



Sealed Bid Proposals

This Bid includes the following forms:

- Invitation for Competitive Sealed Proposals
- Bid Instructions
- Bid Proposal Form
- Intent to Bid
- Form A
- Standard Terms and Conditions
- Felony Conviction Form
- Conflict of Interest Questionnaire
- Certificate of Interested Parties – Form 1295
- Deviation Form
- Wage Rate
- ECISD Authorization for Direct Deposit
- Tax-Exempt Organization Certification
- W-9 Request for Taxpayer Identification Number and Certification

Mr. Amaro Tijerina
Purchasing Coordinator

_____ Date

DATE WEBBED: February 21 & 28, 2019

CSP NO: 19-84

CSP TITLE: Competitive Sealed Proposal

CLOSING TIME/DATE:

Closing Time: **3:00 p.m.**

Closing Date: **March 19, 2019**

BUYER:

Jacqueline Kingan, Senior Buyer

Phone: 956-289-2311, Ext. 2137

Fax: 956-383-7687

Email: j.kingan@ecisd.us

*** DELIVER RFQ'S TO:**

Edinburg CISD

Office of the Purchasing Coordinator

411 North 8th Ave, 2nd Floor

Edinburg, TX 78541

(Do not deliver bids to other ECISD locations) *

*** Do not deliver RFQ's to other ECISD locations. Purchasing will not be responsible for late submittals if vendor delivers bid documentation to other ECISD locations.**

Vendor Certification

The undersigned, by his/her signature, represents the he/she is authorized to bind the bidder to fully comply with the terms and conditions on this Sealed RFQ, including all forms and attachments included herein, for the amount(s) shown on the accompanying bid form(s), if accepted within sixty (60) calendar days after bid opening.

Note: Bidder is strongly encouraged to read the entire Solicitation prior to submitting. Failure to provide the above information in its entirety may be grounds for disqualification of response.

Firm Name: _____

Address: _____

City: _____

State: _____ Zip: _____

(Signature of Person Authorized to Sign Bid)

Printed Name: _____
(Please print or type name above)

Telephone 1-800-_____

Or: _____

Fax: _____

Web Address: _____

Email: _____

Date: _____

Title: _____

I can deliver in _____ days. Early Payment
Discount _____ % if Paid in _____ Days, Net 30

INTENT TO BID

Fax, **this page only**, if solicitation was not faxed or e-mailed directly to your company. All other solicitation documents must be enclosed in a sealed envelope and mailed to the Purchasing Department.

This page is required if solicitation was downloaded without receiving an invitation by the District. Please complete and fax to **956-383-7687** immediately in order to be added to the vendor list and receive addendums or updates regarding this solicitation.

It is the intent of the Purchasing Department to ensure that all interested vendors receive addendums or updates, but it will be the vendor's responsibility to check the Purchasing site periodically. If there are addendums posted on the site and your company has not been notified by fax or e-mail, it will be the vendor's responsibility to download from Purchasing Department's web site and make sure to include with their packet.

The Edinburg CISD Purchasing solicitations and addendums are available on line at www.ecisd.us.

NAME: _____

TITLE: _____

ORGANIZATION: _____

STREET ADDRESS: _____

STREET ADDRESS 2: _____

CITY: _____

STATE: _____

ZIP CODE: _____

WORK PHONE: _____

FAX: _____

E-MAIL: _____

WEB SITE: _____



EDINBURG CONSOLIDATED INDEPENDENT SCHOOL DISTRICT
PURCHASING DEPARTMENT
411 North 8TH/DRAWER 990
EDINBURG, TEXAS 78540
PHONE: (956) 289-2311
FAX (956) 383-7687



Sealed Bid Proposals

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SECTION 00025 -
INVITATION FOR COMPETITIVE SEALED PROPOSALS

PART 1 - GENERAL

1.1 PROJECT DESCRIPTION:

A.

1.2 INSTRUCTIONS TO OFFERORS:

A. Refer to Section 00100 – Bid Instructions.

1.3 PRE-BID CONFERENCE:

A. The purpose of the Pre-Bid Conference is to answer any questions that any offers may have and an on-site visit.

B. Date and Time: **March 5, 2019/ 3:00 p.m.**

C. Location: Edinburg CISD - Maintenance and Facilities Conference Room
1305 East Schunior
Edinburg, Texas 78541

1.4 OPENING OF BIDS:

A. Place:

1. Competitive sealed proposals will be received at the office of :
Edinburg CISD -Purchasing Department
811 North 8th Street
Edinburg, Texas 78501

Attention: Mr. Amaro Tijerina , Purchasing Coordinator

B. Date: **March 19, 2019**_____

C. Hour: **3:00 p.m. C.S.T.**_____

1.5 REJECTION:

A. The Owner reserves the right to reject any or all Bids, and to waive any irregularities or formalities.

END OF SECTION

SECTION 00100 —
BID INSTRUCTIONS

PART 1 - GENERAL

1.1 SECURITY BOND:

- A. Security bond in the amount of five (5%) of the Bid must accompany each Bid. Security bond shall be issued by an insurance company authorized to provide bonds on work in the State of Texas and shall be payable to the Owner.

1.2 DOCUMENTS:

- A. Online Procurement and Contracting Documents: Contact Natanael Perez at nperez@twgarch.com for a download link. Files are available for download after 10:00 a.m. on Thursday, February 21, 2019. Any other questions to be in written/e-mailed format to the attention of Laura Nassri Warren at lwarren@twgarch.com and a copy to Andrina De Anda at andrina@twgarch.com. Online access will be provided to prime bidders only. A hard copy of the Construction Documents and any Addendums can be purchased at RGV Reprographics, Inc., 956-686-1525, located at 519 S Broadway St, McAllen, TX 78501. Please note the Notices of Addendums are to be issued digitally.
- B. Complete sets of Construction Documents shall be used in preparing bids; neither the Owner nor the Architect assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Construction Documents.
- C. The Owner or Architect in making copies of the Construction Documents available on the above terms, does so only for the purpose of obtaining bids on the work and does not confer a license or grant for any other use.
- D. Complete sets of Drawings and Project Manuals are on file at the following locations and subcontractors may examine them there or Online Procurement:

-ECISD Facilities and Maintenance Department, 1305 E. Schunior, Edinburg, TX.

-A.G.C. PLAN ROOMS, (McAllen, Harlingen, Brownsville)

-DODGE REPORTS (Online)

PART 2 - EXAMINATION:

- A. Offerors shall carefully examine the Construction Documents and the construction site to familiarize themselves with existing local conditions under which the Work is to be performed.

PART 3 –

- A. Extra payments will not be authorized for work that could have been foreseen by careful examination of the site. Submission of a bid shall constitute acceptance, by the offeror, of existing site conditions as a part of the requirements for this work.
- B. Offerors shall carefully examine the Construction Documents to verify that they agree with the Table of Contents in the Project Manual, the Index of Drawings Sheet on the Drawings, and the Cover Page of all Addenda. Offerors shall be responsible for obtaining any pages or sheets which have been inadvertently left out during the printing process.

1. All entities providing bids on any portion of the work contained in the Construction Documents shall ascertain the completeness of the set of documents.
2. The Construction Documents are printed by an independent vendor and, although the Architect endeavors to check the documents for completeness, the Architect has, in the past, discovered missing or misplaced sheets in the Drawings and the Specifications.
3. Each entity receiving a set of Construction Documents shall check the indexes against the sheets or pages contained in the sets.
4. Should pages or sheets be found to be misplaced or missing, immediately notify the Architect who will give direction as to placement or provide the sheets or pages that are missing.
5. Failure to notify the Architect means the offeror is providing a bid based on a complete set of Construction Documents.

3.2 INTERPRETATION OF CONSTRUCTION DOCUMENTS:

A. Offerors shall promptly notify the Architect of any ambiguity, inconsistency or error which they may discover upon examination of the Construction Documents or of the site and local conditions. Do not dimension the drawings. Any dimensions, questions, should be directed to the Architect.

