal.
  5. Provide specification variations pages with a listing all variations, including unfurnished or additional required accessories, items or other features, between the submitted equipment and the specified equipment. If there are no variations, then this specification page shall state "NO VARIATIONS". Where variations affect the work of other Contractors, then the Contractor shall certify on this page that these variations have been fully coordinated with the affected Contractors and that all expenses associated with the variations will be paid by the submitting Contractor, and this page shall be signed by the submitting Contractor.
  6. Equipment information including manufacturer's name and designation, size, performance and capacity data as applicable. All applicable Listings, Labels, Approvals and Standards shall be clearly indicated.
  7. Dimensional data and scaled drawings as applicable to show that the submitted equipment will fit the space available with all required Code and maintenance clearances clearly indicated and labeled at a minimum scale of 1/4" = 1'-0", as required to demonstrate that the alternate or substituted product will fit in the space available.
  8. Identification of each item of material or equipment matching that indicated on the Drawings.
  9. Sufficient pictorial, descriptive and diagrammatic data on each item to show its conformance with the Drawings and Specifications. Any options or special requirements or accessories shall be so indicated. All applicable information shall be clearly indicated with arrows or another approved method.
  10. All product substitutions shall be submitted in advance for review and approval before being included in product submittal package.
  11. Certification by the General Contractor and Subcontractor that the material submitted is in accordance with the Drawings and Specifications, signed and dated in longhand.
- D. Structured Cabling System Warranty

1. The Communications Contractor shall submit appropriate documentation from the certifying manufacturer showing the project is registered and qualified for the System Assurance Warranty.
  2. All subsequent work shall be in accordance with approved submittals. The Communications Contractor shall not perform any portion of the work requiring approval of the System Assurance Warranty manufacturer's warranty registration qualification procedures that would disqualify any part or all of the wiring system from that warranty qualification.
- E. Qualifications
1. Communications Contractor shall submit a list of the Contractor's previous projects that demonstrate qualification for this project. This list shall include, but not be limited to:
    - a. At least ten (10) other projects in the last five (5) years
    - b. Name and location of project
    - c. Project contacts, email addresses, and phone numbers
    - d. Total square footage
    - e. Total number of cables/drops
    - f. Types of media
  2. Communications Contractor shall submit an up-to-date and valid statement of qualifications for those assigned to perform the work specified herein at time of bid submission.
    - a. Communications Contractor Employees
    - b. Subcontractors
  3. Manufacturer certifications for Contractor and installers.
- F. Cable Testing Plan
1. The Contractor shall provide a complete and detailed test plan for approval of the cabling system specified herein, including a complete list of test equipment for copper and fiber components and accessories prior to beginning cable testing.
  2. The following minimal items shall be submitted for review:
    - a. A testing plan that clearly describes procedures and methods.
    - b. Product data for test equipment.
    - c. Certifications and qualifications of all persons conducting the testing.
    - d. Calibration certificates indicating that equipment calibration meets National Institute of Standards and Technology (NIST) standards and has been calibrated at least once in the previous year of the testing date.
    - e. Examples of test reports, including all graphs, tables, and charts necessary for display of testing results.
- G. Samples
1. For workstation outlet connectors, jack assemblies, housings and faceplates for color selection and evaluation of technical specifications and requirements. Confirm with Architect, interior designer, and Owner representative for color before purchasing materials.
- H. Refer to Division 1 for additional information on shop drawings and submittals.
- I. Where shop drawings and submittals are marked "REVIEWED", the review of the submittal does not indicate that submittals have been checked in detail nor does it in any way relieve the Contractor from his responsibility to furnish material and perform work as required by the Contract Documents.
- J. Submittals shall be reviewed and returned to the Contractor with one of the following categories indicated:
1. REVIEWED: Contractor does not need to take further submittal action, shall include this submittal in the O&M manual, and verify with Architects and other parties (Owner, etc) reviewing the submittals that no other correction is required before placing orders and starting installations.
  2. REVIEWED AS NOTED: Contractor shall submit a letter verifying that required exceptions to the submittal have been received and complied with including additional accessories or coordination action as noted, and shall include this submittal and compliance letter in the O&M manual. The contractor may order the equipment submitted on at the time of the returned submittal providing the Contractor complies with the exceptions noted, and verified with Architects and other parties (Owner, etc) reviewing the submittals that no other correction is required before placing orders and starting installations.

3. NOT APPROVED: Contractor shall resubmit new submittal on material, equipment or method of installation when the alternate or substitute is not approved, the Contractor will automatically be required to furnish the product, material or method named in the Specifications and/or drawings. Contractor shall not order equipment that is not approved. Repetitive requests for substitutions will not be considered.
  4. REVISE AND RESUBMIT: Contractor shall resubmit new submittal on material, equipment or method of installation when the alternate or substitute is marked revise and resubmit, the Contractor will automatically be required to furnish the product, material or method named in the Specifications and/or provide as noted on previous shop drawings. Contractor shall not order equipment marked revise and resubmit. Repetitive requests for substitutions will not be considered.
  5. CONTRACTOR'S CERTIFICATION REQUIRED: Contractor shall resubmit submittal on material, equipment or method of installation. The Contractor's stamp is required stating the submittal meets all conditions of the contract documents. The stamp shall be signed by the General Contractor. The submittal will not be reviewed if the stamp is not placed and signed on all shop drawings.
  6. MANUFACTURER NOT AS SPECIFIED: Contractor shall resubmit new submittal on material, equipment or method of installation when the alternate or substitute is marked manufacturer not as specified, the Contractor will automatically be required to furnish the product, material or method named in the specifications. Contractor shall not order equipment where submittal is marked manufacturer not as specified. Repetitive requests for substitutions will not be considered.
- K. Materials and equipment which are purchased or installed without shop drawing review shall be at the risk of the Contractor and the cost for removal and replacement of such materials and equipment and related work which is judged unsatisfactory by the Owner or Engineer for any reason shall be at the expense of the Contractor. The responsible Contractor shall remove the material and equipment noted above and replace with specified equipment or material at his own expense when directed in writing by the Architect or Engineer.
- L. Refer to each specification section for additional requirements.

#### 1.14 COORDINATION DRAWINGS

- A. Before submit shop drawings, Contractor shall prepare coordination drawings to a scale of 1/4"=1'-0" or larger; detailing major elements, components, and systems of mechanical equipment and materials in relationship with other systems, installations, and building components. Indicate locations where space is limited for installation and access and where sequencing and coordination of installations are of importance to the efficient flow of the Work, including (but not necessarily limited to) the following:
1. Indicate the proposed locations of communications conduits/sleeves, cable trays, equipment, cabinet and other materials. Include the following:
    - a. Wall and type locations.
    - b. Clearances from other building structure and MEP equipment.
    - c. Clearances for servicing and maintaining equipment and cabling, and space for equipment disassembly required for periodic maintenance.
    - d. Equipment connections and support details.
    - e. Exterior wall and foundation penetrations.
    - f. Fire-rated wall and floor penetrations.
    - g. Sizes and location of required concrete pads and bases.
    - h. Structural floor, wall and roof opening sizes and details.
  2. Indicate scheduling, sequencing, movement, and positioning of large equipment into the building during construction.
  3. Prepare floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.
  4. Prepare reflected ceiling plans to coordinate and integrate installations, air distribution devices, light fixtures, communication systems components, and other ceiling-mounted items.
- B. This Contractor shall be responsible for coordination of all items that will affect the installation of the work of this Division. This coordination shall include, but not be limited to: cable routing, equipment location, clearance, space requirements, sequence of construction, building requirements and special conditions.



- C. By submitting shop drawings on the project, this Contractor is indicating that all necessary coordination has been completed and that the systems, products and equipment submitted can be installed in the building and will operate as specified and intended, in full coordination with all other Contractors and Subcontractors.

#### 1.15 OPERATION AND MAINTENANCE MANUALS

- A. Prepare maintenance manuals in accordance with Division 1 and in addition to the requirements specified in Division 1, include the following information for equipment items:
1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.
  2. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
  3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
  4. Servicing instructions and lubrication charts and schedules.
  5. Prepare maintenance manuals in accordance with Special Project Conditions, in addition to the requirements specified in Division 27, include the following information for equipment items:
    - a. Identifying names, name tags designations and locations for all equipment.
    - b. Fault Current calculations and Coordination Study.
    - c. Reviewed shop drawing submittals with exceptions noted compliance letter.
    - d. Fabrication drawings.
    - e. Equipment and device bulletins and data sheets clearly highlighted to show equipment installed on the project and including performance curves and data as applicable, i.e., description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and model numbers of replacement parts.
    - f. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
    - g. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions, servicing instructions and lubrication charts and schedules.
    - h. Equipment name plate data.
    - i. Wiring diagrams.
    - j. Exploded parts views and parts lists for all equipment and devices.
    - k. Color coding charts for all painted equipment and conduit.
    - l. Location and listing of all spare parts and special keys and tools furnished to the Owner.
    - m. Furnish recommended lubrication schedule for all required lubrication points with listing of type and approximate amount of lubricant required.
  6. The Communications Contractor shall deliver the Installer's Extended Product Warranty and Manufacturer's signed System Assurance Warranty of installed cabling system to include all components that comprise the complete cabling system.
    - a. Delivery shall be completed within two (2) weeks of the time of final punch list review.
  7. Product Certificates shall be signed by manufacturers of cables, connectors, and terminal equipment certifying that products furnished comply with requirements.
  8. Cable Testing Report Requirements
    - a. Submit certified test reports of Contractor-performed tests. Contractor shall submit the required Test Reports in the format and media specified, upon completion of testing the installed system.
  9. The tests shall clearly demonstrate that the media and its components fully comply with the requirements specified herein.
  10. Three (3) sets of electronic and hardcopy versions of test reports shall be submitted together and clearly identified with cable designations.
  11. Cable inventory data shall be submitted for all fiber, copper, and coaxial cabling and termination components. Include products furnished:
    - a. Manufacturer's name
    - b. Manufacturer's part numbers
    - c. Cable designations

- d. Location and riser assignments
  - e. Product Data
12. The Contractor's BICSI Registered Communications Distribution Designer (RCDD) supervisor shall review, approve and stamp all documents prior to submitting. The Contractor's RCDD shall warrant in writing that 100% of the installation meets the requirements specified herein upon completion of all work.
13. Supply Owner with training manuals with instructions on methods of adding or removing cabling to/from firestopped sleeves and chases.

1.16 RECORD DRAWINGS

- A. Maintain a continuous record during the course of construction of all changes and deviations in the work from the contract drawings. Upon completion of the work, purchase a set of "Auto Positive Tracings" on vellum and make corrections as required to reflect the electrical systems as installed. Location and size of all conduit shall be accurately shown to dimension. Submit three prints of the tracings for approval. Make corrections to tracings as directed and deliver "Auto Positive Tracings" to the Architect. Record drawings shall be furnished in addition to shop drawings. Symbols on the Record drawings shall correspond to the identification symbols on the contract drawings and equipment identification plates and tags.
- B. The Contractor shall maintain a set of clearly marked black line record "AS-BUILT" prints on the job site on which he shall mark all work details, alterations to meet site conditions and changes made by "Change Order" notices. These shall be kept available for inspection by the Owner, Architect or Engineer at all times.
- C. Refer to Division 1 for additional requirements concerning record drawings. If the Contractor does not keep an accurate set of as-built drawings, the pay request may be altered or delayed at the request of the Architect. Mark the drawings with a colored pencil. Delivery of as-built prints and reproducibles is a condition of final acceptance.
- D. The record prints shall be updated on a daily basis and shall indicate accurate dimensions for all buried or concealed work, precise locations of all concealed device and cabling, and any deviations from the work shown on the Construction Documents which are required for coordination. All dimensions shall include at least two dimensions to permanent structure points.
- E. Submit three prints of the tracings for approval. Make corrections to tracings as directed and delivered "Auto Positive Tracings" to the architect. "As-Built" drawings shall be furnished in addition to shop drawings.
- F. For all cables and devices served from a wall mounted equipment enclosure, provide printed as-built wiring diagram showing all the cable route and type, device IDs and locations, and brand and models of all system components inside the enclosure, and attach the wiring diagram to the interior face of the enclosure's front door.
- G. When the option described in paragraph E., above is not exercised then upon completion of the work, the Contractor shall transfer all marks from the submit a set of clear concise set of reproducible record "AS-BUILT" drawings and shall submit the reproducible drawings with corrections made by a competent draftsman and three (3) sets of black line prints to the Architect or Engineer for review prior to scheduling the final inspection at the completion of the work. The reproducible record "AS-BUILT" drawings shall have the Engineers Name and Seal removed or blanked out and shall be clearly marked and signed on each sheet as follows:

CERTIFIED RECORD DRAWINGS  
DATE:  
(NAME OF GENERAL CONTRACTOR)  
BY: \_\_\_\_\_  
(SIGNATURE)  
(NAME OF SUBCONTRACTOR)  
BY: \_\_\_\_\_  
(SIGNATURE)

#### 1.17 CERTIFICATIONS AND TEST REPORTS

- A. Submit a detailed schedule for completion and testing of each system indicating scheduled dates for completion of system installation and outlining tests to be performed and schedule date for each test. This detailed completion and test schedule shall be submittal at least 90 days before the projected Project completion date.
- B. Test result reporting forms shall be submitted for review no later than the date of the detailed schedule submitted.
- C. Submit 4 copies of all certifications and test reports to the Architect or Engineer for review adequately in advance of completion of the Work to allow for remedial action as required to correct deficiencies discovered in equipment and systems.
- D. Certifications and test reports to be submitted shall include, but not be limited to those items outlined in Section of Division 27.

#### 1.18 OPERATOR TRAINING

- A. The Contractor shall furnish the services of factory trained specialists to instruct the Owner's operating personnel. The Owner's operator training shall include 12 hours of onsite training in three 4-hour shifts.
- B. Before proceeding with the instruction of Owner Personnel, prepare a typed outline in triplicate, listing the subjects that will be covered in this instruction, and submit the outline for review by the Owner. At the conclusion of the instruction period obtain the signature of each person being instructed on each copy of the reviewed outline to signify that he has a proper understanding of the operation and maintenance of the systems and resubmit the signed outlines.
- C. Refer to other Division 27 Sections for additional Operator Training requirements.

#### 1.19 SITE VISITATION

- A. Visit the site of the proposed construction in order to fully understand the facilities, difficulties and restriction attending the execution of the work.
- B. Before submitting a bid, it will be necessary for each Contractor whose work is involved to visit the site and ascertain for himself the conditions to be met therein in installing his work and make due provision for same in his bid. It will be assumed that this Contractor in submitting his bid has visited the premises and that his bid covers all work necessary to properly install the equipment shown. Failure on the part of the Contractor to comply with this requirement shall not be considered justification for the omission or faulty installation of any work covered by these Specifications and Drawings.
- C. Understand the existing utilities from which services will be supplied; verify locations of utility services and determine requirements for connections.
- D. Determine in advance that equipment and materials proposed for installation fit into the confines indicated.

#### 1.20 WARRANTY

- A. The undertaking of the work described in this Division shall be considered equivalent to the issuance, as part of this work, of a specific guarantee extending one year beyond the date of completion of work and acceptance by Owner, against defects in materials and workmanship. Materials, appliances and labor necessary to effect repairs and replacement so as to maintain said work in good functioning order shall be provided as required. Replacements necessitated by normal wear in use or by Owner's abuse are not included under this guarantee.

- B. All normal and extended warranties shall include parts, labor, miscellaneous materials, travel time, incidental expenses, freight/shipping, refrigerant, oils, lubricants, belts, filters and any expenses related to service call required to diagnose warranty problems.
- C. Structured System Warranty
  1. The Contractor shall be a certified Manufacturer's Value Added Reseller (VAR) and/or Authorized Installer and provide an end-to-end product warranty, adhere to the industry standard engineering, installation and testing procedures and utilize the authorized manufacturer components and distribution channels in provisioning this project.
  2. Contractor shall coordinate with manufacturer for warranty paperwork and procedures prior to the start of the project.
  3. Contractor shall provide a minimum one (1) year warranty on installation and workmanship PLUS an Extended Product Warranty and System Assurance Warranty for this wiring system and shall commit to make available local support for the product and system during the Warranty period.
    - a. The Extended Product Warranty shall apply to all passive structured cabling system components and shall cover the replacement or repair of defective products and labor for the replacement or repair of such defective products for a minimum of one (1) year.
    - b. The System Assurance Warranty provides a complete system and product warranty that will be extended to the end-user, ensuring the structured cabling system will be free of defects in materials and workmanship, will meet or exceed applicable performance requirements defined in the contract documents, and support all current and future network applications for a minimum of twenty (20) years.
  4. System Certification: Upon successful completion of the installation and subsequent inspection, the customer shall be provided with a numbered certificate, from the manufacturer, registering the installation.