B. Submit all questions regarding clarification or interpretation of Construction Documents to the Office of the District Architect: Edinburg CISD Maintenance and Facilities Department, 1305 E. Schunior, Edinburg, Texas 78541, (Attn: Robert Estrada, AIA (956) 316-7265. Written/e-mailed format also to the attention of Natanael Perez at nperez@twgarch.com, Laura Nassri Warren at lwarren@twgarch.com and Andrina De Anda at andrina@twgarch.com .

C. Submit all questions in writing. Replies to questions will be issued to all Offerors in the form of an Addenda. General contractor and subcontractors shall submit questions in writing forty eight (48) hours prior to opening of bids.

D. Make requests for interpretations as early as possible so as to allow adequate time to prepare and issue Addenda.

E. All Offerors shall check with the Architect within six (6) hours prior to Opening of bids to secure all Addenda. The Architect will not be responsible for oral clarification.

1.05 BASIS OF BIDS:

A. Bids shall be on a lump sum basis for each and or combined bid packages and shall include all costs for these projects as described and indicated by the Construction Documents. Basis for bids shall be on brands, materials, processes, products, persons or organizations, etc.,

B. Bids shall include all unit price costs and all Alternate costs as indicated by the Construction Documents and Bid Form.

1.06 BIDS:

A. Bids shall be made on unaltered Bid Forms furnished by the Architect. No oral, telephone or personal Bids will be considered. All blank spaces shall be properly filled in by typewriter or manually in ink.

B. Where so indicated by the makeup of the Bid Form, sums shall be expressed in both words and figures, and in case of discrepancy between the two, the written amount shall govern.

C. Any alteration or erasure to information entered in the blank spaces must be initialed by the signer of the bid.

- D. Original typed sheets shall be submitted, signed in longhand below the typed name of the person authorized to bind the offeror to a Contract.
- E. Where offeror is a corporation, Bid must be signed with the legal name of the corporation followed by the name of the State of Incorporation and the legal signature of a person authorized to bind the corporation to a Contract.
- F. Failure to submit a bid on the form requested, or the inclusion of conditions, limitations or provisions distorting the intent of the Construction Documents, will render the Bid irregular and subject to rejection.

1.07 SUBMITTALS:

- A. Submit Bid, Security Bond and other required data in an opaque, sealed envelope. Submit bid at the time and place shown in the Notice for competitive Sealed Bids.
- B. Envelope shall be addressed to the Owner and identified with the Project Name and the name and address of the offeror.
- C. If the Bid sent by mail, the sealed envelope shall be enclosed in a separate mailing envelope with the notation "BID ENCLOSED" on the face thereof. No envelopes shall be opened until the date and time bids are to be received.

1.08 MODIFICATION OR WITHDRAWAL OF BID:

- A. A Bid may not be withdrawn or canceled by the offeror during the stipulated time period following the time and date designated for the receipt of Bids, unless the award of Contract has been delayed more than sixty (60) days.
- B. Prior to the time and date designated for receipt of Bids, Bids submitted early may be modified or withdrawn only by notice to the party receiving Bids at the place and prior to the time designated for receipt of Bids.
- C. Modification of Bids shall be in writing over the signature of the offeror or be by telegram; if by telegram, written confirmation over the signature of offeror must have been mailed and postmarked on or before the date and time set for receipt of Bids; it shall be so worded as not to reveal the amount of the original Bid.
- D. Withdrawn Bid may be resubmitted up to the time designated for the receipt of Bids provided that they are then fully in conformance with these Bid Instructions.
- E. Security bond shall be in an amount sufficient for the Bid as modified or resubmitted.

1.09 CONSIDERATION OF BID:

- A. Properly identified Bids received on time will be considered.
- B. The Owner shall have the right to reject any or all Bid and in particular to reject a Bid not accompanied by any required security bond or data required by the Contract Documents or a Bid in any way incomplete or irregular.
- C. The Owner shall have the right to waive any formality or irregularity in any bid received.
- D. If the Owner accepts any Alternates, he shall have the right to accept them in any order or combination.
- E. It is the intent of the Owner to award a contract to the offeror submitting the bid providing the "best value" to the Owner provided the Bid has been submitted in accordance with the requirements of the Contract Documents, selection criteria and adopted by the Owner.

1.10 LOCATION AND ACCESS TO PREMISES:

- A. The project site location: Refer to vicinity map on drawings.
- B. The offeror shall have free access to the premises for the purpose of acquainting himself with the conditions, delivering equipment, and performing the work necessary to fulfill the contract. Offeror shall cooperate with the other contractors who may concurrently be working on the premises, integrating his work with that of others, all to the best interest of the total work and its orderly completion.

1.11 STATE SALES TAX:

- A. This project is exempt from state taxes. A sales tax exemption certificate may be obtained from the State Comptroller.

PART 4 - PRODUCTS (Not Applicable)

PART 5 - EXECUTION (Not Applicable)

BID PROPOSAL FORM
BID NO. 19-84
EDINBURG, TEXAS

MR. AMARO TIJERINA
COORDINATOR OF PURCHASING
EDINBURG CISD
411 N. 8TH STREET
EDINBURG, TEXAS 78541

The undersigned, as bidder(s), declares that the only person or parties interested in this proposal as principals are those named herein, that this proposal is made without collusion with any other person, firm or corporation; that he has carefully examined the Form of Contract, Notice to Bidders, General Conditions, Special Provisions, Measurement and Basis of Payment, specifications and the plans thereon referred to, and has carefully examined the locations, and conditions and classes of materials of the proposed work; and agrees that he will provide all the necessary labor, machinery, tools, and apparatus, and other items incidental to construction, and will do all the work and furnish all the materials called for in the contract and specifications in the manner prescribed therein and according to the requirements of the Engineer/Architect as therein set forth.

It is understood that the following quantities of work to be done at unit prices are approximate only and are intended principally to serve as a guide in evaluating bids.

It is further agreed that the quantities of work to be done at unit price and materials to be furnished, may be increased or diminished as may be considered necessary, in the opinion of the Engineer, to complete the work fully as planned and contemplated, and that all quantities of the work, whether increased or decreased, are to be performed at the unit prices set forth below except as provided for in the specifications.

It is further agreed that lump sum prices may be increased to cover additional work ordered by the Engineer, but not shown on the plans or required by the specifications, in accordance with the provisions of the General Conditions. Similarly, they may be decreased to cover deletion of work so ordered.

The 5% bid security accompanying this proposal shall be returned to the bidder, unless in case of the acceptance of the proposal the bidder shall fail to execute a contract and file a performance bond and payment bond within the ten (10) days after its acceptance, in which case the bid security shall become the property of the OWNER, and shall be considered as payment for damages due to delay and other inconveniences suffered by the Owner on account of such failure of the bidder, it is understood that the Owner reserves the right to reject any or all bids.

ORIGINAL BID PROPOSAL FORM MUST BE SUBMITTED ALONG WITH THE BID AND CONTRACT DOCUMENTS BOOKLET

BIDDERS BOND in the amount of \$_____, (5%) of the greatest amount bid in compliance with the INSTRUCTION TO BIDDERS.

The above Cashier's Check or Bidder's Bond is to become the property of the OWNER, in the event the construction contract (when offered by the Owner) and bonds are not executed within the time set forth.

IMPORTANT NOTE:

For information regarding the method UNIT ITEMS are to be MEASURED AND PAID, please refer to the "MEASUREMENT AND BASIS OF PAYMENT" Section attached and made part of this Proposal.

Item No.	Estimated Quantity	Unit	Item Description	Unit Price	Total
1.					

GRAND TOTAL PROPOSAL IMPROVEMENTS: (Items 1-____): \$_____

The undersigned agrees, unless hereinafter stated otherwise to furnish all materials as shown and specified in the Plans and Specifications.

Bidder hereby agrees to commence work under this contract within 10 days after "NOTICE TO PROCEED" is issued, and to complete all the work in the Contract within **60 Calendar Days.**

The undersigned bidder acknowledges the receipt of the following addenda:

ADDENDUM NO.	DATE	BY
ADDENDUM NO. 1		
ADDENDUM NO. 2		
ADDENDUM NO. 3		
ADDENDUM NO. 4		

Date: _____

BY: _____
(Signature)

(Type or Print Name)

(Title)

(Company)

(Address)

(City, State, Zip)

(Phone Number)

(Fax Number)

(Seal – If Bidder is a Corporation)

PART 2 - SECTION 00105 REQUEST FOR COMPETITIVE SEALED PROPOSALS

PROJECT: **CSP NO: 19-84**

OWNER: **Edinburg Consolidated School District**
411 North 8th Street
Edinburg, Texas

ARCHITECT: Edinburg CISD District Architect, Robert Estrada AIA
1305 East Schunior
Edinburg, Texas 78541

RFCSP DEADLINE: **March 19, 2019 @ 3:00 p.m.**

INVITATION: Your firm is invited to submit Competitive Sealed Proposals to the Owner, at the Owner's address indicated above, for the work described above, on or before the RFCSP deadline indicated above.

PRE-BID CONFERENCE: A Pre-Bid Conference has been scheduled for March 5, 2019 at 3:00 PM located at Edinburg CISD - Maintenance and Facilities Conference Room, 1305 East Schunior, Edinburg, Texas 78541. All contractors proposing to submit competitive sealed bids on this project are strongly encouraged to attend.

INSPECTION OF SITE: The site is also accessible for inspection after the pre-bid meeting and at other times upon notification to the Owner and/or Architect. Proposers are encouraged to visit the site and assess existing conditions; however, strict staff supervision and observation requirements must be followed due to the presence of children occupying the facility.

BID DOCUMENTS: Copies of the Proposal Documents, including Drawings and Project Manual, may be reviewed and/or obtained from the following:

Online Procurement and Contracting Documents: Contact Natanael Perez at nperez@twgarch.com for a download link. Files are available for download after 10:00 a.m. on Thursday, February 21, 2018. Any other questions to be in written/e-mailed format to the attention of Laura Nassri Warren at lwarren@twgarch.com and a copy to Andrina De Anda at andrina@twgarch.com. Online access will be provided to prime bidders only. A hard copy of the Construction Documents and any Addendums can be purchased at RGV Reprographics, Inc., 956-686-1525, located at 519 S Broadway St, McAllen, TX 78501. Please note the Notices of Addendums are to be issued digitally.

BID SECURITY: Proposers will be required to provide Bid Security in the form of a Bid Bond in the amount of 5 percent of the largest possible total bid, including consideration of alternates, with each bid. A Bid Bond shall be issued by a Surety acceptable to the Owner and meeting the requirements of General Conditions of the Contract for Construction. Bid Bonds shall be prepared on forms meeting all the requirements of applicable States of Texas statutes. Bid Bonds shall be issued on forms acceptable to the Owner and shall include, as a minimum standard, the information, requirements and standard illustrated by AIA Document A310, latest revised edition available. Failure to provide the Bid Bond with the bid will constitute a non-responsive bid and the bid will not be considered.

PERFORMANCE AND LABOR AND MATERIAL PAYMENT BONDS: The successful offeror will be required to provide 100% Performance and Labor and Materials Payment Bonds in strict conformance with all the requirements of the Contract Documents. Failure to do so will result in cancellation of the contract award and forfeiture of the Bid Bond security as liquidated damages.

BID WITHDRAWAL: Bids will be required to be submitted under a condition of irrevocability for a period of 60 days after submission. No bid may be withdrawn for a period of 60 days.

OWNER'S RIGHT OF REJECTION: The Owner reserves the right to accept or reject any or all offers (competitive sealed bids).

SECTION 00310 — PROPOSAL FORM FOR COMPETITIVE SEALED PROPOSAL

ATTN: Mr. Amaro Tijerina , Purchasing Coordinator
411 N. 8th Avenue
Edinburg, Texas 78541

The Undersigned proposes to furnish all labor, services, materials, tools, and necessary equipment for the Edinburg Consolidated Independent School District Freddy Gonzalez Elementary Gymnasium Improvements and to perform the work required for the construction of said project at the location set out by the Drawings, Project Manual and Specifications, in strict accordance with the Contract Documents for the complete work.

In submitting this Proposal, it is understood that this Proposal may not be altered or withdrawn for sixty {60} days from submission date and that the Owner has reserved the right to reject any and all Proposals.

The Undersigned certifies that this Proposal is made in good faith, without collusion or connection with any other person, persons, partnership, company, firm, association, or corporation offering on this work, for the following sum or prices to wit:

BASE BID:

\$ _____

(Base bid number)

\$ _____

(Base bid number)

\$ _____

(Base bid number)

\$ _____

(Base bid number)

TOTAL:\$ _____

ALTERNATE #1 \$ _____

The Undersigned hereby declares that he has visited the site and has carefully examined the Drawings, Specifications, Contract Documents and Proposal Documents related to the Work covered by his proposal.

Upon receipt of "NOTICE TO PROCEED", the Undersigned will immediately execute the formal contract (Agreement).

The Undersigned agrees to commence work within ten (10) days of receiving the Notice to Proceed and to substantially complete the work on or before _____.

The Contract required will be that Standard Form of the American Institute of Architects and shall provide for payment on accounts of ***ninety-five (95%)*** percent of the value monthly.

The Proposal, the Agreement, the Drawings, the General Conditions, Supplementary General Conditions, the Specifications and any Addenda shall all become a part of the Contract.

I hereby acknowledge receipt of the following Addendum:

BONDING COMPANY (IES):

(Name and address)

Name of Company (bidder)

Printed Name

Address

Title

City State

Signature

Telephone

Sworn to and subscribed before me this _____ day of _____, 20

SEAL

Notary Public in and for the State of Texas

SEAL (If Proposal is By a Corporation) _____

END OF SECTION

SECTION 00148 - INTENT TO BID

Fax, **this page only**, if solicitation was not faxed or e-mailed directly to your company. All other solicitation documents must be enclosed in a sealed envelope and mailed to the Purchasing Department.

This page is required if solicitation was downloaded without receiving an invitation by the District. Please complete and fax to **956-383-7687** immediately in order to be added to the vendor list and receive addendums or updates regarding this solicitation and Contact Natanael Perez at nperez@twgarch.com for a download link.

It is the intent of the Purchasing Department to ensure that all interested vendors receive addendums or updates, but it will be the vendor's responsibility to check the Purchasing site periodically. If there are addendums posted on the site and your company has not been notified by fax or e-mail, it will be the vendor's responsibility to download from Purchasing Department's web site and make sure to include with their packet.

The Edinburg CISD Purchasing solicitations and addendums are available on line at www.ecisd.us.

NAME: _____

TITLE: _____

ORGANIZATION: _____

STREET ADDRESS: _____

STREET ADDRESS 2: _____

CITY: _____

STATE: _____

ZIP CODE: _____

WORK PHONE: _____

FAX: _____

E-MAIL: _____

WEB SITE: _____

SECTION 00510 — AGREEMENT (STIPULATED SUM)

PART 1 – GENERAL

1.1 AGREEMENT FORM:

- A. The “Standard Form of Agreement Between Owner and Contractor where the Basis of Payment is a Stipulated Sum”, AIA Document A101, 2007 Electronic Format Edition, will be the form used as a Contract for this Project.
- B. General Condition AIA – A201 will be used in this project.
- C. A copy of the Standard AIA Document may be examined at the office of the Architect. Copies may be purchased from the American Institute of Architects, 1735 New York Avenue, N.W., Washington, D.C., 20006.
- D. Modification may be made to the above Agreement & General Conditions A201 form or an Owner provided agreement and general conditions may be utilized. Either of which will be provided to contractor for review upon award of project, for final execution of the contract.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

SECTION 00615 — PERFORMANCE BOND AND LABOR AND MATERIAL PAYMENT BOND

PART 1 – GENERAL

1.1 RELATED DOCUMENTS: PERFORMANCE BOND AND LABOR AND MATERIAL PAYMENT BOND:

A. The Contractor shall, prior to the execution of the Contract, furnish bonds covering the faithful performance of the Contract and the payment of all obligations arising thereunder in the amount of 100% of the Contract Price covering 100% performance and 100% payment, and with such sureties secured through the contractor's usual sources as may be agreeable to the parties.

B. The Contractor shall deliver the required bonds to the Owner not later than the date of execution of the Contract, or if the work is commenced prior thereto in response to a letter of intent, the Contractor shall, prior to commencement of the Work, submit evidence satisfactory to the Owner that such bonds will be finished.