#### 1.21 TRANSFER OF ELECTRONIC FILES

- A. Project documents are not intended or represented to be suitable for reuse by Architect/Owner or others on extensions of this project or on any other project. Any such reuse or modification without written verification or adaptation by Engineer, as appropriate for the specific purpose intended, will be at Architect/Owner's risk and without liability or legal exposure to Engineer or its consultants from all claims, damages, losses and expense, including attorney's fees arising out of or resulting thereof.
- B. Because data stored in electric media format can deteriorate or be modified inadvertently, or otherwise without authorization of the data's creator, the party receiving the electronic files agrees that it will perform acceptance tests or procedures within sixty (60) days of receipt, after which time the receiving party shall be deemed to have accepted the data thus transferred to be acceptable. Any errors detected within the sixty (60) day acceptance period will be corrected by the party delivering the electronic files. Engineer is not responsible for maintaining documents stored in electronic media format after acceptance by the Architect/Owner.
- C. When transferring documents in electronic media format, Engineer makes no representations as to the long term compatibility, usability or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by Engineer at the beginning of the Project.
- D. Any reuse or modifications will be Contractor's sole risk and without liability or legal exposure to Architect, Engineer or any consultant.
- E. The Texas Board of Architectural Examiners (TBAE) has stated that it is in violation of Texas law for persons other than the Architect of record to revise the Architectural drawings without the Architect's written consent.
  1. It is agreed that "MEP" hard copy or computer-generated documents will not be issued to any other party except directly to the Architect/Owner. The contract documents are contractually copyrighted and cannot be used for any other project or purpose except as specifically indicated in AIA B-141 Standard Form of Agreement Between Architect and Owner.

2. If the client, Architect or Owner of the project requires electronic media for "record purposes", then AutoCAD/ Revit documents will be prepared by Engineer on electronic media such as removable memory devices, flash drives or CD's. These documents can also be submitted via file transfer protocols. AutoCAD/ Revit files will be submitted with all title block references intact to permit the end user to only view and plot the drawings. Revisions will not be permitted in this configuration.
3. At the Architect/Owner's request, Engineer will assist the Contractor in the preparation of the submittals and prepare one copy of AutoCAD/ Revit files on electronic media or submit through file transfer protocols. The electronic media will be prepared with all indicia of documents ownership removed. The electronic media will be prepared in a ".rvt" or ".dwg" format to permit the end user to revise the drawings.

#### 1.22 PRE-INSTALLATION MEETINGS

- A. Communications Contractor shall attend and/or arrange a scheduled pre-installation conference prior to beginning any work of this section. This venue is to ask and clarify questions in writing with consultant and/or project manager/Owner representative.
- B. Agenda
  1. Safety
  2. Work to be performed
  3. Scheduling
  4. Coordination
  5. Other topics as necessary
- C. Attendance
  1. Communications project manager/supervisor shall attend meetings arranged by General Contractor, Owner's representatives, and other parties affected by work of this document.
  2. All individuals who will serve in an on-site supervisory capacity, including project managers, site supervisors, and lead installers, shall be required to attend the pre-installation conference. Individuals who do not attend the conference will not be permitted to supervise the installation and testing of communications cables on the project.

#### 1.23 CONTRACT ADMINISTRATION

- A. The Engineer may perform site visits and provide job field reports upon inspection of Contractor's installation, materials, supporting hardware, coordination with other trades and progress to schedule to the client.
- B. Job Field Report outline:
  1. General: The general installation progress in relation to scheduled work made by the Contractor up to that date.
  2. Deficiencies and/or Items of Note: Documents observations of the cable installation that may require corrective action by the Contractor.

#### 1.24 POST INSTALLATION MEETINGS

- A. At the time of substantial completion the contractor shall call and arrange for a post installation meeting to present and review all submittal documents to include but not be limited to As-Built Drawings, Test reports, Warranty paperwork, etc.
- B. Attendees shall include
  1. Communications Contractor
  2. Project Manager/Owner Representative
  3. General Contractor
  4. Communications Engineer.
  5. Other trades that the GC deems appropriate.
- C. At this meeting the Communications Contractor shall present and explain all documentation.

- D. Any discrepancies or deviations noted by and agreed to by participants shall be remedied by the Communications Contractor and resubmitted within one (1) week of the meeting.

## PART 2 - PRODUCTS

### 2.1 SUBSTITUTIONS

- A. The names and manufacturers and model numbers have been used in the Contract documents to establish types of equipment and standards of quality. Where more than one manufacturer is named for a specific item of equipment, only one of the specified manufacturers will be considered for approval. Where only one manufacturer is mentioned with the phrase "or approved equal", Contractor may submit an alternate manufacturer for consideration, provided the following conditions are met:
  - 1. Submit alternate equipment with complete descriptive data in shop drawing form. Provide sample of equipment upon request for review by Architect. Samples will be returned if requested in writing.
  - 2. Alternate equipment must be equal from the standpoint of materials, construction and performance.
  - 3. Alternate submittal must be presented to the Engineer/Architect ten (10) days prior to bid date for approval.
- B. Where only one manufacturer is mentioned without the phrase "or approved equal". No substitution is allowed. If the product specified is discontinued, Contractor shall submit an alternate product of equal or better performance at no additional cost for review and approval.
- C. The Architect and Engineer shall be the sole judge of quality and equivalence of equipment, materials and methods.

### 2.2 GENERAL REQUIREMENTS

- A. All materials and products used on this project shall be listed by Underwriters' Laboratories.
- B. Equipment and materials shall be standard products of a manufacturer regularly engaged in the manufacture of telecommunications cabling products and shall be the manufacturer's latest standard design in satisfactory use for at least one year prior to bid opening.
- C. All material and equipment, as provided, should be the standard Commercial-Off-The-Shelf (COTS) products of a manufacturer engaged in the manufacturing of such products.
  - 1. All shall be typical commercial designs that comply with the requirements specified.
  - 2. All material and equipment shall be readily available through manufacturers and/or distributors.
- D. Installer is to comply in every way with the requirements of local laws, ordinances, and rules, , the National Board of Fire Underwriters, and the National Electrical Code.
- E. In the event of any conflicts between documents referenced herein and the contents of this specification, the Installer is to notify in writing to the Architect/Engineer of any such occurrences before the purchasing of any equipment, materials and/or installation by the Installer. The Architect/Engineer will notify the Installer of any actions required to resolve these conflicts.
- F. No change in the plans or in the specifications is to be made without written instruction to do so from the Owner or Architect/Engineer.
- G. Materials are to be installed in accordance with manufacturer's recommendations and best industry practices.
- H. The Installer is to promptly correct all discrepancies and/or defects for which the Installer is responsible.
  - 1. The Installer is to maintain a set of working specifications and drawings on site at all times and to make this set available for inspection during site visits.
- I. All materials are to be new and of the highest quality.

- J. All products installed in the above ceiling space are to meet or exceed the Underwriters Laboratories (UL) fire rated cable insulation requirements and are to be Plenum rated.
- K. The Installer is to seal ALL penetrations, conduits, sleeves, cable trays, etc., where cabling has been installed through rated walls/floors with Wiremold Flamestopper intumescent fire- stop system ( or approved equivalent) where they pass through rated walls. The Installer is responsible for returning any and all penetrations through rated walls or floors made for communications cable to their pre-penetration rating.
- L. All material used to dress cable bundles shall be applied loosely to allow the dressing material to slide around the bundle. Tension of dressing materials shall not deform the cable sheath. Dressing materials should be limited to the telecommunications rooms only. Cabling shall be placed unbundled in cable tray and/or j hooks in the above ceiling spaces. No bundling materials are to be used above ceiling. All j hooks installed shall include the corresponding clip provided by the hook manufacturer. Plastic cable ties will not be permitted.
- M. Any discrepancy in the contract documents is to be remedied by the Installer providing and installing the newer, greater quality or quantity of the item or items in question.
- N. Horizontal cabling is to have minimum ten (10) feet of service loop coiled and stored above the ladder rack in the telecommunication room.
- O. Horizontal cabling is to have no less than twelve (12) and no more than eighteen (18) inches of maintenance loop coiled and stored as close to the entrance to the workstation outlet as possible.
- P. Horizontal cabling is to have no less than six (6) and no more than twelve (12) inches of maintenance loop coiled and stored inside the back box at the workstation outlet.
- Q. Horizontal cable lengths for individual links shall not exceed 90 m (295 ft) from the point of termination at the connector to the point of termination at the patch panel.
- R. A pull cord (nylon; 1/8" minimum) shall be co-installed with all cable installed in any conduit.
- S. Provide nylon bushings for all conduit openings.
- T. All horizontal cables not in a cable tray or conduit shall be supported at a maximum of 48 to 60 inch intervals. Cable support system is to be independent of supports for other trades. At no point shall cable(s) make contact with acoustic ceiling supports, grids, panels, electrical conduits, water pipes or HVAC ductwork or supports.
- U. Any cable damaged or exceeding recommended installation parameters during installation shall be replaced by the installer prior to final acceptance at no cost to the Owner.
- V. Pair untwist at the termination shall not exceed 3.18mm.
- W. Bend radius of the cable in the termination area shall not be less than 4 times the outside diameter of the cable.
- X. The cable jacket shall be maintained to within 25mm (one inch) of the termination point.

### 2.3 ACCESS DOORS

- A. Wherever access is required in walls or ceilings to concealed junction boxes, pull boxes, equipment, etc., installed under this Division, furnish a hinged access door and frame with flush latch handle to another Division for installation. Doors shall be as follows:
  - 1. Plaster Surfaces: Milcor Style K.
  - 2. Ceramic Tile Surfaces: Milcor Style M.

3. Drywall Surfaces: Milcor Style DW.
4. Install panels only in locations approved by the Architect.

## 2.4 FIRE STOPPING

- A. Contractor shall restore the fire rating of penetrations to rated walls, ceiling, flooring after cable pulling. Fire stopping products shall be as follows:
  1. Hilti
  2. SpecSeal
  3. 3M
  4. Owner approved alternate

## 2.5 IDENTIFICATION (LABELING) SYSTEM

- A. Contractor shall label all communications system components installed. Labeling products shall be as follows:
  1. Brady (LAT-19-361-4)
  2. Dymo
  3. Hellerman-Tyton
  4. Owner approved alternate

## 2.6 ESCUTCHEONS

- A. Provide heavy chrome or nickel plated plates, of approved pattern, on conduit passing through walls, floors and ceilings in finished areas. Where conduit passes through a sleeve, no point of the conduit shall touch the building construction. Caulk around such conduit with sufficient layers of two hour rated firesafing by Thermafiber 4.0 P.C.F. density, U.S.G. fire test 4/11/78 and seal off openings between conduit and sleeves with non-hardening mastic prior to application of escutcheon plate. Escutcheons shall be Gravlur Sure-Lock, or approved equal.

## 2.7 SPACE LIMITATIONS

- A. Equipment shall be chosen which shall properly fit into the physical space provided and shown on the drawings, allowing ample room for access, servicing, removal and replacement of parts, etc. Adequate space shall be allowed for clearances in accordance with Code requirements. Physical dimensions and arrangement of equipment shall be subject to the approval of the Architect.

## 2.8 PAINTING

- A. All factory assembled equipment shall be delivered with a hard surface factory applied finish such as baked-on machinery enamel which will not require additional field painting. The finish shall consist of not less than 2 coats of medium gray color paint USA No. 61 Munsell Notation 8-3G, 6. 10/0.54 enamel. This Contractor shall protect this finish from damage due to construction operations until acceptance of the building. He shall be responsible for satisfactorily restoring any such finishes or replacing equipment that becomes stained or damaged.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Field Measurements
  1. Verify dimensions in areas of installation by field measurements before fabrication and indicate measurements on shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the work.
- B. Established Dimensions
  1. Where field measurements cannot be made without delaying the work, coordinate with the General Contractor to establish dimensions.
  2. When approved in writing, proceed with fabricating units without field measurements.



3. Coordinate supports, adjacent construction, and fixture locations to ensure actual dimensions correspond to established dimensions.
- C. Pre-installation inspection
  1. The Contractor shall visually inspect all cables, cable reels, and shipping cartons to detect possible cable damage incurred during shipping and transport.
  2. Visibly damaged goods are not acceptable and shall be replaced by the contractor at no additional cost to the Owner.

### 3.2 DEMOLITION AND REMODELING

- A. Where only portions of the existing Communications system are to be modified as part of the renovation and addition project, devices related to or part of this system outside of the renovation area shall be kept in operations.
- B. The Drawings do not show all demolition work required. The Contractor shall make himself familiar with the required scope of work to accomplish the work required by these documents. All demolition work implied or required shall be included in the scope of this contract.
- C. Utility service outages required by the new installation will be permitted but only at a time approved by the Owner. The Contractor shall allow the Owner two (2) weeks in order to schedule required outages. The time allowed for outages will not be during normal working hours unless otherwise approved by the Owner. All costs of outages, including overtime charges, shall be included in the contract amount.
- D. The contractor shall perform a preconstruction walk thru of the site to observe and test the existing systems for operation. The owner assumes that the system is 100% operational and functioning prior to the commencement of construction. If any portion of the system observed or tested to be non-functional or inoperable at the commencement of the project will be noted by the contractor. A written report will be generated by the contractor noting their findings and submitted to the project team for review and handling. The owner will determine if the items found to be non-functional are to be repaired by contractor or repaired by the owner. If this repair of the equipment found to be non-functional is to be added to the contractor's scope of work the contract amount for the Work shall be adjusted accordingly.
- E. Work Sequence and Timing. The Owner will cooperate with the Contractor; however, the following provisions must be observed:
  1. During the construction of this project, normal facility activities will continue in existing buildings until new buildings or renovated areas are completed. Plumbing, fire protection, lighting, electrical, communications, heating, air conditioning, and ventilation systems shall be maintained in service within the occupied spaces of the existing building.
  2. A meeting will be held at the project site, prior to any construction, between the Owner's Representative, the General Contractor, the Subcontractors and Sub-subcontractors, and the Engineer to discuss Contractor's employee parking space, access, storage of equipment or materials, and use of the Owner's facilities or utilities. The Owner's decisions regarding such matters shall be final.
- F. In the preparation of these documents every effort has been made to show the approximate locations of, and connections to the existing Local Area Network (LAN) and Wide Area Network (WAN) infrastructure and workstation outlets. However, this Contractor shall be responsible for verifying all of the above information. This Contractor shall visit the existing site to inspect the facilities and related areas. This Contractor shall inspect and verify all details and requirements of all the Contract Documents, prior to the submission of a proposal. All discrepancies between the Contract Documents and actual job-site conditions shall be resolved by the contractor, who shall produce drawings which shall be submitted to the Architect/Engineer for review. All labor and materials required to perform the work described shall be a part of this Contract.
- G. All equipment and/or systems noted on the Drawings "To Remain" shall be inspected and tested on site to certify its working condition. A written report on the condition of all equipment to remain, including a copy of the test results and recommended remedial actions and costs shall be made by this Contractor to the Architect/Engineer for review.

- H. All equipment and/or systems noted on the Drawings "To Be Removed" should be removed including, associated pipe and duct, pipe and duct hangers and/or line supports. Where duct or pipe is to be capped for future or end of line use, it shall be properly tagged with its function or service appropriately identified. Where existing equipment is to be removed or relocated and has an electric motor or connection, the Electrical Contractor shall disconnect motor or connection, remove wiring to a safe point and this Contractor shall remove or relocate motor or connection along with the equipment.
- I. During construction and remodeling, portions of the Project shall remain in service. Construction equipment, material, tools, extension cords, etc., shall be arranged so as to present minimum hazard or interruption to the occupants of the building. None of the construction work shall interfere with the proper operation of the existing facility; or be so conducted as to cause harm or danger to persons on the premises. All fire exits, stairs or corridors required for proper access, circulation or exit shall remain clear of equipment, materials or debris. The General Contractor shall maintain barricades, other separations in corridors and other spaces where work is conducted.
- J. Certain work during the demolition and construction phases may require overtime or night time shifts or temporary evacuation of the occupants. Coordinate and schedule all proposed down time with the Owner at least seventy-two (72) hours in advance in writing.
- K. Any salvageable equipment as determined by the Owner, shall be delivered to the Owner, and placed in storage at the location of his choice. All other debris shall be removed from the site immediately.
- L. Equipment, piping or other potential hazards to the occupants of the building shall not be left overnight outside of the designated working or construction area.
- M. Make every effort to minimize damage to the existing building and the Owner's property. Repair, patch or replace as required any damage which occurs as a result of work at the site. Care shall be taken to minimize interference with the Owner's activities during construction and to keep construction disrupted areas to a minimum. Coordinate with the Owner and other trades in scheduling and performance of the work.
- N. When applicable, Include in the contract price all rerouting of existing backbone cabling, , etc., and the reconnecting of the existing equipment as necessitated by field conditions to allow the installation of the new systems regardless of whether or not such rerouting, reconnecting or relocating is shown on the drawings. Furnish all temporary pipe, duct, controls, etc., as required to maintain heating, cooling, and ventilation services for the existing telecommunications rooms in areas scheduled to remain operational with a minimum of interruption.
- O. All existing cabling, equipment, controls and appurtenances not included in the remodel or alteration areas are to remain in place.
- P. Cabling and equipment s serving technology and communications, etc., which is to remain but which is served by pipe, duct, equipment and controls that are disturbed by the remodeling work, shall be reconnected in such a manner as to leave this equipment in proper operating condition.
- Q. It is the intention of this Section of the Specifications to outline minimum requirements to furnish the Owner with a turn-key and operating system in cooperation with other trades with a minimum of disruption or downtime.
- R. Refer to Architectural Demolition and/or Alteration plans for actual location of walls, ceilings, etc., being removed and/or remodeled.
- S. Field verify measurements, and cabling arrangements are as shown on Drawings.
- T. Verify that scheduled cabling and equipment serving only those abandoned devices to be demolished and removed in its entirety.