C. The Contractor shall require the Attorney-In-Fact who executes the required bonds on behalf of the surety to affix thereto a certificate and current copy of his Power of Attorney.

D. Any Payment Bond and Performance Bond furnished pursuant to the provisions of Art. 5160, Vernon's Texas Civil Statutes, connected with this project, shall be furnished by a corporate surety or corporate or corporate sureties in accordance with Article 7.19-1, Vernon's Texas Insurance Code, that has a stated capital and surplus (as reported by it to the Texas Insurance Commission in its most recent report) that is in excess of ten times the stated amount of the Payment Bond or the Performance Bond. Provided however, that if any Payment Bond or any Performance Bond is in an amount in excess of ten percent (10%) of the surety company's capital and surplus (as reported to the Texas Insurance Commission in its most recent report), as a condition to accepting the bond, the Owner must receive written certification and information, satisfactory in form and substance to the Owner, that the surety company has reinsured the portion of the risk that exceeds ten percent (10%) of the surety company's capital and surplus, with one or more reinsurers who are duly authorized, accredited or trusted to do business in the State of Texas. For the purpose of this requirement, any amount reinsured by any reinsurer may not exceed ten percent (10%) of the reinsurer's capital and surplus (as reported to the Texas Insurance Commission by the reinsurer in its most recent report). In the event there is one or more reinsurer, the surety company must provide all necessary information and certification related to the current financial condition of the surety company and any and all reinsurers required by the Owner, together with copies of all reinsurance contracts with the surety company, before any such Payment Bond and Performance Bond is eligible to be considered acceptable by the Owner.

E. ALL CONTRACTORS SHALL SUBMIT THE NAME, ADDRESS AND TELEPHONE NUMBER OF THE CORPORATED SURETIES PROVIDING THE PAYMENT BOND AND PERFORMANCE BOND AND THE LOCAL AGENT.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

SECTION 00320 – RANKING/SELECTION CRITERIA

Ranking /Selection Criteria

The selection of offeror will be based on the following: Ranking/Selection Criteria The district retains the right to apply the selection criteria as allowed in **Educational Code 44.031 section (B)**.

The following support information must be submitted in sealed envelope with proposal and labeled (tabs) as followed:

1. **Monetary Value: 30 Points Max**

1.1 Base Bid (*Bid Proposal Form*)

2. **Qualifications / Experience: 30 Points Max**

- 2.1 Number of years in business
- 2.2 List at least five(5) similar Projects, client and construction cost
- 2.3 Provide contractor's qualification statement form AIA 305

3. **Past Performance : 15 Points Max**

- 3.1 List ten (10) projects for which company have provided services in the past five years. Provide name, telephone number of contact person.
- 3.2 Describe history of change order and proposed method for detailing cost of change orders.
- 3.3 Were the projects completed on schedule and were warranty items completed timely.

4. **Contractor Management / Personnel : 15 Points Max**

- 4.1 Provide resume of proposed project manager, project superintendent and other key personnel.
- 4.2 Provide proposed project team structure.
- 4.3 Requests for Proposal completeness.

5. **Sub-Contractors List – 10 Points Max**

- 5.1 List proposed Subcontractors for this Project.

6. **Insurance Policies**

- 6.1 Provide a copy of the following insurance policies:
Professional Liability Insurance, General Liability, Workers Compensation and Automobile Insurance Policies

7. **Required Forms**

- FORM A - Fully completed and signed
- STANDARD TERMS & CONDITIONS – Fully completed and signed
- FELONY CONVICTION FORM - Fully completed and signed
- CONTRACTOR/VENDOR CRIMINAL CERTIFICATION FORM - Fully completed and signed
- CONFLICT OF INTEREST QUESTIONNAIRE - Fully completed and signed
- CERTIFICATION OF INTERESTED PARTIES (FORM 1295) – Fully completed and signed
- DEVIATION FORM - Fully completed and signed
- WAGE RATE - Fully completed and signed
- ECISD AUTHORIZATION FOR DIRECT DEPOSIT - Fully completed and signed
- TAX EXEMPT ORGANIZATION CERTIFICATION - Fully completed and signed
- W-9 REQUEST FOR TAXPAYER IDENTIFICATION NUMBER & CERTIFICATION – Fully completed and signed.

END OF SECTION

FORM A

Edinburg Consolidated Independent School District

1. GENERAL INFORMATION:

DATE: _____

FIRM NAME: _____

ADDRESS: _____

CITY: _____

2. CONTACT PERSON:

(Limit to two person per firm/application)

NAME: _____

TITLE: _____

TELEPHONE: _____

FAX: _____

INTERNET ADDRESS: _____ - _____

NAME: _____

TITLE: _____

TELEPHONE: _____

FAX: _____

INTERNET ADDRESS _____

3. **TYPE OF ORGANIZATION:**

- a. _____ Sole proprietorship (individual)
- b. _____ Partnership
- c. _____ Professional Corporation
- d. _____ Corporation
- e. _____ Joint venture
- f. _____ Other _____

4. **FIRM BACKGROUND AND STAFF**

Year present firm established _____

Name of parent company, if any _____

Address _____

Year parent firm established _____

Former company name(s), if any, and year(s) established

Name _____	Year _____
_____	Year _____
_____	Year _____

Number of employees in firm _____

Total employees in firm (all office locations) _____

5. **EXPERIENCE PROFILE**

PROFILE OF FIRM'S PROJECT EXPERIENCE FOR LAST FIVE YEARS

List the total number of projects for the last five years

Project Type	New Construction	Renovation/Addition
A. High Schools	_____	_____
B. Middle Schools	_____	_____
C. Elementary Schools	_____	_____
D. Athletic Facilities/ Stadium Parking Lots	_____	_____

6. **CURRENT CLIENTS AND PROJECTS:**

Please list three of your current clients whose projects reflect the scope of your present

workload. A. Project_____

Client_____

Contact person/title_____

Phone number_____

Services provided_____

B. Project_____

Client_____

Contact person/title_____

Phone number_____

Services provided_____

C. Project_____

Client_____

Contact person/title_____

Phone number _____

Services provided _____

APPLICATION SIGNATURE

The information provided on this application I believe to be true and representative of the firm for which it is submitted

Signature of firm's contact person

Date

STANDARD TERMS & CONDITIONS

(REVISED FEBRUARY 2017)

PLEASE READ THE FOLLOWING CAREFULLY, AND RETURN THE SIGNATURE PAGE WITH YOUR BID OR PROPOSAL.

The following terms and conditions are requirements that are binding upon the vendor awarded the bid and they communicate the Edinburg School District's expectations in regard to the bidder's performance in connection with the district's purchase.

1. **Seller of Package Goods:** Seller will package goods in accordance with good commercial practice. Each shipping container shall be clearly and permanently packed as follows:
 - a. Seller's name and address;
 - b. Consignee's name, address and purchase order or purchase release number and the supply agreement number if applicable;
 - c. Container number and total number of containers, e.g. box 1 of 4 boxes; and the number of the container bearing the packing slip.
 - d. Seller shall bear cost of packaging unless otherwise provided.
 - e. Goods shall be suitably packed to secure lowest transportation costs and to conform to requirements of common carriers and any applicable specifications.
 - f. Buyer's count or weight shall be final and conclusive on shipments not accompanied by packing lists.
2. **Shipment under Reservation Prohibited:** Seller is not authorized to ship the goods under reservation and no tender of a bill of lading will operate as a tender of goods.
3. **Title and Risk of Loss:** The title and risk of loss of the goods shall not pass to Buyer until Buyer actually receives and takes possession of the goods at the point or points of delivery.
4. **Delivery Terms and Transportation Charges:** F.O.B. Destination Freight Prepaid unless terms are specified otherwise in bid:
5. **No Placement of Defective Tender:** Every tender or delivery of goods must fully comply with all provisions of this contract as to time of delivery, quality and the like. If a tender is made which does not fully conform, this shall constitute a breach and Seller shall not have the right to substitute a conforming tender provided, where the time for performance has not yet expired, the Seller may reasonably notify Buyer of his intention to cure and may then make a conforming tender within the contract time but not afterward.
6. **Place of Delivery:** The place of delivery shall be that set forth on the purchase order. Any change thereto shall be effected by modification as provided for in Clause 20, "Modifications," hereof. The terms of this agreement are "no arrival, no sale."
7. **Invoices:** Seller shall submit separate invoices, in duplicate, on each purchase order after each delivery. Invoices shall indicate the purchase order number, shall be itemized and transportation charges, if any, shall be listed separately. A copy of the bill of lading, and the freight weight bill when applicable, should be attached to the invoice. Mail to:

**Edinburg Consolidated Independent School District
Attn.: Accounts Payable Department
Drawer 990
Edinburg, Texas 78540-0990**

8. **Payments:** The payment shall not be due until the above instruments are submitted after delivery. Suppliers should keep the Accounts Payable Department advised of any changes in your remittance addresses.
9. **Taxes:** Do not include Federal Excise, State or City Sales Tax. School District shall furnish tax exemption certificate, if required.
10. **Gratuities:** The Buyer may, by written notice to the Seller, cancel this contract without liability to Seller if it is determined by Buyer that gratuities, in the form of entertainment, gifts, or otherwise, were offered or given by the Seller, or any agent, or representative of the Seller, to any officer or employee of the School District with a view toward securing a contract or securing favorable treatment with respect to the awarding or amending or the making or any determinations with respect to the performing of such a contract. In the event this contract is canceled by Buyer pursuant to this provision, Buyer shall be entitled, in addition to any other rights and remedies, to recover or withhold the amount of the cost incurred by Seller in providing such gratuities.
11. **Special Tools and Test Equipment:** If the price stated on the face hereof includes the cost of any special tooling or special test equipment fabricated or required by Seller for the purpose of filling this order, such special tooling equipment and any process sheets related thereto shall become the property of the Buyer and to the extent feasible shall be identified by the Seller as such.
12. **Warranty Price:** The price to be paid by the Buyer shall be that contained in Seller's bid which Seller warrants to be no higher than Seller's current prices on orders by others for products of the kind and specification covered by this agreement for similar quantities under similar or like conditions and methods of purchase. In the event Seller breaches this warranty, the prices of the items shall be reduced to the Seller's current prices on orders by others, or in the

alternative, Buyer may cancel this contract without liability to Seller for breach or Seller's actual expense. The Seller warrants that no person or selling agency has been employed or retained to solicit or secure this contract upon an agreement or understanding for commission, percentage, brokerage, or contingent fee excepting bona fide employees of bona fide established commercial or selling agencies maintained by the Seller for the purpose of securing business. For breach or violation of this warranty, the Buyer shall have the right in addition to any other right or rights to cancel this contract without liability and to deduct from the contract price, or otherwise recover the full amount of such commission, percentage, brokerage or contingent fee.

13. **Warranty Products:** Seller warrants that the goods furnished will conform to the specifications, drawings and descriptions listed in the bid invitation and to the sample(s) furnished by Seller, if any. In the event of a conflict between the specifications, drawings and descriptions, the specifications shall govern. Seller shall not limit or exclude any implied warranties and any attempt to do so shall render this contract voidable at the option of the Buyer.
14. **Safety Warranty:** Seller warrants that the product sold to Buyer shall conform to the standards promulgated by the U.S. Department of Labor under the Occupational Safety and Health Act (OSHA) of 1970. In the event the product does not conform to OSHA standards, Buyer may return the product for correction or replacement at the Seller's expense. In the event Seller fails to make the appropriate correction within 15 working days, correction made by Buyer will be at Seller's expense.
15. **No Warranty by Buyer against Infringements:** As part of this contract for sale, Seller agrees to ascertain whether goods manufactured in accordance with the specifications attached to this agreement will give rise to the rightful claim of any third person by way of infringement or the like. Buyer makes no warranty that the production of goods according to the specification will not give rise to such a claim, and in no event shall Buyer be liable to Seller for indemnification in the event that Seller is sued on the grounds of infringement or the like. If Seller is of the opinion that an infringement or the like will result, the Seller will notify Buyer to this effect in writing within two weeks after the signing of this agreement. If Buyer does not receive notice and is subsequently held liable for the infringement or the like, Seller will hold Buyer harmless. If Seller in good faith ascertains that production of the goods in accordance with the specifications will result in infringement or the like, this contract shall be null and void except that Buyer will pay Seller the reasonable cost of his search as to infringements.
16. **Right of Inspection:** Buyer shall have the right to inspect the goods at delivery before accepting them.
17. **Cancellation:** Buyer shall have the right to cancel for default all or any part of the undelivered portion of this order if Seller breaches any of the terms hereof including warranties of Seller or if the Seller becomes insolvent or commits acts of bankruptcy. Such right of cancellation is in addition to and not in lieu of any other remedies, which Buyer may have in law or equity.
18. **Termination:** The performance of work under this order may be terminated in whole or in part by the Buyer in accordance with this provision. Termination of work there under shall be effected by the delivery to the Seller of a "Notice of Termination" specifying the extent to which performance of work under the order is terminated and the date upon which such termination becomes effective. Such right of termination is in addition to and not in lieu of rights of Buyer set forth in Clause 15, herein.
19. **Force Majeure:** If by reason of Force Majeure, either party hereto shall be rendered unable wholly or in part to carry out its obligations under this Agreement then such party shall give notice and full particulars of Force Majeure in writing to the other party within a reasonable time after occurrence of the event or cause relied upon, and the obligation of the party giving such notice, so far as it is affected by such Force Majeure, shall be suspended during the continuance of the inability then claimed, except as hereinafter provided, but for no longer period, and such party shall endeavor to remove or overcome such inability with all reasonable dispatch. The term Force Majeure as employed herein, shall mean acts of God, strikes, lockouts, or other industrial disturbances, act of public enemy, orders of any kind of government of the United States or the State of Texas or any civil or military authority; insurrections; riots; epidemics; landslides; land sinkage; lighting; earthquake; fires; hurricanes; storms; floods; washouts; droughts; arrests; restraint of government and people; civil disturbances; explosions, breakage or accidents to machinery, pipelines or canals, or other causes not reasonably within the control of the party claiming such inability. It is understood and agreed that the settlement of strikes and lockouts shall be entirely within the discretion of the party having the difficulty, and that the above requirement that any Force Majeure shall be remedied with all reasonable dispatch shall not require the settlement of strikes and lockouts by acceding to the demands of the opposing party or parties when such settlement is unfavorable in the judgment of the party having the difficulty.
20. **Assignment Delegation:** No right or interest in this contract shall be assigned or delegation of any obligation made by Seller without the written permission of the Buyer. Any attempted assignment or delegation by Seller shall be wholly void and totally ineffective for all purposes unless made in conformity with this paragraph.
21. **Waiver:** No claim or right arising out of a breach of this contract can be discharged in whole or in part by a waiver or renunciation of the claim or right unless the waiver or renunciation is supported by consideration and is in writing signed by the aggrieved.
22. **Modifications:** This contract can be modified or rescinded only by a writing signed by both parties to the contract or their duly authorized agents.
23. **Interpretation Parole Evidence:** This writing is intended by the parties as a final expression of their agreement and is intended also as a complete and exclusive statement of the terms of their agreement. No course of prior dealings between the parties and no usage of the trade shall be relevant to supplement or explain any term used in this

agreement. Acceptance or acquiescence in a course of performance rendered under this agreement shall not be relevant to determine the meaning of this agreement even though the accepting or acquiescing party has knowledge of the performance and opportunity for objection. Whenever a term defined by the Uniform Commercial Code is used in this agreement, the definition contained in the Code is to control.