- U. Demolition Drawings are based on casual field observation and existing Record Documents. Report discrepancies to Architect and Engineer before disturbing existing installation.
- V. Beginning of demolition means that the contractor accepts existing conditions.
- W. Demolish and extend existing communications work under provisions of Division 02 and this Section.
- X. Remove, relocate, and extend existing systems to accommodate new construction.
- Y. Remove abandoned cabling to source of origination point. Remove racks and other equipment as scheduled on the drawings.
- Z. Remove exposed / abandoned cabling systems, including abandoned systems above accessible ceiling finishes. Cut systems flush with walls and floors, and patch surfaces.
- AA. Repair adjacent construction and finishes damaged during demolition and extension work.
- BB. Maintain access to existing systems which remain active. Modify installation or provide access doors as appropriate.
- CC. Extend existing systems using materials and methods compatible with existing systems, or as specified.
- DD. Clean and repair existing materials and equipment which remain or are to be reused. The Contractor shall modify, remove, and/or relocate all materials and items so indicated on the Drawings or required by the installation of new facilities. All removals and/or dismantling shall be conducted in a manner as to produce maximum salvage. Salvage materials shall remain the property of the Owner and shall be delivered to such destination as directed by the Owner. Materials and/or items scheduled for relocation and which are damaged during dismantling or reassembly operations shall be repaired and restored to good operating condition. The Contractor may, at his discretion and upon the approval of the Owner, substitute new materials and/or items of like design and quality in lieu of materials and/or items to be relocated.
- EE. All items which are to be relocated shall be carefully removed in reverse to original assembly or placement and protected until relocated. The contractor shall clean and repair and provide all new materials, fittings, and appurtenances required to complete the relocations and to restore to good operative order. All relocations shall be performed by workmen skilled in the work and in accordance with standard practice of the trades involved.
- FF. When items scheduled for relocation are found to be in damaged condition before work has been started on dismantling, the Contractor shall call the attention of the Owner to such items and receive further instructions before removal. Items damaged in repositioning operations are the Contractor's responsibility and shall be repaired or replaced by the Contractor as approved by the Owner, at no additional cost to the Owner.
- GG. Service lines and wiring to items to be removed, salvaged, or relocated shall be removed to points indicated on the Drawings, specified, or acceptable to the Owner. Service lines and wiring not scheduled for reuse shall be removed to the points at which reuse is to be continued or service is to remain. Such services shall be sealed, capped, or otherwise tied-off or disconnected in a safe manner acceptable to the Owner. All disconnections or connections into the existing facilities shall be done in such a manner as to result in minimum interruption of services to adjacent occupied areas. Services to existing areas or facilities which must remain in operation during the construction period shall not be interrupted without prior specific approval of the Owner as hereinbefore specified.

- HH. The Contractor shall be responsible for loss or damage to the existing facilities caused by him and his workmen and shall be responsible for repairing such loss or damage. The Contractor shall send proper notices, make necessary arrangements, and perform other services required for the care, protection and in-service maintenance of all electrical services for the new and existing facilities. The Contractor shall erect temporary barricades, with necessary safety devices, as required to protect personnel from injury, removing all such temporary protection upon completion of the work.
- II. Where existing construction is removed to provide working and extension access to existing utilities, Contractor shall remove doors, piping, conduit, outlet boxes, wiring, light fixtures, air conditioning ductwork and equipment, etc., to provide this access and shall reinstall same upon completion of work in the areas affected.
- JJ. Where partitions, walls, floors, or ceilings of existing construction are being removed, all contractors shall remove and reinstall in locations approved by the Architect all devices required for the operation of the various systems installed in the existing construction.

### 3.3 INSTALLATION

- A. General
  - 1. Contractor shall install work in accordance with specifications, drawings, manufacturer's instructions and approved submittal data.
- B. Allowable cable bend radius and pull tension:
  - 1. In general, communications cable cannot tolerate sharp bends or excessive pull tension during installation.
  - 2. Refer to cable manufacturer's bend radius recommendations for the maximum allowable limits.
  - 3. After installation, exposed cable and other surfaces must be cleaned free of lubricant residue. Use only lubricants specifically designed for cable installation.
- C. Pull Strings
  - 1. Provide pull strings in all new conduits, including all conduits with cable installed (trailer strings) as part of this contract.
  - 2. Data and video cables can be pulled in tandem with pull strings.
  - 3. The pull strings must move freely to prevent cable jacket/cable damage during pulls.

### 3.4 EXCAVATING AND BACKFILLING

- A. Trenching and backfilling and other earthwork operations required to install the facilities specified herein shall conform to the applicable requirements of Division 2 (95% of maximum standard density). Where trenching or excavation is required in improved areas, the backfill shall be compacted to a condition equal to that of adjacent undisturbed earth and the surface of the area restored to the condition existing prior to trenching or excavating operations. Provide a minimum of 3" of sand underneath all conduits. The plans indicate information pertaining to surface and sub-surface obstructions; however, this information is not guaranteed. Should obstructions be encountered whether or not shown, the Contractor shall alter routing of new work, reroute existing lines, remove obstructions where permitted, or otherwise perform whatever work is necessary to satisfy the purpose of new work and leave existing surfaces and structures in a satisfactory and serviceable condition. All work shall comply with OSHA Standards.

### 3.5 WORKMANSHIP AND CONCEALMENT

- A. The work of this Section shall be performed by workman skilled in their trade. Installation shall be consistent in completeness whether concealed or exposed. Each item of Communications work shall be concealed in walls, chases, under floors and above ceilings except:
  - 1. Where shown to be exposed.
  - 2. Where exposure is necessary to the proper function.

### 3.6 SLEEVES, CUTTING AND PATCHING

- A. This section shall be responsible for placing sleeves for all conduit passing through walls, partitions, sound walls, beams, floors, roof, etc. Sleeves through below-grade walls shall use water-tight fitting manufactured by O-Z/Gedney.
- B. All cutting and patching will be done under another Division, but this Section will be responsible for timely performance of this work and layout of holes and setting sleeves.
- C. All un-used sleeves shall be sealed with 2 hour UL approved fire sealant manufactured by "3M" or approved equal.

### 3.7 LABELING

- A. All communications system field devices, faceplates, cables, termination devices, equipment enclosures (racks, cabinets, wall mounted boxes, etc) shall be clearly labelled with printed labels showing the device/cable ID, type, and the origination and destination location for cables.
- B. All labelling shall conform to Owner's labelling standard and industry standards. Submit labelling scheme as part of the shop drawing for review and approval before work to start.
- C. Cable labels: Self-adhesive vinyl or vinyl-cloth wraparound tape markers, machine printed with alphanumeric cable designations.
- D. Flat-surface labels: Self-adhesive vinyl or vinyl-cloth labels, machine printed with alphanumeric cable designations.
- E. Provide transparent plastic label holders, and 4-pair marked colored labels.
- F. In accordance with ANSI/TIA-606-B "Administration Standard for Commercial Telecommunications Infrastructure":
  - 1. Install colored labels according to the type of field as per color code designations.
  - 2. Use "designation strip color-code guidelines for voice, data, cross-connect, riser, and backbone fields".
- G. Pathway Labels and Labeling System
  - 1. Labeling system shall consist of a hand-held portable printer
  - 2. Conduits: General-purpose label designed for powdered coated surfaces with an ultra-aggressive adhesive. Label size shall be appropriate for the conduit size. Font size shall be legible from the finished floor.
  - 3. Inner duct: Polyethylene general-purpose tagging material attached using tie wraps.
  - 4. Junction boxes: General-purpose label designed for powdered coated surfaces with an ultra-aggressive adhesive, trade name. Font size shall be easily visible from the finished floor.
  - 5. All labels shall be permanent, i.e. will not fade, peel, or deteriorate due to environment or time.
  - 6. Identification
    - a. All conduits, junction boxes, gutters, and pull boxes shall have machine-generated labels easily visible from the finished floor.
    - b. Conduits shall be labeled with the word "communications" and the conduit's origination room number and destination room number.
    - c. The Contractor shall label conduit at each wall and floor penetration and at each conduit termination, such as outlet boxes, pull boxes, and junction boxes, or as otherwise specified in other sections.
    - d. Junction boxes, gutters and pull boxes shall be labeled with identification name or number as determined by contractor and submitted for approval.
    - e. The Contractor shall label conduit sleeves at each wall and floor penetration.

### 3.8 FIRESTOPPING

- A. Provide approved fire-resistant materials to restore originally-designed fire-ratings to all wall, floor, and ceiling penetrations used in the distribution and installation for communications cabling system.
- B. Install and seal penetrations (conduit, sleeves, slots, chases) in fire-rated barriers created for communications infrastructure to prevent the passage of smoke, fire, toxic gas, or water through the penetrations.
- C. The firestopping material shall maintain/establish the fire-rated integrity of the wall/barrier that has been penetrated.
- D. All through penetrations in a fire rated surface require a sleeve, regardless of penetration diameter or penetrating cable count.
- E. Using a "ring and string" method of installing cabling for membrane penetrations in a wall cavity is acceptable, provided the solution was accepted by the Owner in writing. Code-compliant firestopping rules still apply.
- F. Coordinate firestopping procedures and materials with General Contractor.
- G. Sharing the pathway of other trades/utilities through compliant and non-compliant penetrations does not remove the requirement to maintain code-compliant firestopping.
- H. Provide and install removable, intumescent mechanical systems in floor chases for all openings greater than 0'-4".
- I. Provide and install removable, intumescent, firestop bricks for all openings greater than 0'-4" where there are penetrations through walls.
- J. Bricks shall be listed for insertion in fire-rated openings and require restraining materials or apparatus as needed per manufacturers' specifications.
- K. Provide manufacturer recommended material for rated protection for any given barrier.
- L. Laminate and permanently affix adjacent to chases the following information:
  - 1. Manufacturer of firestop system.
  - 2. Date of installation/repair.
  - 3. Part and model numbers of system and all components.
  - 4. Name and phone numbers of local distributor and manufacturer's corporate headquarters.
- M. Solutions and shop drawings/submittals for firestop materials and systems shall be presented to the General Contractor for written approval of materials/systems prior to purchase and installation.
- N. Materials shall be installed per manufacturer instructions, be UL-listed for intended use, and meet NEC and locals codes for fire stopping measures.
- O. The material chosen shall be distinctively colored to be clearly distinguishable from other materials, adhere to itself, and maintain the characteristics for which it is designed to allow for the removal and/or addition of communication cables without the necessity of drilling holes in the material.
- P. Develop training manuals with instructions on methods of adding or removing cabling to/from firestopped sleeves and chases.
- Q. Within the normal environment, the installed systems shall not generate nor be susceptible to any harmful electromagnetic emission, radiation, or induction that degrades, or obstructs any equipment.

- R. Expansion Capability: Unless otherwise indicated, provide spare conductor pairs in cables, positions in patch panels, cross connects, and terminal strips, and space in cable pathways and backboard layouts to accommodate 20% future increase in structure cable system capacity.
- S. In the event of a breach of the representations and warranties contained herein, the Contractor, at their own expense, shall take all measures necessary to make the cabling system work and comply with the applicable manufacturer written technical recommendations and standards.

### 3.9 TESTING CABLING SYSTEM

- A. Upon completion of the installation of the communications infrastructure systems, including all pathways and grounding, the Contractor shall test the system.
  - 1. Cables and termination modules shall be affixed, mounted or installed to the designed/specified permanent location prior to testing.
  - 2. Any removal and reinstallation of any component in a circuit, including faceplates, shall require retesting of that circuit and any other disturbed or affected circuits.
  - 3. Approved instruments, apparatus, services, and qualified personnel shall be utilized.
  - 4. The Contractor must verify that the requirements of the specifications are fully met through testing with an approved tester (rated for testing parameters listed elsewhere), and documentation as specified below.
  - 5. This includes confirmation of requirements by demonstration, testing and inspection. Demonstration shall be provided at final walk-through in soft copy and printed test data.
- B. Non-Compliant Cabling
  - 1. Testing that shows some or all pairs of a cable do not comply with specifications, without written approval by the Owner, shall be replaced at Contractor's expense (including respective connectors).
  - 2. With the Owner's written approval, the over-length cable(s) shall be excluded from requirements to pass standardized tests and shall be explicitly identified.
    - a. Testing is still required for non-compliant cabling.
    - b. The tests shall be for wire-mapping, opens, cable-pair shorts, and shorts-to-ground.
    - c. The test results must be within acceptable tolerances and shall be submitted with the Owner's acceptance document.
- C. Failed Tests
  - 1. If tests fail, Contractor shall correct as required to produce a legitimate passing test.
  - 2. Manipulation of tester parameters on a failing test in order to achieve a passing test is unacceptable.
  - 3. If the Contractor is found to have manipulated or falsified any failing test result to show a "PASS" for any reason (without written notice and prior approval of the Owner), the Contractor shall be required to employ a Third-Party Testing Agent selected by the Owner to retest the complete cable plant and shall be required to pay all costs associated with this retesting.
- D. Owner reserves the right to be present during any or all testing.

### 3.10 WALL MOUNTED EQUIPMENT

- A. Install all wall mounted equipment in accordance with the National Electrical Code, industry standards and as shown on the drawings.
- B. Unless noted otherwise, all wall mounted equipment that need to be accessed for operation or maintenance shall be mounted at a working height not requiring a ladder when wall space is available. Installation of these devices at greater elevations shall be approved by the Engineer. Contractor shall provide a coordination sketch of each mechanical/electrical room noting locations and mounting heights of all electrical devices(note bottom and top elevations) shown to be installed. Sketches shall be provided to the Engineer for review and the general contractor for coordination with other trades working in these rooms.

### 3.11 CLEANING

- A. The Contractor will clean all surfaces of equipment and devices prior to final acceptance by Owner.

### 3.12 CORROSIVE AREAS

- A. In areas of a corrosive nature, which include but are not limited to the following: pool equipment rooms, cooling towers and areas subject to salt air, etc., provide NEMA 4X stainless steel or fiberglass reinforced enclosures for contactors, panel boards, controllers, starters, disconnects and materials used as supporting means (i.e. plastibond unistrut, pipe, fittings). The use of spray on coating may be acceptable in some applications.

### 3.13 TESTS AND INSPECTIONS

- A. Tests and inspection requirements shall be coordinated with Division I.
- B. Date for final acceptance test shall be sufficiently in advance of completion date of contract to permit alterations or adjustments necessary to achieve proper functioning of equipment prior to contract completion date.
- C. Conduct re-tests as directed by Architect on portions of work or equipment altered or adjusted as determined to be necessary by final acceptance test. No resultant delay or consumption of time as a result of such necessary re-test beyond contract completion date shall relieve Contractor of his responsibility under contract.
- D. Put circuits and equipment into service under normal conditions, collectively and separately, as may be required to determine satisfactory operation. Demonstrate equipment to operate in accordance with requirements of these specifications. Perform tests in the presence of Architect. Furnish instruments and personnel required for tests.
- E. Final Inspection:
  - 1. At the time designated by the Architect, the entire system shall be inspected by the Architect and Engineer. The contractor or his representative shall be present at this inspection.
  - 2. All devices, equipment, equipment cabinets and enclosure shall be cleaned and in operating condition.
  - 3. Certificates and documents required hereinbefore shall be in order and presented to the Architect prior to inspection.
  - 4. Panel covers, junction box covers, etc., shall be removed for visual inspection of the wire, bus bars, etc.
  - 5. After the inspection, any items which are noted as needing to be changed or corrected in order to comply with these specifications and the drawings shall be accomplished without delay.

### 3.14 ACCEPTANCE

- A. Once all work has been completed, test documentation has been submitted, and Owner is satisfied that all work is in accordance with contract documents, the Owner shall notify Contractor in writing of formal acceptance of the system.
- B. Contractor must warrant in writing that 100% of the installation meets the requirements specified herein (Standards Compliance & Test Requirements).
- C. Acceptance shall be subject to completion of all work, successful post-installation testing which yields 100% PASS rating, and receipt of full documentation soft and hard copies as described herein.

END OF SECTION





SECTION 31 1000  
SITE CLEARING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. All applicable provisions of the Bidding and Contract Requirements, and Division 1 - General Requirements shall govern the work under this section.

1.02 WORK INCLUDED

- A. This Section includes the following:
  - 1. Clearing and grubbing.
  - 2. Stripping and stockpiling topsoil.
  - 3. Temporary erosion and sedimentation control measures.
- B. Related Sections include the following:
  - 1. Division 32 Section "Chain Link Fences and Gates" for temporary construction fencing.

1.03 MATERIAL OWNERSHIP

- A. Except for stripped topsoil or other materials indicated to remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.04 PROJECT CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
  - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
  - 2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
  - 3. Do not proceed with work on adjoining property until directed by Engineer.
- B. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.
- C. Do not commence site clearing operations until temporary erosion and sedimentation control measures are in place.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to sediment and erosion control Drawings.
- B. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- C. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.02 TREE PROTECTION

- A. Reference 015639 "Tree and Plant Protection".

3.03 UTILITIES

- A. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed.
  - 1. Arrange with utility companies to shut off indicated utilities.
- B. 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 Engineer and Owner not less than two days in advance of proposed utility interruptions.
  - 2. Do not proceed with utility interruptions without Owner's written permission.
- C. Excavate for and remove underground utilities indicated to be removed.

### 3.04 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, grass, and other vegetation to permit installation of new construction.
  - 1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
  - 2. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.
  - 3. Grind stumps and remove roots, obstructions, and debris extending to a depth of 18 inches (450 mm) below exposed subgrade.
  - 4. Use only hand methods for grubbing within tree protection zone.
- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
  - 1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches (200 mm) and compact each layer to a density equal to adjacent original ground.

### 3.05 TOPSOIL STRIPPING

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.
  - 1. Remove subsoil and nonsoil materials from topsoil, including trash, debris, weeds, roots, and other waste materials.
- C. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.
  - 1. Limit height of topsoil stockpiles to 72 inches (1800 mm).
  - 2. Do not stockpile topsoil within tree protection zones.
  - 3. Dispose of excess topsoil as specified for waste material disposal.
  - 4. Select subparagraph above or below.
  - 5. Stockpile surplus topsoil to allow for respreading deeper topsoil.

### 3.06 SITE IMPROVEMENTS

- A. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.
- B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
  - 1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut length of existing pavement to remain before removing existing pavement. Saw-cut faces vertically.
  - 2. Paint cut ends of steel reinforcement in concrete to remain to prevent corrosion.

### 3.07 DISPOSAL

- A. Disposal: Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.
  - 1. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities.

END OF SECTION

SECTION 31 2000  
EARTH MOVING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. All applicable provisions of the Bidding and Contract Requirements, and Division 1 - General Requirements shall govern the work under this section.

1.02 WORK INCLUDED

- A. This Section includes the following:
  - 1. Subgrade course for pavements.
  - 2. Base material for asphalt paving.
- B. All earthwork to be performed and materials used shall be in accordance with the Geotechnical Engineering Report. In the event of a discrepancy between the above-referenced standards, the plans, and/or any portion of this specification section, the order of precedence will be the above-referenced report, the City Design Standards, and then these specifications. The Contractor shall contact the engineer in the event of a discrepancy.

1.03 DEFINITIONS

- A. Backfill: Soil material or controlled low-strength material used to fill an excavation.
  - 1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
  - 2. Final Backfill: Backfill placed over initial backfill to fill a trench.
- B. Base Material: Course placed between the subgrade asphaltic concrete paving.
- C. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.
- D. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
  - 1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Engineer. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
- E. Fill: Soil materials used to raise existing grades.
- F. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below base material.

1.04 SUBMITTALS

- A. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:
  - 1. Classification according to ASTM D 2487 of each borrow soil material proposed for fill and backfill.
  - 2. Laboratory compaction curve according to ASTM D 698 for each borrow soil material proposed for fill and backfill.

1.05 PROJECT CONDITIONS

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Owner and then only after arranging to provide temporary utility services according to requirements indicated.
  - 1. Notify Owner not less than two days in advance of proposed utility interruptions.
  - 2. Do not proceed with utility interruptions without Owner's written permission.
  - 3. Contact utility-locator service for area where Project is located before excavating.
- B. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shut off services if lines are active.

## PART 2 - PRODUCTS

### 2.01 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Satisfactory Soils: On-site soils are suitable for use as fill within the pavement areas, provided they are free from organics and debris. Select fill must be used for grade adjustments in the helipad area.
- C. Unsatisfactory Soils: Materials, which do not comply with the requirements for acceptable material or which, cannot be compacted to the specified or indicated density.
- D. Subgrade: Stabilize the subgrade to materials as specified by Texas Department of Transportation. The subgrade material should be compacted to at least 98 percent of the modified Proctor maximum dry density (AASHTO T-180).
- E. Base Material: The limerock base course should have a minimum Limerock Bearing Ratio (LBR) of 100 and should be compacted to 98 percent of the modified Proctor maximum dry density (AASHTO T-180).
- F. Select Fill: USCS Classification CL and/or SC, with a Plasticity Index between 10 and 20.

## PART 3 - EXECUTION

### 3.01 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
- B. Provide protective insulating materials to protect subgrades and foundation soils against freezing temperatures or frost.

### 3.02 DEWATERING

- A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
  - 1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

### 3.03 EXCAVATION, GENERAL

- A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.
  - 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

### 3.04 EXCAVATION FOR WALKS AND PAVEMENTS

- A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

### 3.05 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.
- B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches (300 mm) higher than top of pipe or conduit, unless otherwise indicated.
- C. Trench Bottoms: Excavate trenches 4 inches (100 mm) deeper than bottom of pipe elevation to allow for bedding course. Hand excavate for bell of pipe.
  - 1. Excavate trenches 6 inches (150 mm) deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

### 3.06 SUBGRADE INSPECTION

- A. Notify Testing Agency when excavations have reached required subgrade.
- B. If Testing Agency determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
  - 1. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph (5 km/h).
  - 2. Proof-roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than 20 tons.
  - 3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Engineer, and replace with compacted backfill or fill as directed.
- C. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
- D. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Engineer, without additional compensation.

### 3.07 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
  - 1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

### 3.08 BACKFILL

- A. Place all backfill in strict accordance with Geotechnical Report for this project.
- B. Place and compact backfill in excavations promptly, but not before completing the following:
  - 1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
  - 2. Surveying locations of underground utilities for Record Documents.
  - 3. Testing and inspecting underground utilities.
  - 4. Removing concrete formwork.
  - 5. Removing trash and debris.
  - 6. Removing temporary shoring and bracing, and sheeting.
  - 7. Installing permanent or temporary horizontal bracing on horizontally supported walls.
- C. Place backfill on subgrades free of mud, frost, snow, or ice.

### 3.09 SOIL FILL

- A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- B. Place and compact fill material in layers to required elevations as follows:
  - 1. Under grass and planted areas, use satisfactory soil material.
  - 2. Under walks and pavements, use satisfactory soil material.
- C. Place soil fill on subgrades free of mud, frost, snow, or ice.

### 3.10 SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.
  - 1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
  - 2. Remove and replace, or scarify and air dry otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

### 3.11 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. All compaction in strict accordance with Geotechnical recommendations.
- B. Place backfill and fill soil materials in layers not more than 8 inches (200 mm) in loose depth for material compacted by heavy compaction equipment.
- C. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.
- D. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698:
  - 1. Under pavements, scarify and recompact existing subgrade and each layer of backfill or fill soil material at 95 percent. Refer to Geotechnical Report for thickness.
  - 2. Under walkways, scarify and recompact top 6 inches (150 mm) below subgrade and compact each layer of backfill or fill soil material at 95 percent.
  - 3. Under lawn or unpaved areas, scarify and recompact top 6 inches (150 mm) below subgrade and compact each layer of backfill or fill soil material at 95 percent.
  - 4. For utility trenches, compact each layer of initial and final backfill soil material at 95 percent.

### 3.12 GRADING

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
  - 1. Provide a smooth transition between adjacent existing grades and new grades.
  - 2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

### 3.13 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.
- B. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:
  - 1. Paved Areas: At subgrade and at each compacted fill and backfill layer, at least 1 test for every 2000 sq. ft. (186 sq. m) or less of paved area, as indicated in Geotechnical Report, but in no case fewer than 3 tests.
  - 2. Trench Backfill: At each compacted initial and final backfill layer, at least 1 test for each 150 feet (46 m) or less of trench length, but no fewer than 2 tests.
- C. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; re-compact and retest until specified compaction is obtained.

### 3.14 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
  - 1. Scarify or remove and replace soil material to depth as directed by Engineer; reshape and recompact.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
  - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.15 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

END OF SECTION





SECTION 31 3213  
SOIL MIXING STABILIZATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. All applicable provisions of the Bidding and Contract Requirements, and Division 1 - General Requirements shall govern the work under this section.
- B. This Section includes soil mixing stabilization and specialties outside the building, including the following:
  - 1. Excavation, treatment, and backfilling of subgrade for lime stabilization.
- C. All soil mixing stabilization to be performed and materials used shall be in accordance with the Geotechnical Engineering Report. In the event of a discrepancy between the above-referenced report and any portion of this specification section, the above-referenced report will govern. The Contractor shall contact the Engineer in the event of a discrepancy.

1.02 REFERENCE STANDARDS

- A. American Society for Testing Materials (ASTM) latest edition
  - 1. C150 Portland Cement
  - 2. C618 Fly Ash and Raw or Calcined Natural Pozzolan for use as a Mineral Admixture in Portland Cement Concrete
  - 3. C 977 Quicklime and Hydrated Lime for Soil Stabilization
  - 4. D 1633 Compressive Strength of Molded Soil-Cement Cylinders
- B. American Association of State Highway and Transportation Officials (AASHTO) latest edition
  - 1. M 216 Lime for Soil Stabilization
- C. National Lime Association (NLA)
  - 1. Bulletin 326 Lime Stabilization Construction Manual
- D. Texas Department of Transportation Standards
  - 1. TXDOT Item 260 Lime Treatment (Road Mixed)
  - 2. TXDOT Item 265 Fly Ash or Lime – Fly Ash Treatment (Road Mixed)

1.03 ENVIRONMENTAL REQUIREMENTS

- A. Do not install mixed materials in wind in excess of 10 mph or when temperature is below 40 degrees Fahrenheit.

1.04 QUALITY ASSURANCE

- A. Perform work in accordance with state and local standards in conjunction with requirements specified herein.

1.05 SUBMITTALS

- A. Submit 30-pound sample of each material to be used at the site in airtight containers to the independent testing laboratory or submit gradation and certification of material that is to be used to the independent testing laboratory for review.
- B. Submit name of each materials supplier and specific type and source of each material. Change in source requires approval of Owner.
- C. Submit mix design and materials mix ratio that will achieve specified requirements of state and local agencies for soil stabilization.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Hydrated Lime: TXDOT Item 260

2.02 EQUIPMENT

- A. Perform operations using suitable, well maintained equipment capable of excavating subsoil, mixing and placing materials, wetting, consolidating, and compacting of material.

PART 3 – EXECUTION

3.01 PREPARATION

- A. Obtain approval from the independent testing laboratory of mix design before proceeding with placement.

- B. Start stabilization only when weather and soil conditions are favorable for successful application of proposed material.
  - C. Proofroll subgrade to identify areas in need of stabilization in accordance with Section 312000.
- 3.02 EXCAVATION
- A. Excavate subsoil to depth sufficient to accommodate soil stabilization.
  - B. Remove lumped subsoil, boulders, and rock that interfere with achieving uniform subsoil conditions.
  - C. Notify Construction Manager of unexpected subsurface conditions. Discontinue affected work in area until notified to resume work.
  - D. Correct areas over-excavated in accordance with Section 31 20 00.
  - E. Remove excess excavated material from site.
- 3.03 SOIL TREATMENT AND BACKFILLING
- A. Lime Stabilized Subgrade: Where indicated on Construction Drawings or as required after continual failure, treat prepared subgrade with hydrated lime in accordance with state highway department specifications (TXDOT Item 260).
    - 1. A minimum of 48 hours of tempering time shall be provided before final mixing.
    - 2. Subgrade soils shall be treated with lime at a rate of 6 to 8 percent lime, by dry weight.
  - B. Subsoil shall be in accordance with Section 31 20 00.
  - C. Maintain optimum moisture of mixed materials to attain required stabilization and compaction.
  - D. Finish subgrade surface in accordance with Section 31 20 00.
  - E. Remove surplus mix materials from site at no additional cost to the Owner.
- 3.04 CURING
- A. Immediately following compaction of mix, seal top surface with curing seal.
  - B. Do not permit traffic for 72 hours after sealing top surface.
- 3.05 FIELD QUALITY CONTROL
- A. Compression test and analysis of hardened fill material will be performed in accordance with Section 02300.
  - B. If tests indicate work does not meet specified requirements, remove work, replace and retest, at no cost to owner.

END OF SECTION

SECTION 31 5000  
EXCAVATION SUPPORT AND PROTECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section includes temporary excavation support and protection systems.
- B. Related Requirements:
  - 1. Section 013233 "Photographic Documentation" for recording preexisting conditions and excavation support and protection system progress.
  - 2. Section 312000 "Earth Moving" for excavating and backfilling and for controlling surface-water runoff and ponding.
  - 3. Section 312319 "Dewatering" for dewatering excavations.

1.03 PREINSTALLATION MEETINGS

- A. Pre-installation Conference: Conduct conference at Project site.
  - 1. Review geotechnical report.
  - 2. Review existing utilities and subsurface conditions.
  - 3. Review coordination for interruption, shutoff, capping, and continuation of utility services.
  - 4. Review proposed excavations.
  - 5. Review proposed equipment.
  - 6. Review monitoring of excavation support and protection system.
  - 7. Review coordination with waterproofing.
  - 8. Review abandonment or removal of excavation support and protection system.

1.04 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, performance properties, and dimensions of individual components and profiles, and calculations for excavation support and protection system.
- B. Shop Drawings: For excavation support and protection system, prepared by or under the supervision of a qualified professional engineer.
  - 1. Include plans, elevations, sections, and details.
  - 2. Show arrangement, locations, and details of soldier piles, piling, lagging, tiebacks, bracing, and other components of excavation support and protection system according to engineering design.
  - 3. Indicate type and location of waterproofing.
  - 4. Include a written plan for excavation support and protection, including sequence of construction of support and protection coordinated with progress of excavation.

1.05 INFORMATIONAL SUBMITTALS

- A. Contractor Calculations: For excavation support and protection system. Include analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- B. Existing Conditions: Using photographs, show existing conditions of adjacent construction and site improvements that might be misconstrued as damage caused by inadequate performance of excavation support and protection systems. Submit before Work begins.
- C. Record Drawings: Identify locations and depths of capped utilities, abandoned-in-place support and protection systems, and other subsurface structural, electrical, or mechanical conditions.

1.06 FIELD CONDITIONS

- A. Interruption of Existing Utilities: Do not interrupt any utility serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility according to requirements indicated:
  - 1. Notify Owner no fewer than two days in advance of proposed interruption of utility.
  - 2. Do not proceed with interruption of utility without Owner's written permission.

- B. Project-Site Information: A geotechnical report has been prepared for this Project and is available for information only. The opinions expressed in this report are those of a geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by a geotechnical engineer. Owner is not responsible for interpretations or conclusions drawn from the data.
- C. Survey Work: Engage a qualified land surveyor or professional engineer to survey adjacent existing buildings, structures, and site improvements; establish exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.

## PART 2 - PRODUCTS

### 2.01 PERFORMANCE REQUIREMENTS

- A. Provide, monitor, and maintain excavation support and protection system capable of supporting excavation sidewalls and of resisting earth and hydrostatic pressures and superimposed and construction loads.
  - 1. Contractor Design: Design excavation support and protection system, including comprehensive engineering analysis by a qualified professional engineer.
  - 2. Prevent surface water from entering excavations by grading, dikes, or other means.
  - 3. Install excavation support and protection systems without damaging existing buildings, structures, and site improvements adjacent to excavation.
  - 4. Continuously monitor vibrations, settlements, and movements to ensure stability of excavations and constructed slopes and to ensure that damage to permanent structures is prevented.

### 2.02 MATERIALS

- A. General: Provide materials that are either new or in serviceable condition.
- B. Structural Steel: ASTM A 36/A 36M, ASTM A 690/A 690M, or ASTM A 992/A 992M.
- C. Steel Sheet Piling: ASTM A 328/A 328M, ASTM A 572/A 572M, or ASTM A 690/A 690M; with continuous interlocks.
  - 1. Corners: [Site-fabricated mechanical interlock] [Roll-formed corner shape with continuous interlock].
- D. Wood Lagging: Lumber, mixed hardwood, nominal rough thickness of size and strength required for application.
- E. Shotcrete: Comply with Section 033713 "Shotcrete" for shotcrete materials and mixes, reinforcement, and shotcrete application.
- F. Cast-in-Place Concrete: ACI 301, of compressive strength required for application.
- G. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- H. Tiebacks: Steel bars, ASTM A 722/A 722M.
- I. Tiebacks: Steel strand, ASTM A 416/A 416M.

## PART 2 - EXECUTION

### 3.01 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards that could develop during excavation support and protection system operations.
  - 1. Shore, support, and protect utilities encountered.
- B. Install excavation support and protection systems to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.
  - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
- C. Locate excavation support and protection systems clear of permanent construction so that construction and finishing of other work is not impeded.

### 3.02 SOLDIER PILES AND LAGGING

- A. Install steel soldier piles before starting excavation. Extend soldier piles below excavation grade level to depths adequate to prevent lateral movement. Space soldier piles at regular intervals not to exceed allowable flexural strength of wood lagging. Accurately align exposed faces of flanges to vary not more than 2 inches from a horizontal line and not more than 1:120 out of vertical alignment.