24. **Applicable Law:** This agreement shall be governed by the Uniform Commercial Code. Wherever the term "Uniform Commercial Code" is used, it shall be construed as meaning the Uniform Commercial Code as adopted in the State of Texas effective and in force on the date of this agreement.
25. **Advertising:** Seller shall not advertise or publish, without Buyer's prior consent, the fact that Buyer has entered into this contract, except to the extent necessary to comply with proper requests for information from an authorized representative of the federal, state or local government.
26. **Right to Assurance:** Whenever one party to this contract in good faith has reason to question the other party's intent to perform he/she may demand that the other party give written assurance of his/hers business intent to perform. In the event that a demand is made and no assurance is given within five (5) days, the demanding party may treat this failure as an anticipatory repudiation of the contract.
27. **Venue:** Both parties agree that venue for any litigation arising from this contract shall lie in Hidalgo County, Texas.
28. **Prohibition Against Personal Interest in Contracts:** Any board member which has any substantial interest, either direct or indirect, in any business entity seeking to contract with the district, shall, before any vote or decision on any matter involving the business entity, file an affidavit stating the nature and extent of interest and shall abstain from any participation in the matter. This is not required if the vote or decision will not have any special effect on the entity other than its effect on the public. However, if a majority of the governing body are also required to file, and do file similar affidavits, then the member is not required to abstain from further participation. Vernon's Texas Codes Annotated, Local Government Code. Chapter 171.
29. **Penalties for Non-Performance:** If, at any time, the contractor fails to fulfill or abide by the terms, conditions, or specifications of the contract, the Edinburg Consolidated Independent School District reserves the right to:
- Purchase on the open market and charge the contractor the difference between contract and actual purchase price, or
 - Deduct such charges from existing invoice totals due at the time, or
 - Cancel the contract within thirty (30) days written notification of intent
30. **Right to Investigate:**
- Capacity
 - Financial Information
 - Business Records (Federally Funded Contracts)
31. **Bidder Qualification:** Bidders not on the District's bid list, may be required to prove their qualifications concerning the following criteria:
- Financial capabilities
 - Bonding status
 - Contractual history (references)
 - Ability to fulfill and abide by the terms and specifications
 - Quality and stability of product and sources
32. **District Bid Forms:** Bid proposal not submitted on District's bid forms will be rejected. Faxed or e-mail submittals will not be accepted. These forms of submittals will be destroyed or deleted and the vendor will be notified immediately.
33. **Addendums:** It will be the Vendors responsibility to check the Purchasing website periodically for any and all addendums. It is also at the Districts discretion to fax or email addendums as deemed necessary.
34. **Delinquent School Taxes:** The Edinburg CISD shall not do business with any individual or company that is delinquent in the payment of their school taxes. In accordance with law, the District shall not enter into a contract or other transaction with a person indebted to the District, nor shall the District award a contract to or enter into a transaction with an apparent low Contractor or successful proposer indebted to the District.

_____ I am not a delinquent taxpayer to the Edinburg CISD.

_____ I am a delinquent taxpayer to McAllen ISD (your bid may be disqualified if your debt is not cleared prior to award.)

35. **"OR EQUAL" Products:** Whenever an article or material is defined by describing a proprietary product or by using the name of a manufacturer, the term "or equal", if not inserted, shall be implied. The specified article or material shall be understood as indicating the type, function, minimum standard of design, efficiency, and quality desired and shall not be construed as to exclude other manufactured products of comparable quality, design and efficiency. The District reserves the right to waive any or all technicalities, and shall be the sole judge in determining equality, technicalities and formalities. Bidders offering substitute items must indicate manufacturer's name and model number.

36. **Deviation(s)** – Any deviation(s) to the specification(s) shall be listed on a separate sheet(s) of paper and attached to the bid response form identifying the section number, component(s) with deviation(s) and a clearly defined explanation for the deviation(s). It is the bidder's responsibility to submit a bid that meets all mandatory specifications stated within. Because of the variations in manufacturer's construction, the bidder must compare their product bid with the required listed minimum specifications and identify any deviations. Failure to properly identify deviations may render the bidder's proposal non-responsive and not capable of consideration for award. Bidders should note that a descriptive brochure of the model bid may not be sufficient or acceptable as proper identification of deviations from the written specifications.
37. **Right to award:** The District reserves the right to award the bid in its entirety, partially, or reject it. The District reserves the right to buy any and/or all supplies from any vendor.
38. **Right to increase or decrease quantities:** The District reserves the right to increase or decrease the number of articles called for in any item of the specifications or to eliminate items entirely. Bidder's proposal will be adjusted in accordance with the unit price quoted therein.
39. **Renewal Option for Term Contracts:** There will be a renewal option to extend this term contracts, if applicable, for an additional one (1) year period if all parties agree to the renewal in writing and all bid prices, discounts, terms and conditions remain the same. In no instance shall this extension be considered automatic.
40. **Warranty & Guarantees:** Except as otherwise specified, the bidder warrants and guarantees all work against defects in materials, equipment or workmanship for one (1) year from the date of final acceptance. Upon receipt of written notice from the
41. District of the discovery of any defects, the bidder shall remedy the defects and replace any property damaged there from occurring within the warranty and guarantee period.
42. **Evaluation Factors:** The bid award shall be based on the following evaluation factors:
- the purchase price;
 - the reputation of the vendor and of the vendor's goods or services;
 - the quality of the vendor's goods or services;
 - the extent to which the goods or services meet the district's needs;
 - the vendor's past relationship with the district;
 - the total long-term cost to the district to acquire the vendor's goods or services
43. **Non-Collusive Bidding Certification:** By submission of this bid or proposal, the bidder certifies that:
- This bid or proposal has been independently arrived at without collusion with any other bidder or with any competitor;
 - This bid or proposal has not been knowingly disclosed and will not be knowingly disclosed, prior to the opening of bids, or proposals for this project, to any other bidder, competitor or potential competitor;
 - No attempt has been or will be made to induce any other person, partnership or corporation to submit or not to submit a bid or proposal;
 - The person signing this bid or proposal certifies that he has fully informed himself regarding the accuracy of the statements contained in this certification, and under the penalties being applicable to the bidder as well as to the person signing in its behalf.
44. **EEOC Non-Discrimination Statement:** It is the policy of Edinburg CISD not to discriminate on the basis of sex, age, handicap, religion, race, color, or national origin in its educational programs.
45. **Conflict of Interest Disclosure:** Pursuant to Chapter 176, Texas Local Government Code, vendors doing or seeking to do business with Edinburg CISD must submit a Conflict of Interest disclosure form if they have a business relationship as defined by Section 176.001 (1-a) with a local government entity and meet the disclosure requirements of Section 176.006(a). A person commits an offense (Class C misdemeanor) if they knowingly violate Section 176.006, Local Government Code.
46. **Certificate of Interested Parties:** All Bids, CSPs, RFPs, RFQs prior to award or award of Contract by the School Board will require that the Texas Ethics Commission (TEC) Form 1295 Electronic (on line) Vendor filing procedure be completed by Vendor. All Vendors being recommended to the Board of Trustees for award or renewal of award on Agenda must register and obtain a TEC Certification for the specific award. This certification Form 1295 must be electronically submitted, printed and notarized. Notarized form must be submitted as a required form for this solicitation. There is no charge for this TEC online process.

Texas Ethics Commission (TEC) Form 1295 must be completed (by firm – on line "New Form 1295 Certificate of Interested Parties Electronic Filing Application" site at: https://www.ethics.state.tx.us/whatsnew/elf_info_form1295.htm). The TEC website includes Question/Answers and Video instructions.

47. **Declaration of Business Location** – Texas Education Code 44.031 (b)(8). By signing below, Contractor certified the Contractor's or the Contractor's ultimate parent company or majority owner:

____ A. Has its principal place of business in the State of Texas; OR

____ B. Employs at least 500 persons in the State of Texas

____ C. Principal Place of business is not in the State of Texas:
____ (City, State)

48. **Owner(s) Name of Business:** By signing below, Contractor certified the owner(s) name of the business submitting bid is/are: (Please print name(s) below. If not applicable, please indicate N/A.)

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

49. **Texas Historically Underutilized Business (HUB)** - Texas Education Code 44.031(b)(6) or Small and Minority Firms, Women's Business Enterprises and Labor Surplus Area Firm: Contractor certified the Bidder's company is HUB certified with the State of Texas.