- B. Install wood lagging within flanges of soldier piles as excavation proceeds. Trim excavation as required to install lagging. Fill voids behind lagging with soil, and compact.
  - C. Install wales horizontally at locations indicated on Drawings and secure to soldier piles.
- 3.03 SHEET PILING
- A. Before starting excavation, install one-piece sheet piling lengths and tightly interlock vertical edges to form a continuous barrier.
  - B. Accurately place the piling, using templates and guide frames unless otherwise recommended in writing by the sheet piling manufacturer. Limit vertical offset of adjacent sheet piling to 60 inches. Accurately align exposed faces of sheet piling to vary not more than 2 inches from a horizontal line and not more than 1:120 out of vertical alignment.
  - C. Cut tops of sheet piling to uniform elevation at top of excavation.
- 3.04 TIEBACKS
- A. Drill, install, grout, and tension tiebacks.
  - B. Test load-carrying capacity of each tieback and replace and retest deficient tiebacks.
    - 1. Have test loading observed by a qualified professional engineer responsible for design of excavation support and protection system.
  - C. Maintain tiebacks in place until permanent construction is able to withstand lateral earth and hydrostatic pressures.
- 3.05 BRACING
- A. Bracing: Locate bracing to clear columns, floor framing construction, and other permanent work. If necessary to move brace, install new bracing before removing original brace.
    - 1. Do not place bracing where it will be cast into or included in permanent concrete work unless otherwise approved by Architect.
    - 2. Install internal bracing if required to prevent spreading or distortion of braced frames.
    - 3. Maintain bracing until structural elements are supported by other bracing or until permanent construction is able to withstand lateral earth and hydrostatic pressures.
- 3.06 FIELD QUALITY CONTROL
- A. Survey-Work Benchmarks: Resurvey benchmarks as required during installation of excavation support and protection systems, excavation progress, and for as long as excavation remains open. Maintain an accurate log of surveyed elevations and positions for comparison with original elevations and positions. Promptly notify Architect if changes in elevations or positions occur or if cracks, sags, or other damage is evident in adjacent construction.
  - B. Promptly correct detected bulges, breakage, or other evidence of movement to ensure that excavation support and protection system remains stable.
  - C. Promptly repair damages to adjacent facilities caused by installation or faulty performance of excavation support and protection systems.
- 3.07 REMOVAL AND REPAIRS
- A. Remove excavation support and protection systems when construction has progressed sufficiently to support excavation and earth and hydrostatic pressures. Remove in stages to avoid disturbing underlying soils and rock or damaging structures, pavements, facilities, and utilities.
    - 1. Remove excavation support and protection systems to a minimum depth of 48 inches below overlying construction and abandon remainder.
    - 2. Fill voids immediately with approved backfill compacted to density specified in Section 312000 "Earth Moving."
    - 3. Repair or replace, as approved by Architect, adjacent work damaged or displaced by removing excavation support and protection systems.
  - B. Leave excavation support and protection systems permanently in place.

END OF SECTION



SECTION 31 63 29

DRILLED CONCRETE PIERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Concrete piers, including drilling, reinforcing, casing, and placing concrete.
- B. Related Documents/Sections:
  - 1. Document 00 31 32 - Geotechnical Data.
  - 2. Section 01 45 23 - Testing and Inspection Services.
  - 3. Section 03 20 00 - Concrete Reinforcing.
  - 4. Section 03 30 00 - Cast-in-Place Concrete.
  - 5. Typical Pier Detail - refer to structural drawings.

1.2 SUBMITTALS

- A. Data Reports: Independent Testing Laboratory shall log each drilled shaft by recording not less than the following information:
  - 1. Identifying mark; use same identifying mark shown on drawings.
  - 2. Date and time excavation started;
  - 3. Shaft diameter as per drawings;
  - 4. Shaft diameter as constructed;
  - 5. Bottom of penetration as per drawings;
  - 6. Bottom of penetration as constructed;
  - 7. Actual elevation at initial point of drilling, i.e. top of ground (in relation to sea level);
  - 8. Estimated bearing elevation at top of penetration as per drawings (in relation to sea level);
  - 9. Actual elevation at top of penetration as constructed (in relation to sea level);
  - 10. Bottom of casing (if casing is used) (in relation to sea level);
  - 11. Comments on water conditions;
  - 12. Date and time excavation completed;
  - 13. Date and time concrete placed;

Note: This data report does not reduce or limit the scope of work or the recording of data as required by the testing laboratory services for fulfillment of the contract documents.
- B. Complete logs at the end of each day and submit a copy to the Architect for review.
- C. Reconciliation of Drilled Piers and Casings: Upon completion of the construction of the drilled piers, the contractor shall reconcile the actual costs of the drilled piers and casings against the estimated costs, based on the estimated depths and sizes of piers shown on the structural drawings, the percentage of piers estimated to require casing as described in this specification, other pertinent information given in this specification and the contractor's unit prices stated on the Bid Form, which included Extra and Credit prices for drilled piers and casings.
  - 1. The contractor shall document the total costs of the combined reconciliations of the drilled pier depths and casing lengths for submission to the Architect in a format identical to that represented by Sample Worksheets "I" and "II" included at the end of this specification section. To obtain Total Dollar Change to Contract, refer to formula on Sample Worksheet "II".
  - 2. Refer to Sample "III", included at the end of this specification section for Glossary of Terms used in Sample Worksheets "I" and "II".
- D. Confirmation of contact with Owner's testing company.

1.3 QUALITY ASSURANCE

- A. Tolerances:
  - 1. Center line of the top of the drilled shaft shall be within 3" of the plan location.
  - 2. Drilled shaft shall be plumb to within 1½" the first 10' plus 1% of the depth greater than 10'.
- B. Prior to start of shaft drilling, Contractor shall contact Owner's testing laboratory for verification and identification of bearing strata, and required penetration of bearing strata by their geotechnical engineer.



#### 1.4 UNIT PRICES

- A. Piers: Bids shall be based on drilling to estimated bearing elevation(s) plus required penetration depth as shown on typical pier detail in the structural drawings. Bids shall state unit prices per foot inclusive of drilling, reinforcing, and concrete for depths greater or less than the estimated depths as shown on typical pier detail. Adjustment of the contract sum shall be based on the total of individual shaft depths greater or less than estimated depths multiplied by their respective applicable unit price. The reconciliation of pier shaft lengths shall be calculated as shown on the "Sample "I" Pier Depth Reconciliation Worksheet" included in this specification section.
- B. Casings for Piers: Bids shall include the cost of casings for 10% of the total number of piers in each pier diameter category (e.g. 18", 24", etc.). Contractor shall fill in unit prices on the bid form for casing "extra" costs and "credit" amounts for each category. After taking into account the total linear feet of casing required by the base bid for each category, the Contract sum shall be adjusted to reflect the net increase or decrease in the total linear feet of casing required for each category, multiplied by the applicable unit cost or credit amount. The reconciliation of pier casing lengths shall be calculated as shown on the "Sample "II" Pier Casing Length Reconciliation Worksheet" included in this specification section.
- C. Penetrations shall be drilled to depths shown on structural drawings and shall be included in the contractor's bid. In recognition of the imprecise nature of the drilling process, payment for over-drilling penetrations shall be permitted for up to and including 8" beyond the depth shown on the structural drawings. Payments for overdrilling beyond 8" shall only be considered when recommended by the Independent Testing Laboratory as a result of conditions encountered in the field, on a per-hole basis and when such recommendation has been so noted on the pier log report.

#### PART 2 - PRODUCTS

##### 2.1 MATERIALS

- A. Reinforcement shall meet the requirements specified in SECTION 03 20 00 - CONCRETE REINFORCING.
- B. Concrete shall meet the requirements specified in SECTION 03 30 00 - CAST-IN-PLACE CONCRETE with the exception of the following slump requirements:
  - 4" to 6" for dry shafts
  - 6" to 8" if casings are used
- C. Casing: ASTM A 252, Grade 2 or ASTM A 36.
- D. Pier Sleds: Provide "Centraligner" sleds and Hijacker pier bolsters as manufactured by Pieresearch, Arlington, TX (phone 817.265.0980) or equivalent.

#### PART 3 - EXECUTION

##### 3.1 PERFORMANCE

- A. Drilling: Drill foundation shafts with a power auger drilling machine designed for the purpose. Locate accurately and drill to the required size and depth. Underream for pier bells. Actual depth required for piers shall be determined by an engineer from the independent testing laboratory at the project site during the pier drilling operation. The pier drilling rig shall have sufficient size and power to penetrate to the required depths.
- B. Cleaning: Machine clean the bottoms of shafts of loose material and debris. De-water the shafts. Shafts shall be inspected by the testing laboratory before concrete is placed.
- C. Reinforcing Steel:
  - 1. Form a cage as a structural element to maintain its shape and proportion throughout the placing of concrete and extraction of casing.
  - 2. Install pier sleds so that reinforcing remains in position without displacement while the concrete is placed. Sled spacing and attachment shall be in accordance with sled manufacturer's recommendations.
  - 3. Block reinforcing steel up off the bottom at least 3" with pier bolsters and fasten in place without any contact with the sides of the shaft.

- D. Placing Concrete: Place concrete in each pier shaft not later than 8-hours after drilling, **[underreaming]** and cleaning of the pier hole is completed.
1. Concrete shall be placed using a clean "tremie". In no event shall concrete strike the sides of the excavation or the reinforcing cage. Placement by the "Free Fall" method may be implemented only at the direction of the Owner's on-site testing laboratory.
  2. Vibrate or "rod" only the top 10' of concrete. Do not vibrate concrete of 6" slump or higher.
  3. Do not place concrete in intersecting walls and beams until the pier concrete is no longer plastic.
- E. Casing:
1. If caving soil or flowing water is encountered, use a casing to prevent caving and to exclude water. Casing shall be temporary type, to be withdrawn as the concrete is placed.
  2. If a temporary casing is used, withdraw casing as concrete is placed so that bottom of casing remains below top of concrete throughout placing operation or until top of concrete reaches stable soil free from seepage. Do not rotate casing during withdrawal.
  3. The requirement for casing of piers and the quantity of casing required for each pier, if any, shall be determined by the independent testing laboratory representative at the project site during the pier drilling operation.

### 3.2 FIELD QUALITY CONTROL

- A. Inspection and Evaluation: The Independent Testing Laboratory shall provide full-time inspection at the project site during the drilling of shafts, installation of reinforcing steel, and placing of concrete in pier shafts. Full-time inspection shall include recording and reporting the information required in this specification.
- B. The cost of the full-time inspection service shall be borne by the Owner.
- C. All costs associated with reinspection, additional inspection or retesting required as a result of non-conforming work shall be borne by the Contractor.

### 3.3 LIMITATIONS OF AUTHORITY OF TESTING LABORATORY

- A. Laboratory is not authorized to:
1. Release, revoke, alter or enlarge on requirements of contract documents.
  2. Approve or accept any portion of the work.
  3. Perform any duties of the Contractor.

### 3.4 CONTRACTOR'S RESPONSIBILITIES

- A. Cooperate with laboratory personnel, provide access to work.
- B. Furnish copies of product test reports as required.
- C. Furnish incidental labor and facilities:
1. To provide access to work to be tested.
  2. To obtain and handle samples at the Project site.
  3. To facilitate inspections and tests.
  4. For storage and curing of test samples.
- D. Notify laboratory sufficiently in advance of operations to allow for laboratory assignment of personnel and scheduling of tests. Notify laboratory immediately if there is a change in schedule to alleviate any unnecessary trips by laboratory personnel.
- E. Payment for all retesting required because of nonconforming work or materials.

END OF SECTION

## SAMPLE WORKSHEET "I" PIER DEPTH RECONCILIATION WORKSHEET

PROJECT \_\_\_\_\_

PAGE \_\_\_\_\_ OF \_\_\_\_\_

PIER DIAMETER THIS PAGE \_\_\_\_\_

		A	MINUS	B	=	C	x	D	=	E
PIER NO.	ESTIMATED BEARING ELEVATION	ACTUAL BEARING ELEVATION	AMOUNT DEEPER (+) OR SHALLOWER (-) THAN ESTIMATED BEARING	APPLICABLE UNIT PRICE FROM BID FORM (NOTE: EXTRA(+) OR CREDIT (-))	NET EXTRA COST OR CREDIT DUE PER PIER					
1										
2										
3										
4										
5										
6										
7										
8										
9										
					<b>TOTAL OF COLUMN "E"</b>					

## SAMPLE WORKSHEET "II"

### PIER CASING LENGTH RECONCILIATION WORKSHEET

PROJECT \_\_\_\_\_

PAGE \_\_\_\_\_ OF \_\_\_\_\_

PIER DIAMETER THIS PAGE \_\_\_\_\_

		F	MINUS	A	=	G	F	MINUS	B	=	H
	PIER NO.	GROUND ELEVATION AT PIER		ESTIMATED BEARING ELEVATION		ESTIMATED CASING LENGTH	GROUND ELEVATION AT PIER		* ACTUAL BEARING ELEVATION		ACTUAL CASING LENGTH
1											
2											
3											
						SUM OF FIGURES IN COLUMN "G"  x SPECIFIED BID BASIS PERCENTAGE FOR PIERS TO BE CASED ----- = TOTAL ESTIMATED CASING LENGTH					SUM OF FIGURES IN COLUMN "H"          = TOTAL ACTUAL CASING LENGTH

TOTAL ACTUAL CASING LENGTH - TOTAL ESTIMATED CASING LENGTH x APPLICABLE UNIT PRICE EXTRA(+) OR CREDIT(-) = TOTAL COST OF CASINGS

TOTAL COLUMN "E" ON WORKSHEET "I" + TOTAL COST OF CASINGS ON WORKSHEET "II" = TOTAL DOLLAR CHANGE TO CONTRACT

\* IF THE ELEVATION OF THE BOTTOM OF CASING DIFFERS FROM THE ACTUAL BEARING ELEVATION, USE BOTTOM OF CASING ELEVATION WHEN CALCULATING TOTAL ACTUAL CASINGS.

## **SAMPLE "III" GLOSSARY OF TERMS USED IN SAMPLE WORKSHEETS "I" AND "II"**

**COLUMN "A" - ESTIMATED BEARING ELEVATION:**

For bidding purposes, it is the estimated elevation shown on the typical pier detail in the structural drawings at which point pier penetration commences.

**COLUMN "B" - ACTUAL BEARING ELEVATION:**

Actual elevation at which the bearing material is encountered by each pier as determined in the field by the independent testing laboratory.

**COLUMN "C" - AMOUNT DEEPER (+) OR SHALLOWER (-) THAN ESTIMATED BEARING ELEVATION:**

The amount, in feet, the bearing material was encountered above or below the estimated bearing elevation.

**COLUMN "D" - APPLICABLE UNIT PRICE FROM BID FORM, EXTRA (+) OR CREDIT (-):**

The applicable Extra and/or Credit unit prices per linear foot including drilling, reinforcing and concrete shown on the successful contractor's Bid Form.

**COLUMN "E" - NET EXTRA COST OR CREDIT DUE PER PIER:**

Net extra cost or credit due per individual pier (exclusive of casing, if required).

**COLUMN "F" - GROUND ELEVATION AT PIER:**

The elevation of ground at pier at time pier is drilled.

**COLUMN "G" - ESTIMATED CASING LENGTH:**

The estimated total linear feet of casing required for bidding purposes.

**COLUMN "H" - ACTUAL CASING LENGTH:**

The actual total linear feet of casing utilized during drilling.

SECTION 32 1313  
CONCRETE PAVING

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. All applicable provisions of the Bidding and Contract Requirements, and Division 1 – General Requirements shall govern the work under this section.

1.02 WORK INCLUDED

- A. This Section includes exterior cement concrete pavement for driveways, parking lots, curbs and gutters, and walkways.
- B. All concrete paving to be performed and materials to be used shall be in accordance with the Geotechnical Engineering Report and the applicable requirements in the American Concrete Institute's Manual of Concrete Practice. In the event of a discrepancy between the above-referenced report and any portion of this specification section, the above-referenced report will govern. The Contractor shall contact the Engineer in the event of a discrepancy.

1.03 SUBMITTALS

- A. Mix Design: Submit one (1) copy of the Mix design prepared by the batch plant servicing the Project.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products who complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1.05 PROJECT CONDITIONS

- A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

PART 2 – PRODUCTS

2.01 FORMS

- A. Form Materials: construction grade wood or metal, or other approved panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.
- B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

2.02 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60.
- B. Joint Dowel Bars: Plain steel bars, ASTM A 615/A 615M, Grade 60. Cut bars true to length with ends square and free of burrs.
- C. Tie Bars: ASTM A 615/A 615M, Grade 60.
- D. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete.

2.03 CONCRETE MATERIALS

- A. Cementitious Material: Portland Cement: ASTM C 150, Type II
- B. Normal-Weight Aggregates: ASTM C 33, Class 4S coarse aggregate, uniformly graded. Provide aggregates from a single source.
  - 1. Maximum Coarse-Aggregate Size 1 1/2-inch (38 mm) nominal.
  - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Water: ASTM C 94/C 94M.
- D. Air-Entraining Admixture: ASTM C 260.
- E. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and to contain no more than 0.1 percent water-soluble chloride ions by mass of cementitious material.
  - 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
  - 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
  - 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
  - 4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
  - 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
  - 6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.04 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) dry.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

- C. Water: Potable.
- D. White-Pigmented Curing Compound: ASTM C 1315

#### 2.05 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber

#### 2.06 PAVEMENT MARKINGS

- A. Pavement-Marking Paint: Latex, waterborne emulsion, lead and chromate free, ready mixed, complying with FS TT-P-1952, with drying time of less than 45 minutes.

#### 2.07 WHEEL STOPS

- A. Wheel Stops: Precast, air-entrained concrete, 2500-psi minimum compressive strength, 4-1/2 inches high by 10 inches wide by 72 inches long. Provide chamfered corners and holes for anchoring to substrate.
  - 1. Dowels: Galvanized steel, 3/4-inch (19-mm) diameter, 18-inch (254-mm) minimum length.