____ I am an Active certified HUB vendor. HUB expiration date: _____

____ Small and Minority Firms, Women's Business Enterprises and Labor Surplus Area Firms

____ I am neither.

50. **Criminal History Record Information Review of Certain Contract Employees:** By signing below, the Contractor agrees to comply with Section 22.0834. Criminal History Record Information Review of Certain Contract Employees, Texas Education Code if awarded a contract through this solicitation. The undersigned Contractor, if awarded a contract, shall obtain criminal history record information through the criminal history clearinghouse as provided by Section 411.0845, Government Code relating to an employee or applicant who has or will have continuing duties related to the contracted services; and the employee or applicant has or will have direct contact with students. The contractor agrees to certify of the receipt of criminal history record information before or immediately after employing or securing the services of the employee or applicant that has or will have continuing duties related to the contracted services if the employee or applicant has or will have direct contact with students. The Contractor further agrees that if awarded a contract, shall assume all expenses associated with the criminal background check and shall immediately remove any employee or agent who was convicted of a felony, or misdemeanor involving moral turpitude, as defined by Texas law, from District property or the location where students are present.

____ None of my employees and any of the subcontractors has or will have continuing duties related to the contracted services; and has or will have direct contact with students. I further certify that my company has taken precautions or imposed conditions to ensure that my employees and any subcontractor will not have continuing duties related to the contracted services; and will not have direct contact with students throughout the term of the Contract.

OR

____ Some or all of my employees and/or my subcontractors will have continuing duties related to the contracted services; and will have direct contact with students. I further certify that:

1. I have obtained all required criminal history record information regarding all of my employees and/or my subcontractors. None of my employees and/or my subcontractors has any conviction or other criminal history information if a the time of the offense, the victim was under 18 or enrolled in a public school: (a) a felony offense under Title 5, Texas Penal Code; (b) an offense for which a defendant is required to register as a sex offender under Chapter 62, Texas Code of Criminal Procedures; or (c) an equivalent offense under federal law or the laws of another state. IF AVAILABLE, ATTACH A COPY OF YOUR FAST PASS RECEIPT.
2. If you received information that any of my employees and/or subcontractors subsequently has a reported criminal history, I will immediately remove the covered employee from contract duties and notify the District in writing immediately.
3. I will provide the District with the names and any other requested information regarding any of my employees and/or subcontractors so the District may obtain criminal history record information if awarded a contract.
4. If the District objects to the assignment of any of my employees and/or subcontractors, I agree to discontinue using the individual to provide services to the District.

51. **Contract Provisions for contracts under Federal Awards:** By submission of this bid, Contractor agrees to comply with the following provisions.
- 51.1 Contracts for more than the simplified acquisition threshold currently set at \$150,000, which is the inflation adjusted amount determined by the Civilian Agency Acquisition Council and the Defense Acquisition Regulation Council (Councils) as authorized by 41 U.S.C.1908, must address administrative, contractual, or legal remedies in instances where contractors violate or breach contract terms, and provide for such sanctions and penalties as appropriate.
- 51.2 All contracts in excess of \$10,000 must address termination for cause and for convenience including the manner by which it will be effected and the basis for settlement.
- 51.3 Equal Employment Opportunity. Except as otherwise provided under 41 CFR Part 60, all contracts that meet the definition of "federally assisted construction contract" in 41 CFR Part 60-1.3 must include the equal opportunity clause provided under 41 CFR 60-1.4(b), in accordance with Executive Order 11246, "Equal Employment Opportunity" (30 FR 12319, 12935, 3 CFR Part, 1964-1965 Comp., p. 339), as amended by Executive Order 11375, "Amending Executive Order 11246 Relating to Equal Employment Opportunity," and implementing regulations at 41 CFR part 60, "Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor."
- 51.4 Davis-Bacon Act, as amended (40 U.S.C. 3141-3148). When required by Federal program legislation, all prime construction contracts in excess of \$12,000 must include a provision for compliance with the Davis-Bacon Act (40 U.S.C 3141-3144, and 3146-3148 as supplemented by Department of Labor regulations (29 CFR Part 5, "Labor Standards Provisions Applicable to Contracts Covering Federally Finance and Assisted Construction"). In accordance with the statute, contractors must be required to pay wages to laborers and mechanics at a rate not less than the prevailing wages specified in a wage determination made by the Secretary of Labor. In addition, contractors must be required to pay wages not less than once a week. The non-Federal entity must place a copy of the current prevailing wage determination issued by the Department of Labor in each solicitation. The decision to award a contract or subcontract must be conditioned upon the acceptance of the wage determination. The entity must report all suspected or reported violations to the Federal awarding agency. The contracts must also include a provision for compliance with the Copeland "Anti-Kickback" Act (40 U.S.C. 3145) as supplemented by Department of Labor regulations (20 CFR Part 3, "Contractors and Subcontractors on Public Building or Public Work Financed in Whole or in Part by Loans or Grants from the United States"). The Act provides that each contractor or sub-recipient must be prohibited from including, by any means, any person employed in the construction, completion, or repair of public work, to give up any part of the compensation to which he or she is otherwise entitled. The entity must repair all suspected or reported violation to the Federal awarding agency.
- 51.5 Contract Work Hours and Safety Standards Act (40 U.S.C. 3701-3708). Where applicable, all contracts awarded in excess of \$100,000 that involve the employment of mechanics or laborers must include a provision for compliance with 40 U.S.C. 3702 and 3704, as supplemented by Department of Labor regulations (29 CFR Part 5). Under 40 U.S.C. 3702 of the Act, each contractor must be required to compute the wages of every mechanic and laborer on the basis of a standard work week of 40 hours. Work in excess of the standard work week is permissible provided that the worker is compensated at a rate of not less than one and a half times the basic rate of pay for all hours worked in excess of 40 hours in the work week. The requirements of 40 U.S.C. 3704 are applicable to construction work and provide that no laborer or mechanic must be required to work in surroundings or under working conditions which are unsanitary, hazardous or dangerous. These requirements do not apply to the purchases of supplies or materials or articles ordinarily available on the open market, or contracts for transportation or transmission of intelligence.
- 51.6 Rights to Inventions Made Under a Contract or Agreement. If the Federal award meets the definition of "funding agreement" under 37 CFR §401.2 (a) and the recipient or sub recipient wishes to enter into a contract with a small business firm or nonprofit organization regarding the substitution of parties, assignment or performance of experimental, developmental, or research work under that "funding agreement," the recipient or sub recipient must comply with the requirements of 37 CFR Part 401, "Rights to Inventions Made by Nonprofit Organizations and Small Business Firms Under Government Grants, Contracts and Cooperative Agreements," and any implementing regulations issued by the awarding agency.
- 51.7 Clean Air Act (42 U.S.C. 7401-7671q.) and the Federal Water Pollution Control Act (33 U.S.C. 1251-1387), as amended—Contracts and sub grants of amounts in excess of \$150,000 must contain a provision that requires the award to agree to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act (42 U.S.C. 7401-7671q) and the Federal Water Pollution Control Act as amended (33 U.S.C. 1251-1387). Violations must be reported to the Federal awarding agency and the Regional Office of the Environmental Protection Agency (EPA).
- 51.8 Debarment and Suspension (Executive Orders 12549 and 12689)—A contract award (see 2 CFR 180.220) must not be made to parties listed on the government wide exclusions in the System for Award Management (SAM), in accordance with the OMB guidelines at 2 CFR 180 that implement Executive Orders 12549 (3 CFR part 1986 Comp., p. 189) and 12689 (3 CFR part 1989 Comp., p. 235), "Debarment and Suspension." SAM Exclusions contains the names of parties debarred, suspended, or otherwise excluded by agencies, as well as parties declared ineligible under statutory or regulatory authority other than Executive Order 12549.
- 51.9 Byrd Anti-Lobbying Amendment (31 U.S.C. 1352)—Contractors that apply or bid for an award exceeding \$100,000 must file the required certification. Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer or

employee of Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant or any other award covered by 31 U.S.C. 1352. Each tier must also disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Such disclosures are forwarded from tier to tier up to the award.