#### 2.08 CONCRETE MIXTURES

- A. Prepare design mixtures, proportioned according to ACI 301, for each type and strength of normal-weight concrete determined by either laboratory trial mixes or field experience.
- B. Proportion mixtures to provide normal-weight concrete with the following properties:
  - 2. Compressive Strength (28 Days): 4,000 psi
  - 3. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.50
  - 4. Slump Limit: 4 inches
- C. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:
  - 1. Air Content: do not exceed 2 percent
- D. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.
  - 1. Use water-reducing admixture in concrete, as required, for placement and workability.
  - 2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

### PART 3 – EXECUTION

#### 3.01 EXAMINATION

- A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.
- B. Proof-roll prepared subbase surface below concrete pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding.
  - 1. Completely proof-roll subbase in one direction and repeat in perpendicular direction. Limit vehicle speed to 3 mph.
  - 2. Proof-roll with a 20-ton pneumatic roller or similar equipment, such as a fully loaded dump truck.
  - 3. Subbase with soft spots and areas of pumping or rutting exceeding depth of 1/2 inch require correction according to requirements in Division 31 Section "Earth Moving."  
Proceed with concrete pavement operations only after nonconforming conditions have been corrected and subgrade is ready to receive pavement.

#### 3.02 PREPARATION

- A. Remove loose material from compacted subbase surface immediately before placing concrete.

#### 3.03 EDGE FORMS AND SCREED CONSTRUCTION

- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for pavement to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
- B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

#### 3.04 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
- C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.

#### 3.05 JOINTS

- A. General: Form construction, isolation, and contraction joints and tool edgings true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline, unless otherwise indicated.

1. When joining existing pavement, place transverse joints to align with previously placed joints, unless otherwise indicated.
  - B. Construction Joints: Set construction joints at side and end terminations of pavement and at locations where pavement operations are stopped for more than one-half hour unless pavement terminates at isolation joints.
    1. Continue steel reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of pavement strips, unless otherwise indicated.
    2. Provide tie bars at sides of pavement strips where indicated.
    3. Butt Joints: Use epoxy bonding adhesive at joint locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
    4. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt-coat one-half of dowel length to prevent concrete bonding to one side of joint.
  - C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.
    1. Extend joint fillers full width and depth of joint.
    2. Terminate joint filler not less than 1/2 inch (13 mm) or more than 1 inch (25 mm) below finished surface if joint sealant is indicated.
    3. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
    4. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
    5. Protect top edge of joint filler during concrete placement with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.
  - D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows to match jointing of existing adjacent concrete pavement:
    1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3-mm-) wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.
    2. Doweled Contraction Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.
  - E. Edging: Tool edges of pavement, gutters, curbs, and joints in concrete after initial floating with an edging tool to a 3/8-inch (10-mm) radius. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces.
  - F. Joint sealants: Joints shall be sealed with approved exterior pavement joint sealants and shall be installed in accordance with manufacturer's recommendations.
- 3.06 PAVEMENT MARKING
- A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Engineer.
  - B. Allow concrete pavement to cure for 28 days and be dry before starting pavement marking.
  - C. Sweep and clean surface to eliminate loose material and dust.
  - D. Apply paint with mechanical equipment to produce pavement markings of dimensions indicated with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils (0.4 mm).
- 3.07 FIELD QUALITY CONTROL
- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
  - B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
    1. Testing Frequency: Obtain at least 1 composite sample for each 100-cu. yd. (76 cu. m) or fraction thereof of each concrete mix placed each day.
    2. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
    3. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mix. Perform additional tests when concrete consistency appears to change.
    4. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.
    5. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each composite sample.



6. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
7. Compressive-Strength Tests: ASTM C 39/C 39M; test 1 specimen at 7 days and 2 specimens at 28 days.
  - a. A compressive-strength test shall be the average compressive strength from 2 specimens obtained from same composite sample and tested at 28 days.
- C. Strength of each concrete mix will be satisfactory if average of any 3 consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).
- D. Test results shall be reported in writing to Engineer, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
- E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Engineer but will not be used as sole basis for approval or rejection of concrete.
- F. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Engineer.
- G. Remove and replace concrete pavement where test results indicate that it does not comply with specified requirements.
- H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

END OF SECTION

SECTION 32 1314  
CONCRETE SIDEWALK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. All applicable provisions of the Bidding and Contract Requirements, and Division 1 – General Requirements shall govern the work under this Section.

1.02 WORK INCLUDED

- A. The work specified in this Section consists of the construction of concrete sidewalk in accordance with these Specifications and in conformity with the lines, grades, dimensions, and notes shown on the plans.

1.03 RELATED WORK

- A. Section 024119 – Selective Demolition
- B. Division 31 – Earthwork

PART 2 - PRODUCTS

2.01 CONCRETE

- A. Concrete shall be Class A Concrete unless otherwise shown on the plans.

2.02 FORMS

- A. Forms for this work shall be made of either wood or metal and shall have a depth equal to the plan dimensions for the depth of concrete being deposited against them. They shall be straight, free from warp or bends, and of sufficient strength when staked, to resist the lateral pressure of the concrete without displacement from lines and grade. Forms shall be cleaned each time they are used and shall be oiled prior to placing the concrete.

2.03 SUBGRADE AND GRADING

- A. Excavation shall be made to the required depth, and the foundation material upon which the sidewalk is to be set shall be compacted to a firm, even surface, true to grade and cross-section, and shall be moist at the time that the concrete is placed.

2.04 JOINTS

- A. Expansion joints between the sidewalk and the curb, and at all other locations indicated on the plans, shall be 1/4-inch wide, formed with a preformed joint filler. Preformed joint filler shall meet the requirements of AASHTO M153 or AASHTO M213.
- B. Contraction joints may be of the open type or may be sawed. Open type contraction joints shall be formed by staking a metal bulkhead in place and depositing the concrete on both sides. After the concrete has set sufficiently to preserve the width and shape of the joint, the bulkhead shall be removed. After the sidewalk has been finished over the joint, the slot shall be edged with a tool having a 1/2-inch radius.  
  
If the CONTRACTOR elects to saw the contraction joints, a slot approximately 1/8-inch-wide and not less than 1-1/2 inches deep shall be cut with a concrete saw after the concrete has set, and within the following periods of time:  
  
Contraction joints shall be constructed at not more than twenty (20) foot intervals and shall be in place within twelve (12) hours after finishing.

PART 3 - EXECUTION

3.01 PLACING

- B. The concrete shall be placed in the forms to the required depth and shall be vibrated and spaded until mortar entirely covers its surface.

3.02 FINISHING

- A. Screeding: The concrete shall be struck-off by means of a wood or metal screed, used perpendicular to the forms, and floated in order to obtain the required grade and remove surplus water and laitance.
- B. Surface requirements: The concrete shall be given a broom finish. The surface variations shall not be more than 1/4 inch under a ten-foot straightedge, nor more than 1/8 inch on a five-foot transverse section. The exposed edge of the slab shall be carefully finished with an edging tool having a radius of 1-1/2 inch.

3.03 CURING

- A. The concrete shall be continuously cured for a period of at least 72 hours. Curing shall be commenced after finishing has been completed and as soon as the concrete has hardened sufficiently, to permit application of the curing material without marring the surface.
- B. Wet burlap, white-pigmented curing compound, waterproof paper or polyethylene sheets may be used for the curing.

END OF SECTION

SECTION 32 1373  
CONCRETE PAVING JOINT SEALANTS

PART 1 - GENERAL

RELATED DOCUMENTS

- A. All applicable provisions of the Bidding and Contract Requirements, and Division 1 – General Requirements shall govern the work under this section.

1.02 WORK INCLUDED

- A. This Section includes the following:
1. Expansion and contraction joints within cement concrete pavement.
  2. Joints between cement concrete and asphalt pavement.

1.03 SUBMITTALS

- A. Product Data: For each joint-sealant product indicated. In the event of a discrepancy between this specification section and the City Design Criteria, the City's Design Criteria shall govern. The Contractor shall notify the Engineer in the event of a discrepancy.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by manufacturer.  
B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multicomponent materials.  
B. Store and handle materials to comply with manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.06 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 (4.4 deg C).
  2. When joint substrates are wet or covered with frost.
  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

2.01 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backing materials, 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.

2.02 COLD-APPLIED JOINT SEALANTS

- A. Type NS Silicone Sealant for Concrete: Single-component, low-modulus, neutral-curing, nonsag silicone sealant complying with ASTM D 5893 for Type NS.
1. Available Products:

- a. Crafcoc Inc.; RoadSaver Silicone.
- b. Dow Corning Corporation; 888.
- B. Type SL Silicone Sealant for Concrete and Asphalt: Single-component, low-modulus, neutral-curing, self-leveling silicone sealant complying with ASTM D 5893 for Type SL.
  - 1. Available Products:
    - a. Crafcoc Inc.; RoadSaver Silicone SL.
    - b. Dow Corning Corporation; 890-SL.

#### 2.03 HOT-APPLIED JOINT SEALANTS

- A. Elastomeric Sealant for Concrete: Single-component formulation complying with ASTM D 3406.
  - 1. Available Products:
    - a. Crafcoc Inc.; Superseal 444/777.
    - b. Meadows, W. R., Inc.; Poly-Jet 3406.
- B. Sealant for Concrete and Asphalt: Single-component formulation complying with ASTM D 3405.
  - 1. Available Products:
    - a. Koch Materials Company; Product No. 9005.
    - b. Koch Materials Company; Product No. 9030.
    - c. Meadows, W. R., Inc.; Sealtight Hi-Spec.
    - d. Approved equals.

#### 2.04 JOINT-SEALANT BACKER MATERIALS

- A. General: Provide joint-sealant backer materials that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by joint-sealant manufacturer based on field experience and laboratory testing.
- B. Round Backer Rods for Cold- and Hot-Applied Sealants: ASTM D 5249, Type 1, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.
- C. Backer Strips for Cold- and Hot-Applied Sealants: ASTM D 5249; Type 2; of thickness and width required to control sealant depth, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.
- D. Round Backer Rods for Cold-Applied Sealants: ASTM D 5249, Type 3, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.

#### 2.05 PRIMERS

- A. Primers: Product 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.

### PART 3 – EXECUTION

#### 3.01 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.
  - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.02 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions.
  - 1. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint-sealant manufacturer, based on 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.

### 3.03 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 backer materials of type 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 backer materials.
  - 2. Do not stretch, twist, puncture, or tear backer materials.
  - 3. Remove absorbent backer materials that have become wet before sealant application and replace them with dry materials.
- D. 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 provided for each joint configuration.
  - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified 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 sealants from surfaces adjacent to joint.
  - 2. Use tooling agents that are approved in writing by joint-sealant manufacturer and that do not discolor sealants or adjacent surfaces.
- F. Provide joint configuration to comply with joint-sealant manufacturer's written instructions, unless otherwise indicated.
- G. Provide recessed joint configuration for silicone sealants of recess depth and at locations indicated.

### 3.04 CLEANING

- A. Clean off excess sealants or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

### 3.05 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 and replace with joint sealant so installations with repaired areas are indistinguishable from the original work.

END OF SECTION



SECTION 32 1723  
PAVEMENT MARKINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. All applicable provisions of the bidding and Contract Requirements, and Division 1 – General Requirements shall govern the work under this Section.

1.2 WORK INCLUDED

- A. The work covered by this Section shall include the furnishing of all labor, equipment and materials necessary to construct and install all pavement marking, and striping in accordance with the plans and these specifications.

1.3 RELATED WORK

- A. Section 321216 – Asphalt Paving
- B. Section 321313 – Concrete Paving

1.4 QUALITY ASSURANCE

- A. Perform all work in accordance with the requirements of local agencies.

PART 2 - PRODUCTS

2.1 PAVEMENT MARKINGS

- A. Chlorinated rubber-alkyd type, as per Fed Spec. No. TT-P-115, Type III, or conforming to the applicable Sections of the Texas Department of Transportation Standard Specifications.
  - 1. Paint shall be factory mixed, quick drying and non-bleeding type.
  - 2. Color shall be as per D.O.T. requirements.
  - 3. Striping, arrows, lane markers and stop bars shall be provided with paint containing reflective additive.
- B. Thermoplastic paint shall conform to the applicable Sections of the Texas Department of Transportation Standard Specifications.
- C. Traffic paint shall conform to the applicable Sections of the Texas Department of Transportation Standard Specifications.

PART 3 - EXECUTION

3.1 TRAFFIC AND LANE MARKINGS

- A. Sweep dust and loose material from the sealed surface.
- B. Apply paint striping as indicated on the drawings, with suitable mechanical equipment to produce uniform straight edges.
  - 1. Apply in not less than (2) two coats as per manufacturer's recommended rates of applications.
- C. Protect pavement markings until completely dry in accordance with manufacturer's recommendations.

END OF SECTION





SECTION 32 31 15

VINYL-CLAD CHAIN LINK FENCING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Provide materials, equipment and labor to install vinyl clad chain link fencing and gates.

1.2 SUBMITTALS

A. Product Data: Submit in accordance with Section 01 33 23 - SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES. Include installation instructions for fence posts, fabric, gates, and accessories.

1.3 QUALITY ASSURANCE

A. Single-source Responsibility: Obtain chain link fences as complete units, including necessary erection accessories, fittings, and fastenings from a single source or manufacturer.

PART 2 - PRODUCTS

2.1 EXAMPLES OF ACCEPTABLE MANUFACTURERS

A. Provide vinyl-clad chain link fences and gates as manufactured by one of the following:  
Allied Fence Manufacturing Co.  
Ameristar Fence Products  
Anchor Fence Div. Master-Halco, Inc.  
Merchants Metals

2.2 MATERIALS AND CONSTRUCTION

A. Fabric: The chain link fabric shall be 8 gauge outside finish with 11 gauge galvanized steel core, vinyl clad both selvages knuckled. Color to be determined by Architect.

B. Top rail: 1½", vinyl clad. Color to be determined by Architect.

C. Terminal and Gate Posts: Terminal and Gate Posts shall be 2½" vinyl covered square tubing weighing 5.10 lbs. per lineal foot; or roll-formed section measuring 3½" having integral fabric loops weighing 5.14 lbs. per lineal foot or alternately TYPE I (See paragraph B) 2.875" O.D. steel round posts vinyl covered weighing 5.79 lbs. per lineal foot, or TYPE II (See paragraph B) 2.875" O.D. steel round posts vinyl covered weighing 4.64 lbs. per lineal foot. These posts shall not be splice welded in such a manner the weld appears above the grade line.

D. Terminal and Gate Post Fittings: Terminal and gate post fittings including tension bands, brace connections and top rail connections shall be No. 11 gauge, hot-dipped galvanized, cold-rolled carbon steel vinyl covered. No aluminum, cast iron, or pot-metal will be accepted as equals or substitutes. Top rail, brace and truss bands shall be vinyl covered and not less than ¾" wide, secured by 5/16" diameter vinyl covered carriage bolts. Tension bars shall be vinyl covered and not be less than 3/16" by ¾" and not less than 2" shorter than the nominal height of the fabric with which they are to be used. One tension bar shall be provided for each end and gate post, and two for each corner and pull post.

- E. Gates: Gate width is shown on drawings. Frames shall be constructed of 2" vinyl covered square members weighing 2.72 lbs. per lineal foot or alternately of TYPE I (See paragraph B) 1.900" O.D. round steel pipe weighing 2.72 lbs. per lineal foot or TYPE II (See paragraph B) 1.900" O.D. round steel pipe vinyl covered weighing 2.281 lbs. per lineal foot. Gate frames shall be welded or alternately shall utilize corner fittings of heavy malleable iron or pressed steel securely riveted to the frame. Fabric matching the fence fabric shall be installed in the frame by means of tension bars and hook bolts. Frames having corner fittings shall be equipped with adjustable truss rods having a diameter of 3/8". Hinges shall be of adequate strength to support the gate and have large bearing surfaces for clamping in position. Under no conditions of use or abuse shall the hinges twist or turn under the action of the gate. Gates shall be capable of being opened and closed quickly and easily by one person. Gates shall be equipped with a positive latching device that will accommodate padlocking. A plunger rod, catch and semi-automatic outer catch shall be installed on drive gates so as to secure gates in an open position. Hinges, latches and catches shall be one of the manufacturer's standard designs as selected and approved by the Architect.
- F. Line posts and line post top: 2" vinyl clad. Color to be determined by Architect.
- G. Terminal posts and terminal post top: 2½" vinyl clad. Color to be determined by Architect.
- H. Bottom cable: No. 7 gauge galvanized steel vinyl clad. Color to be determined by Architect.
- I. Ties: 11 gauge aluminum vinyl clad. Color to be determined by Architect
- J. Concrete: Provide concrete consisting of Portland cement, ASTM C 150, aggregates ASTM C33, and clean water. Mix materials to obtain concrete with a minimum 28-day compressive strength of 2500 psi. Use at least 4 sacks of cement per cu. Yd., 1-inch maximum size aggregate, a maximum 3-inch slump, and 2 to 4 percent entrained air.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. General: Install fence in compliance with ASTM F 567. Do not begin installation and erection before final grading is completed.
- B. Excavation: Drill/hand-excavate with post-hole digger, holes for posts in firm, compacted soil.
  - 1. Excavate holes for each post to minimum diameter recommended by fence manufacturer, but not less than 4 times largest cross-section of post.
  - 2. Excavate hole depths approximately 3 inches lower than post bottom, with bottom of posts set not less than 36 inches below finish grade surface.
- C. Setting Posts: Center and align posts in holes 3 inches above bottom of excavation. Space maximum 10 feet o.c. Protect portion of posts above ground from concrete splatter. Place concrete around posts and vibrate or tamp for consolidation. Check each post for vertical and top alignment, and hold in position during placement and finishing operations. Extend concrete footings 2 inches above grade and trowel to a crown to shed water.
- D. Top Rails: Run rail continuously through line post caps, bending to radius for curved runs and at other posts terminating into rail end attached to posts or post caps fabricated to receive rail. Provide expansion couplings as recommended by fencing manufacturer.
- E. Bottom Tension Wire: Install tension wire within 6 inches of bottom of fabric before stretching fabric and tie to each post with not less than same gage and type of wire. Pull wire taut, without sags. Fasten fabric to tension wire with 11-gage hog rings of same material and finish as fabric wire, spaced maximum 24 inches o.c.
- F. Fabric: Leave approximately 2 inches between finish grade and bottom selvage. Pull fabric taut and tie to posts, rails, and tension wires. Install fabric on security side of fence, and anchor to framework so that fabric remains in tension after pulling force is released.
- G. Tension or Stretcher Bars: Thread through or clamp to fabric 4 inches o.c., and secure to end, corner, pull, and gate posts with tension bands spaced not over 15 inches o.c.

- H. Tie Wires: Use U-shaped wire of proper length to secure fabric firmly to posts and rails with ends twisted at least 2 full turns. Bend ends of wire to minimize hazard to persons or clothing.
1. Maximum Spacing: Tie fabric to line posts 12 inches o.c. and to rails and braces 24 inches o.c.

3.2 PROTECTION AND CLEAN UP

- A. Clean Up: Clean up all excess materials and dispose off premises. All excess materials are to become the property of the Contractor and shall be removed from the site at his expense.

END OF SECTION

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SECTION 33 0500  
COMMON WORK RESULTS FOR UTILITIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section includes the following:
  - 1. Piping joining materials.
  - 2. Transition fittings.
  - 3. Dielectric fittings.
  - 4. Sleeves.
  - 5. Identification devices.
  - 6. Grout.City
  - 7. Flowable fill.
  - 8. Piped utility demolition.
  - 9. Piping system common requirements.
  - 10. Equipment installation common requirements.
  - 11. Painting.
  - 12. Concrete bases.
  - 13. Metal supports and anchorages.

1.03 DEFINITIONS

- B. Exposed Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions.
- C. Concealed 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.
- D. ABS: Acrylonitrile-butadiene-styrene plastic.
- E. CPVC: Chlorinated polyvinyl chloride plastic.
- F. PE: Polyethylene plastic.
- G. PVC: Polyvinyl chloride plastic.

1.04 ACTION SUBMITTALS

- H. Product Data: For the following:
  - 1. Dielectric fittings.
  - 2. Identification devices.

1.05 INFORMATIONAL SUBMITTALS

- I. Welding certificates.

1.06 QUALITY ASSURANCE

- J. Steel Support Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- K. Steel Piping Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
  - 1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
  - 2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.
- L. Comply with ASME A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.

1.07 DELIVERY, STORAGE, AND HANDLING

- M. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.
- N. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.08 COORDINATION

- O. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.
- P. Coordinate installation of identifying devices after completing covering and painting if devices are applied to surfaces.
- Q. Coordinate size and location of concrete bases.

PART 2 - PRODUCTS

2.01 PIPING 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.
  - 2. AWWA C110, rubber, flat face, 1/8-inch-thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.
- B. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.
- C. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.
- D. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
- E. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.
- F. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
- G. Solvent Cements for Joining Plastic Piping:
  - 1. ABS Piping: ASTM D 2235.
  - 2. CPVC Piping: ASTM F 493.
  - 3. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
  - 4. PVC to ABS Piping Transition: ASTM D 3138.
  - 5. Fiberglass Pipe Adhesive: As furnished or recommended by pipe manufacturer.

2.02 TRANSITION FITTINGS

- A. Transition Fittings, General: Same size as, and with pressure rating at least equal to and with ends compatible with, piping to be joined.
- B. Transition Couplings NPS 1-1/2 (DN 40) and Smaller:
  - 1. Underground Piping: Manufactured piping coupling or specified piping system fitting.
  - 2. Aboveground Piping: Specified piping system fitting.
- C. AWWA Transition Couplings NPS 2 (DN 50) and Larger:
  - 1. 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:
  - 2. Manufacturers: Subject to compliance with requirements.
  - 3. Description: AWWA C219, metal sleeve-type coupling for underground pressure piping.
- D. Plastic-to-Metal Transition Fittings:
  - 1. 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:
  - 2. Manufacturers: Subject to compliance with requirements.
  - 3. Description: PVC one-piece fitting with manufacturer's Schedule 80 equivalent dimensions; one end with threaded brass insert, and one solvent-cement-joint or threaded end.
- E. Plastic-to-Metal Transition Unions:

1. 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:
  2. Manufacturers: Subject to compliance with requirements.
  3. Description: MSS SP-107, PVC four-part union. Include brass or stainless-steel threaded end, solvent-cement-joint or threaded plastic end, rubber O-ring, and union nut.
- F. Flexible Transition Couplings for Underground Nonpressure Drainage Piping:
1. 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:
  2. Manufacturers: Subject to compliance with requirements.
  3. Description: ASTM C 1173 with elastomeric sleeve, ends same size as piping to be joined, and corrosion-resistant metal band on each end.

## 2.03 DIELECTRIC FITTINGS

- A. Dielectric Fittings, General: Assembly of copper alloy and ferrous materials or ferrous material body with separating nonconductive insulating material suitable for system fluid, pressure, and temperature.
- B. Dielectric Unions:
1. 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:
  2. Manufacturers: Subject to compliance with requirements.
  3. Description: Factory fabricated, union, NPS 2 (DN 50) and smaller.
    - a. Pressure Rating: 150 psig minimum at 180 deg F.
    - b. End Connections: Solder-joint copper alloy and threaded ferrous; threaded ferrous.
- C. Dielectric Flanges:
1. 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:
  2. Manufacturers: Subject to compliance with requirements.
  3. Description: Factory-fabricated, bolted, companion-flange assembly, NPS 2-1/2 to NPS 4 (DN 65 to DN 100) and larger.
    - a. Pressure Rating: 150 psig minimum.
    - b. End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.
- D. Dielectric-Flange Kits:
1. 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:
  2. Manufacturers: Subject to compliance with requirements.
  3. Description: Nonconducting materials for field assembly of companion flanges, NPS 2-1/2 (DN 65) and larger.
    - a. Pressure Rating: 150 psig minimum.
    - b. Gasket: Neoprene or phenolic.
    - c. Bolt Sleeves: Phenolic or polyethylene.
    - d. Washers: Phenolic with steel backing washers.
- E. Dielectric Couplings:
1. 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:
  2. Manufacturers: Subject to compliance with requirements.
  3. Description: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining, NPS 3 (DN 80) and smaller.
    - a. Pressure Rating: 300 psig at 225 deg F.
    - b. End Connections: Threaded.
- F. Dielectric Nipples:
1. 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:
  2. Manufacturers: Subject to compliance with requirements.



3. Description: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining.
  - a. Pressure Rating: [300 psig (2070 kPa) at 225 deg F (107 deg C)] <Insert pressure and temperature>.
  - b. End Connections: Threaded or grooved.

#### 2.04 SLEEVES

- A. Mechanical sleeve seals for pipe penetrations are specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."
- B. Galvanized-Steel Sheet Sleeves: 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint.
- C. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized, plain ends.
- D. Cast-Iron Sleeves: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- E. Molded PVC Sleeves: Permanent, with nailing flange for attaching to wooden forms.
- F. PVC Pipe Sleeves: ASTM D 1785, Schedule 40.
- G. Molded PE Sleeves: Reusable, PE, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.

#### 2.05 IDENTIFICATION DEVICES

- A. General: Products specified are for applications referenced in other utilities Sections. If more than single type is specified for listed applications, selection is Installer's option.
- B. Equipment Nameplates: Metal permanently fastened to equipment with data engraved or stamped.
  1. Data: Manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances, and essential data.
  2. Location: Accessible and visible.
- C. Stencils: Standard stencils prepared with letter sizes complying with recommendations in ASME A13.1. Minimum letter height is 1-1/4 inches for ducts, and 3/4 inch for access door signs and similar operational instructions.
  1. Material: Fiberboard, Brass.
  2. Stencil Paint: Exterior, oil-based, alkyd-gloss black enamel, unless otherwise indicated. Paint may be in pressurized spray-can form.
  3. Identification Paint: Exterior, oil-based, alkyd enamel in colors according to ASME A13.1, unless otherwise indicated.
- D. Snap-on Plastic Pipe Markers: Manufacturer's standard preprinted, semirigid, snap-on type. Include color-coding according to ASME A13.1, unless otherwise indicated.
- E. Pressure-Sensitive Pipe Markers: Manufacturer's standard preprinted, color-coded, pressure-sensitive-vinyl type with permanent adhesive.
- F. Pipes with OD, Including Insulation, Less Than 6 Inches: Full-band pipe markers, extending 360 degrees around pipe at each location.
- G. Pipes with OD, Including Insulation, 6 Inches and Larger: Either full-band or strip-type pipe markers, at least three times letter height and of length required for label.
- H. Lettering: Manufacturer's standard preprinted captions as selected by Architect.
- I. Lettering: Use piping system terms indicated and abbreviate only as necessary for each application length.
  1. Arrows: Either integrally with piping system service lettering to accommodate both directions of flow, or as separate unit on each pipe marker to indicate direction of flow.
- J. Plastic Tape: Manufacturer's standard color-coded, pressure-sensitive, self-adhesive vinyl tape, at least 3 mils thick.
  1. Width: 1-1/2 inches on pipes with OD, including insulation, less than 6 inches; 2-1/2 inches for larger pipes.
  2. Color: Comply with ASME A13.1, unless otherwise indicated.
- K. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch sequenced numbers. Include 5/32-inch hole for fastener.
  1. Material: 0.032-inch- thick, [polished brass] [or] [aluminum].
  2. Material: 0.0375-inch- thick stainless steel.
  3. Material: 3/32-inch- thick plastic laminate with 2 black surfaces and a white inner layer.

4. Material: Valve manufacturer's standard solid plastic.
  5. Size: 1-1/2 inches in diameter, unless otherwise indicated.
  6. Shape: As indicated for each piping system.
- L. Valve Tag Fasteners: Brass, wire-link, or beaded chain; or brass S-hooks.
- M. Engraved Plastic-Laminate Signs: ASTM D 709, Type I, cellulose, paper-base, phenolic-resin-laminate engraving stock; Grade ES-2, black surface, black phenolic core, with white melamine subcore, unless otherwise indicated. Fabricate in sizes required for message. Provide holes for mechanical fastening.
1. Engraving: Engraver's standard letter style, of sizes and with terms to match equipment identification.
  2. Thickness: 1/16 inch unless otherwise indicated.
  3. Thickness: 1/16 inch, for units up to 20 sq. in. or 8 inches in length, and 1/8 inch for larger units.
  4. Fasteners: Self-tapping, stainless-steel screws or contact-type permanent adhesive.
- N. Plastic Equipment Markers: Manufacturer's standard laminated plastic, in the following color codes:
1. Green: Cooling equipment and components.
  2. Yellow: Heating equipment and components.
  3. Brown: Energy reclamation equipment and components.
  4. Blue: Equipment and components that do not meet criteria above.
  5. Hazardous Equipment: Use colors and designs recommended by ASME A13.1.
  6. Terminology: Match schedules as closely as possible. Include the following:
    - a. Name and plan number.
    - b. Equipment service.
    - c. Design capacity.
    - d. Other design parameters such as pressure drop, entering and leaving conditions, and speed.
  7. Size: 2-1/2 by 4 inches for control devices, dampers, and valves; 4-1/2 by 6 inches for equipment.
- O. Plasticized Tags: Preprinted or partially preprinted, accident-prevention tags, of plasticized card stock with mat finish suitable for writing.
1. Size: 3-1/4 by 5-5/8 inches.
  2. Fasteners: Brass grommets and wire.
  3. Nomenclature: Large-size primary caption such as DANGER, CAUTION, or DO NOT OPERATE.
- P. Lettering and Graphics: Coordinate names, abbreviations, and other designations used in piped utility identification with corresponding designations indicated. Use numbers, letters, and terms indicated for proper identification, operation, and maintenance of piped utility systems and equipment.
1. Multiple Systems: Identify individual system number and service if multiple systems of same name are indicated.
- 2.06 GROUT
- A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
1. Characteristics: Post hardening, volume adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
  2. Design Mix: 5000-psi, 28-day compressive strength.
  3. Packaging: Premixed and factory packaged.
- 2.07 FLOWABLE FILL
- A. Description: Low-strength-concrete, flowable-slurry mix.
1. Cement: ASTM C 150, Type I, portland.
  2. Density: 115- to 145-lb/cu. ft.
  3. Aggregates: ASTM C 33, natural sand, fine and crushed gravel, or stone, coarse.
  4. Aggregates: ASTM C 33, natural sand, fine.
  5. Admixture: ASTM C 618, fly-ash mineral.
  6. Water: Comply with ASTM C 94/C 94M.
  7. Strength: 100 to 200 psig at 28 days.

### PART 3 - EXECUTION

#### 3.01 PIPED UTILITY DEMOLITION

- A. Refer to Section 024119 "Selective Demolition" for general demolition requirements and procedures.
- B. Disconnect, demolish, and remove piped utility 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. Fill abandoned piping with flowable fill, and cap or plug piping with same or compatible piping material.
  - 3. Equipment to Be Removed: Disconnect and cap services and remove equipment.
  - 4. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make operational.
  - 5. 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.

#### 3.02 DIELECTRIC FITTING APPLICATIONS

- A. Dry Piping Systems: Connect piping of dissimilar metals with the following:
  - 1. NPS 2 and Smaller: Dielectric unions.
  - 2. NPS 2-1/2 to NPS 12: Dielectric flanges.
- B. Wet Piping Systems: Connect piping of dissimilar metals with the following:
  - 1. NPS 2 and Smaller: Dielectric.
  - 2. NPS 2-1/2 to NPS 4: Dielectric nipples.
  - 3. NPS 2-1/2 to NPS 8: Dielectric nipples.
  - 4. NPS 10 and NPS 12: Dielectric flange kits.

#### 3.03 PIPING INSTALLATION

- A. Install piping according to the following requirements and utilities 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 the Coordination Drawings.
  - 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 to permit valve servicing.
  - E. Install piping at indicated slopes.
  - F. Install piping free of sags and bends.
  - G. Install fittings for changes in direction and branch connections.
  - H. Select system components with pressure rating equal to or greater than system operating pressure.
  - I. Sleeves are not required for core-drilled holes.
  - J. Permanent sleeves are not required for holes formed by removable PE sleeves.
  - K. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.
    - 1. Cut sleeves to length for mounting flush with both surfaces.
      - a. Exception: Extend sleeves installed in floors of equipment areas or other wet areas [2 inches above finished floor level.
    - 2. Install sleeves in new walls and slabs as new walls and slabs are constructed.
      - a. PVC or Steel Pipe Sleeves: For pipes smaller than NPS 6.
      - b. Steel Sheet Sleeves: For pipes NPS 6 and larger, penetrating gypsum-board partitions.
  - L. Verify final equipment locations for roughing-in.
  - M. Refer to equipment specifications in other Sections for roughing-in requirements.
- #### 3.04 PIPING JOINT CONSTRUCTION
- A. Join pipe and fittings according to the following requirements and utilities Sections specifying piping systems.

- B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
  - C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
  - D. 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.
  - E. Welded Joints: Construct joints according to AWS D10.12/D10.12M, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.
  - F. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
  - G. Grooved Joints: Assemble joints with grooved-end pipe coupling with coupling housing, gasket, lubricant, and bolts according to coupling and fitting manufacturer's written instructions.
  - H. 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 (0.20 percent maximum lead content) complying with ASTM B 32.
  - I. 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.
  - J. Pressure-Sealed Joints: Assemble joints for plain-end copper tube and mechanical pressure seal fitting with proprietary crimping tool to according to fitting manufacturer's written instructions.
  - K. Plastic Piping Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
    - 1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
    - 2. ABS Piping: Join according to ASTM D 2235 and ASTM D 2661 appendixes.
    - 3. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
    - 4. 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.
    - 5. PVC Nonpressure Piping: Join according to ASTM D 2855.
    - 6. PVC to ABS Nonpressure Transition Fittings: Join according to ASTM D 3138 Appendix.
  - L. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.
  - M. Plastic Nonpressure Piping Gasketed Joints: Join according to ASTM D 3212.
  - N. Plastic Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.
    - 1. Plain-End PE Pipe and Fittings: Use butt fusion.
    - 2. Plain-End PE Pipe and Socket Fittings: Use socket fusion.
  - O. Bonded Joints: Prepare pipe ends and fittings, apply adhesive, and join according to pipe manufacturer's written instructions.
- 3.05 PIPING CONNECTIONS
- A. Make connections according to the following, unless otherwise indicated:
    - 1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
    - 2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.
    - 3. Install dielectric fittings at connections of dissimilar metal pipes.
- 3.06 EQUIPMENT INSTALLATION
- A. Install equipment level and plumb, unless otherwise indicated.

- B. Install equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference with other installations. Extend grease fittings to an accessible location.
  - C. Install equipment to allow right of way to piping systems installed at required slope.
- 3.07 PAINTING
- A. Painting of piped utility systems, equipment, and components is specified in Section 099113 "Exterior Painting," Section 099123 "Interior Painting," and Section 099600 "High-Performance Coatings."
  - B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.
- 3.08 IDENTIFICATION
- A. Piping Systems: Install pipe markers on each system. Include arrows showing normal direction of flow.
    - 1. Stenciled Markers: According to ASME A13.1.
    - 2. Plastic markers, with application systems. Install on insulation segment if required for hot noninsulated piping.
    - 3. Locate pipe markers on exposed piping according to the following:
    - 4. Near each valve and control device.
    - 5. Near each branch, excluding short takeoffs for equipment and terminal units. Mark each pipe at branch if flow pattern is not obvious.
    - 6. Near locations where pipes pass through walls or floors or enter inaccessible enclosures.
    - 7. At manholes and similar access points that permit view of concealed piping.
    - 8. Near major equipment items and other points of origination and termination.
  - B. Equipment: Install engraved plastic-laminate sign or equipment marker on or near each major item of equipment.
    - 1. Lettering Size: Minimum 1/4-inch-high for name of unit if viewing distance is less than 24 inches, 1/2-inch-high for distances up to 72 inches, and proportionately larger lettering for greater distances. Provide secondary lettering two-thirds to three-fourths of size of principal lettering.
    - 2. Text of Signs: Provide name of identified unit. Include text to distinguish among multiple units, inform user of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations.
  - C. Adjusting: Relocate identifying devices that become visually blocked by work of this or other Divisions.
- 3.09 CONCRETE BASES
- A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.
    - 1. Construct concrete bases of dimensions indicated, but not less than 4 inches (100 mm) larger in both directions than supported unit.
    - 2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around the full perimeter of base.
    - 3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
    - 4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
    - 5. Install anchor bolts to elevations required for proper attachment to supported equipment.
    - 6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
    - 7. Use 3000-psi, 28-day compressive-strength concrete and reinforcement.
- 3.10 ERECTION OF METAL SUPPORTS AND ANCHORAGES
- A. Refer to Section 055000 "Metal Fabrications" for structural steel.
  - B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor piped utility materials and equipment.
  - C. Field Welding: Comply with AWS D1.1/D1.1M.

3.11 GROUTING

- A. Mix and install grout for 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



SECTION 33 4100  
STORM UTILITY DRAINAGE PIPING

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes gravity-flow, nonpressure storm drainage outside the building, with the following components:
  - 1. Site storm sewer drainage piping, fittings, accessories, and bedding.
  - 2. Catch basins, paved area drains, site surface drains and stormwater detention facilities.
  - 3. Connection of building storm water drainage system.
  - 4. Precast concrete, Cast-in-place concrete manholes.
- B. All public work to be performed and materials to be used within the street right-of-way, shall be in accordance with the City of Conroe Design Standards. In the event of a discrepancy between the above-referenced standards, the plans, and/or any portion of this specification section, the order of precedence will be the plans, the City Design Standards, and then these specifications. The Contractor shall contact the engineer in the event of a discrepancy.

1.02 DEFINITIONS

- A. PVC: Polyvinyl chloride plastic.
- B. HDPE: High density polyethylene.
- C. RCP: Reinforced concrete pipe

1.03 PERFORMANCE REQUIREMENTS

- A. Gravity-Flow, Non-pressure, Drainage-Piping Pressure Rating: 10-foot head of water (30 kPa). Pipe joints shall be at least silttight, unless otherwise indicated.

1.04 SUBMITTALS

- A. Product Data: For the following:
  - 1. Pipe materials, fittings, and accessories.
  - 2. Drains.
- B. Shop Drawings: For the following:
  - 1. Manholes: Include plans, elevations, sections, details, and frames and covers. Catch Basins and Stormwater Inlets. Include plans, elevations, sections, details, and frames, covers, and grates.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Do not store plastic manholes, pipe, and fittings in direct sunlight.
- B. Protect pipe, pipe fittings, and seals from dirt and damage.
- C. Handle manholes according to manufacturer's written rigging instructions.
- D. Handle catch basins and stormwater inlets according to manufacturer's written rigging instructions.

1.06 PROJECT CONDITIONS

- A. Interruption of Existing Storm Drainage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
  - 1. Notify Engineer and Owner no fewer than two days in advance of proposed interruption of service.

PART 2 – PRODUCTS

2.01 PVC PIPE AND FITTINGS

- A. PVC Sewer Pipe and Fittings; NPS 6" to 12" ASTM D 3034, SDR 26, with bell-and-spigot ends for gasketed joints with ASTM F 477, elastomeric seals.

2.02 CONCRETE PIPE AND FITTINGS

- A. Reinforced-Concrete Sewer Pipe and Fittings: ASTM C 76 (ASTM C 76M), with groove and tongue ends and gasketed joints with ASTM C 443 (ASTM C 443M), rubber gaskets.
  - 1. Class III, Wall B.

2.03 HDPE PIPE AND FITTINGS



- A. Pipe shall have a smooth interior and exterior corrugations.
  - 1. 4-through 10-inch (100 to 250 mm) shall meet AASHTO M252m, Type S.
  - 2. 12- through 60-inch (300 to 1500 mm) shall meet AASHTO M294, Type S or ASTM F2306.
- B. Pipe shall be joined with joints meeting the requirements of AASHTO M252, AASHTO M294, or ASTM F2306.
- C. 4-through 60-inch (100 to 1500mm) shall be watertight according to the requirements of ASTM D3212. Gaskets shall be made of polyisoprene meeting the requirements of ASTM F477. Gaskets shall be installed by the pipe manufacturer and covered with a removable, protective wrap to ensure the gasket is free from debris. A joint lubricant available from the manufacturer shall be used on the gasket and bell during assembly.
- D. 12- through 60-inch (300 to 1500 mm) diameters shall have a reinforced bell with a bell tolerance device. The bell tolerance shall be installed by the manufacturer.
- E. Fittings shall conform to AASHTO M252, AASHTO M294, or ASTM F2306.
- F. To assure watertightness, field performance verification may be accomplished by testing in accordance with ASTM C969. Appropriate safety precautions must be used when field-testing any pipe material.
- G. Installation shall be in accordance with ASTM D2321 and manufacturer's published installation guidelines, with the exception that minimum cover in trafficked areas for 4- through 48-inch (100 to 1200 mm) diameters shall be one foot. (0.3 m) and for 60-inch (1500 mm) diameters, the minimum cover shall be 2 ft. (0.6 m) in single run applications.

#### 2.04 NONPRESSURE-TYPE PIPE COUPLINGS

- A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined, and corrosion-resistant-metal tension band and tightening mechanism on each end.
- B. Sleeve Materials:
  - 1. For Concrete Pipes: ASTM C 443 (ASTM C 443M), rubber.
  - 2. For Cast-Iron Soil Pipes: ASTM C 564, rubber.
  - 3. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
  - 4. For Dissimilar Pipes: ASTM D 5926, PVC, or other material compatible with pipe materials being joined.

#### 2.05 CLEANOUTS AND PLUGS

- A. Installation shall be in accordance with the details and at locations shown on the drawings.
- B. All cleanouts shall have a 2' x 2' x 6" thick concrete apron.

#### 2.06 MANHOLES

- A. Standard Precast Concrete Manholes: ASTM C 478 (ASTM C 478M), precast, reinforced concrete, of depth indicated, with provision for sealant joints.
  - 1. Diameter: 48 inches (1200 mm) minimum, unless otherwise indicated.
  - 2. Ballast: Increase thickness of precast concrete sections or add concrete to base section, as required to prevent flotation.
  - 3. Base Section: 6-inch (150-mm) minimum thickness for floor slab and 4-inch (102-mm) minimum thickness for walls and base riser section and having separate base slab or base section with integral floor.
  - 4. Riser Sections: 4-inch (102-mm) minimum thickness, and lengths to provide depth indicated.
  - 5. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.
  - 6. Joint Sealant: ASTM C 990 (ASTM C 990M), bitumen or butyl rubber.
  - 7. Steps: Individual FRP steps or FRP ladder, wide enough to allow worker to place both feet on 1 step and designed to prevent lateral slippage off of step. Cast or anchor steps into sidewalls at 12- to 16-inch (300- to 400-mm) intervals. Omit steps if total depth from floor of manhole to finished grade is less than 60 inches (1500 mm).
  - 8. Grade Rings: Reinforced-concrete rings, 6- to 9-inch (150- to 225-mm) total thickness, to match diameter of manhole frame and cover.

9. Manhole Frames and Covers: Ferrous; 28-inch ID by 7- to 9-inch (175- to 225-mm) riser with 4-inch- (102-mm-) minimum width flange and 30-inch-diameter cover. Include indented top design with lettering cast into cover, using wording equivalent to "STORM SEWER."
  - a. Material: ASTM A 536, Grade 60-40-18 ductile iron, unless otherwise indicated.
- B. Cast-in-Place Concrete Manholes: Construct of reinforced-concrete bottom, walls, and top; designed according to ASTM C 890 for A-16 (ASSHTO HS20-44), heavy-traffic, structural loading; of depth, shape, dimensions, and appurtenances indicated.
  1. Ballast: Increase thickness of concrete, as required to prevent flotation.
  2. Resilient Pipe Connectors: ASTM C 923 (ASTM C 923M), cast or fitted into manhole walls, for each pipe connection.
  3. Steps: Individual FRP steps or FRP ladder, wide enough to allow worker to place both feet on 1 step and designed to prevent lateral slippage off of step. Cast or anchor steps into sidewalls at 12- to 16-inch (300- to 400-mm) intervals. Omit steps if total depth from floor of manhole to finished grade is less than 60 inches (1500 mm).
  4. Adjusting Rings: Interlocking rings with level or sloped edge in thickness and diameter matching manhole frame and cover. Include sealant recommended by ring manufacturer.
  5. Grade Rings: Reinforced-concrete rings, 6- to 9-inch (150- to 225-mm) total thickness, to match diameter of manhole frame and cover.
  6. Manhole Frames and Covers: Ferrous; 28-inch ID by 7- to 9-inch (175- to 225-mm) riser with 4-inch- (102-mm-) minimum width flange and 30-inch-diameter cover. Include indented top design with lettering cast into cover, using wording equivalent to "STORM SEWER."
    - a. Material: ASTM A 536, Grade 60-40-18 ductile iron, unless otherwise indicated.
    - b. Protective Coating: Foundry-applied, SSPC-Paint 16, coal-tar, epoxy-polyamide paint; 10-mil (0.26-mm) minimum thickness applied to all surfaces, unless otherwise indicated.

## 2.07 CONCRETE

- A. General: Cast-in-place concrete according to ACI 318/318R, ACI 350R, and the following:
  1. Cement: ASTM C 150, Type II.
  2. Fine Aggregate: ASTM C 33, sand.
  3. Coarse Aggregate: ASTM C 33, crushed gravel.
  4. Water: Potable.
- B. Portland Cement Design Mix: 4000 psi (27.6 MPa) minimum, with 0.45 maximum water-cementitious materials ratio.
  1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
  2. Reinforcement Bars: ASTM A 615/A 615M, Grade 60 (420 MPa), deformed steel.
- C. Ballast and Pipe Supports: Portland cement design mix, 3000 psi (20.7 MPa) minimum, with 0.58 maximum water-cementitious materials ratio.
  1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
  2. Reinforcement Bars: ASTM A 615/A 615M, Grade 60 (420 MPa), deformed steel.

## 2.08 CATCH BASINS

- A. Installation shall be in accordance with the details and at locations shown on the drawings.

## 2.09 STORMWATER INLETS

- A. Curb Inlets: Made with vertical curb opening, of materials and dimensions according to the details and at locations shown on plans.
- B. Frames and Grates: Heavy-duty frames and grates according to the details and at locations shown on plans.

## PART 3 – EXECUTION

### 3.01 EARTHWORK

- A. Excavation, trenching, and backfilling are specified in Division 31 Section "Earth Moving."

### 3.02 PIPING APPLICATIONS

- A. Pipe couplings and special pipe fittings with pressure ratings at least equal to piping rating may be used in applications below, unless otherwise indicated.
  - 1. Use nonpressure-type flexible couplings where required to join gravity-flow, nonpressure sewer piping, unless otherwise indicated.
    - a. Unshielded flexible couplings for same or minor difference OD pipes.
    - b. Unshielded, increaser/reducer-pattern, flexible or rigid couplings for pipes with different OD.
    - c. Ring-type flexible couplings for piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.
- B. Special Pipe Fittings: Use for pipe expansion and deflection. Pipe couplings and special pipe fittings with pressure ratings at least equal to piping rating may be used in applications below, unless otherwise indicated.
- C. Gravity-Flow, Nonpressure Sewer Piping: As shown on plans.

### 3.03 PIPING INSTALLATION

- A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take design considerations into account. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.
- B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.
- C. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.
- D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- E. Tunneling: Install pipe under streets or other obstructions that cannot be disturbed by tunneling, jacking, or a combination of both.
- F. Install gravity-flow, nonpressure drainage piping according to the following:
  - 1. Install piping NPS 6 (DN 150) and larger with restrained joints at tee fittings and at changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place concrete supports or anchors.
  - 2. Install piping with 36-inch (915-mm) minimum cover.
  - 3. Install PVC sewer piping according to ASTM D 2321 and ASTM F 1668.
  - 4. Install reinforced-concrete sewer piping according to ASTM C 1479 and ACPA's "Concrete Pipe Installation Manual."
    - a. Install HDPE pipe according to ASTM D2321.

### 3.04 PIPE JOINT CONSTRUCTION

- A. Where specific joint construction is not indicated, follow piping manufacturer's written instructions.
- B. Join gravity-flow, nonpressure drainage piping according to the following:
  - 1. Join PVC sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints or ASTM D 3034 for elastomeric gasket joints.
  - 2. Join reinforced-concrete sewer piping according to ACPA's "Concrete Pipe Installation Manual" for rubber-gasket joints.
  - 3. Join dissimilar pipe materials with nonpressure-type flexible or rigid couplings.
- C. Join dissimilar pipe materials with pressure-type couplings.

### 3.05 CLEANOUT INSTALLATION

- A. Install cleanouts and riser extension from sewer pipe to cleanout at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts and cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.
  - 1. Use heavy-duty, top-loading classification cleanouts in vehicle-traffic service areas.
  - 2. Use extra-heavy-duty, top-loading classification cleanouts in fire lane areas.
- B. Set cleanout frames and covers in earth in cast-in-place concrete block, 24 by 24 by 6 inches deep. Set with tops 1 inch (25 mm) above surrounding earth grade.

- C. Set cleanout frames and covers in concrete pavement with tops flush with pavement surface.
- 3.06 DRAIN INSTALLATION
- A. Install type of drains in locations indicated.
    - 1. Use heavy-duty, top-loading classification drains in vehicle-traffic service areas.
    - 2. Use extra-heavy-duty, top-loading classification drains in roads areas.
  - B. Embed drains in 4-inch (102-mm) minimum depth of concrete around bottom and sides.
  - C. Fasten grates to drains if indicated.
  - D. Set drain frames and covers with tops flush with pavement surface.
  - E. Assemble trench sections with flanged joints.
  - F. Embed trench sections in 4-inch (102-mm) minimum concrete around bottom and sides.
- 3.07 MANHOLE INSTALLATION
- A. General: Install manholes, complete with appurtenances and accessories indicated.
  - B. Install precast concrete manhole sections according to ASTM C 891.
  - C. Construct cast-in-place manholes as indicated.
- 3.08 CATCH BASIN INSTALLATION
- A. Construct catch basins to sizes and shapes indicated.
  - B. Set frames and grates to elevations indicated.
- 3.09 STORMWATER INLET AND OUTLET INSTALLATION
- A. Construct inlet head walls, aprons, and sides of reinforced concrete, as indicated.
  - B. Install outlets that spill onto grade, anchored with concrete, where indicated.
  - C. Install outlets that spill onto grade, with flared end sections that match pipe, where indicated.
  - D. Construct energy dissipaters at outlets, as indicated.
- 3.10 CONCRETE PLACEMENT
- A. Place cast-in-place concrete according to ACI 318/318R.
- 3.11 FIELD QUALITY CONTROL
- A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches (610 mm) of backfill is in place, and again at completion of Project.
    - 1. Submit separate reports for each system inspection.
    - 2. Defects requiring correction include the following:
      - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
      - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
      - c. Crushed, broken, cracked, or otherwise damaged piping.
      - d. Infiltration: Water leakage into piping.
      - e. Exfiltration: Water leakage from or around piping.
    - 3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
    - 4. Reinspect and repeat procedure until results are satisfactory.
  - B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
    - 1. Do not enclose, cover, or put into service before inspection and approval.
    - 2. Test completed piping systems according to authorities having jurisdiction.
    - 3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
    - 4. Submit separate report for each test.
  - C. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.
- 3.12 CLEANING
- A. Clean interior of piping of dirt and superfluous materials. Flush with potable water.

END OF SECTION





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