- 51.10 A an entity that is a state agency or agency of a political subdivision of a state and its contractors must comply with section 6002 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act. The requirements of Section 6002 include procuring only items designated in guidelines of the Environmental Protection Agency (EPA) at 40 CFR part 247 that contain the highest percentage of recovered materials practicable, consistent with maintaining a satisfactory level of competition, where the purchase price of the item exceeds \$10,000 or the value of the quantity acquired during the preceding fiscal year exceeded \$10,000; procuring solid waste management services in a manner that maximizes energy and resource recovery; and establishing an affirmative procurement program for procurement of recovered materials identified in the EPA guidelines.
52. Debarment and Suspension (Executive Orders 12549 and 12689): By signing below Contractor certified that neither it nor its principals are currently listed on the government-wide exclusions in SAM as debarred, suspended, or otherwise excluded by agencies or declared ineligible under statutory or regulatory authority other than Executive Order 12549. Contractor further agrees to immediately notify the District if he/she is later listed on the government-wide exclusions in SAM, or is debarred, suspended, or otherwise excluded by agencies or declared ineligible under statutory or regulatory authority other than Executive Order 12549.

I, the undersigned authorize agent for the company named below, certify that the information concerning Section 1-51 listed above has been reviewed by me and the information furnished is true to the best of my knowledge. I further certify that I agree to comply with Sections 1-51 listed above.

Print/Type Signature Name

Official Title

Authorized Signature

Date

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 an 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 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

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.

Vendor's Name

Authorized Company Official's Name (Printed)

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

Signature of Company Official

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

Signature of Company Official

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

Names of Felon(s)

Details of Conviction(s)

Signature of Company Official

CONTRACTOR/VENDOR CRIMINAL CERTIFICATION FORM

Criminal History Record Information Review of Certain Contract/Vendor Employees

A Contractor/Vendor must comply with Section 22.0834, Criminal History Record Information Review of Certain Contract Employees, Texas Educational Code. Before work on this contract begins, Contractor/Vendor shall obtain criminal history record information through the criminal history clearinghouse as provided by Section 411.0845, Government Code relating to an employee or applicant who has or will have direct contact with students. The Contractor/Vendor must obtain criminal history record information before or immediately after employing or securing the services of the employee or applicant that has or will have continuing duties related to the contracted services, if the employee or applicant has or will have direct contact with students. The Contractor/Vendor further agrees that they shall assume all expenses associated with the criminal background check and shall immediately remove turpitude, as defined by Texas law, from District property or the location where students are present.

I, the undersigned authorized agent for the company named below, certify that I have complied with the procedures outlined above and/or do not have employees whose duties are performed at school campuses where children are present.

_____ I have complied with Senate Bill 9 Section 22.0834

_____ I certify that the Company/Firm will not have employees working where children are Present.

_____ I certify that the Company/Firm will not have employees that will visit ECISD grounds.

First Name:_____ Last Name:_____

Date of Birth:_____ TX DL#:_____ SS#_____

Bid/RFP/Quote No. Awarded:_____

Company Name:_____

Address:_____

City:_____ State:_____ Zip:_____

Telephone:_____

E-Mail:_____

Signature

Date

CONFLICT OF INTEREST QUESTIONNAIRE

FORM CIQ

For vendor or other person doing business with local governmental entity

This questionnaire reflects changes made to the law by the H.B. 1491 80th Leg., Regular Session.

This questionnaire is being filed in accordance with Chapter 176, Local Government Code by a person who has a business relationship as defined by Section 176.001(1-a) with a local governmental entity and the person 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 person becomes aware of facts that require the statement to be filed. See Section 176.006, Local Government Code.

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

OFFICE USE ONLY

Date Received

1 Name of person doing business 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 September 1 of the year for which an activity described in Section 176.006 (a), Local Government Code, is pending and not later than the 7th business day after the date the originally filed questionnaire becomes incomplete or inaccurate.)

3

Name of local government officer with whom filer has employment or business relationship.

Name of Officer

This section (item 3 including subparts A, B, C & D) must be completed for each officer with whom the filer has an employment or other business relationship as defined by Section 176.001(1-a), Local Government Code. Attached additional pages to this form CIQ as necessary.

A. Is the local government officer named in this section receiving or likely to receive taxable income, other than investment income, from the filer of the questionnaire?

☐

Yes

☐

No

B. Is the filer of the questionnaire receiving or likely to receive taxable income, other than investment income,

☐

Yes

☐

No

C. Is the filer of this questionnaire employed by a corporation or other business entity with respect to which the local government officer serves as an officer or director, or holds an ownership of 10 percent or more?

☐

Yes

☐

No

D. Describe each employment or business relationship with the local government officer named in this section

4

Signature of person doing business with the governmental entity

Date

CERTIFICATION OF INTERESTED PARTIES – FORM 1295

Definitions and Instructions for Completing Form 1295

Edinburg Consolidated Independent School District is required to comply with House Bill 1295, which amended the Texas Government Code by adding Section 2252.908, Disclosure of Interested Parties. Section 2252.908 prohibits Edinburg CISD from entering into a contract resulting from a Bid, CSP, RFP, RFQ, Inter-Local Cooperative Quote with a business entity unless the business entity submits a Disclosure of Interested Parties – Form 1295 to Edinburg CISD at the time the business entity submits the signed contract. The Texas Ethics Commission has adopted rules requiring the business entity to file Form 1295 electronically with the Texas Ethics Commission.

As a “business entity,” all vendors must electronically complete, print, sign, notarize and submit Form 1295 with their proposals or contracts even if no interested parties exist.

Proposers must file Certificate of Interested Parties – Form 1295 with the Texas Ethics Commission using the following online application:

https://www.ethics.state.tx.us/whatsnew/elf_info_form1295.htm

- Proposers must use the filing application on the Texas Ethics Commission's website (see link above) to enter the required information on Form 1295.
- Proposers must print a copy of the completed form, which will include a certification of filing containing a unique certification number.
- The Form 1295 must be printed and then signed by an authorized agent of the business entity, and the form must be notarized.
- The completed Form 1295 with the certification of filing must be filed with Edinburg Consolidated Independent School District by including a copy of the completed/notarized form with the proposal response.
- Edinburg CISD must acknowledge the receipt of the filed Form 1295 by notifying the Texas Ethics Commission of the receipt of the filed Form 1295 no later than the 30th day after the date the contract binds all parties to the contract.
- After Edinburg CISD acknowledges the Form 1295, the Texas Ethics Commission will post the completed Form 1295 to its website within seven (7) business days after receiving notice from Edinburg CISD.

Instructions to Vendors:

1. Read these instructions,
2. Go to the Ethics Commission Website https://www.ethics.state.tx.us/whatsnew/elf_info_form1295.htm,
3. Register and complete Form 1295 online - include the bid/proposal # and the contract/(Bid,CSP,RFQ,RFP name,
4. Print a copy of the submitted Form 1295 and have it notarized - it will have a certification # in the top right corner,
5. Include a copy of the completed, signed and notarized Form 1295 with the proposal response.

Definitions:

- **Interested Party:** a person who:
 - 1) has controlling interest in a business entity with whom Edinburg CISD contracts; or
 - 2) actively participates in facilitating a contract or negotiating the terms of a contract, including a broker, intermediary, adviser, or attorney for the business entity.
- **Controlling Interest** means:
 - 1) an ownership interest or participating interest in a business entity by virtue of units, percentage, shares, stock, or otherwise that exceeds 10 percent;
 - 2) membership on the board of directors or other governing body of a business entity of which the board or other governing body is composed of not more than 10 members; or
 - 3) service as an officer of a business entity that has four or fewer officers, or service as one of the four officers most highly compensated by a business entity that has more than four officers.
- **Intermediary:** a person who actively participates in the facilitation of the contract or negotiating the contract, including a broker, advisor, attorney, or representative of or agent for the business entity who:
 - 1) receives compensation from the business entity for the person's participation;
 - 2) communicates directly with the governmental entity or state agency on behalf of the business entity regarding the contract; and
 - 3) is not an employee of the business entity.
- **Business Entity:** includes an entity through which business is conducted with a governmental entity or state agency, regardless of whether the entity is a for-profit or nonprofit entity.

Resources:

Form 1295 Frequently Asked Questions:

- https://www.ethics.state.tx.us/whatsnew/FAQ_Form1295.html

Instructional Video – First Time Business User:

- <https://www.ethics.state.tx.us/filinginfo/videos/Form1295/FirstLogin-Business/Form1295Login-Business.html>

Instructional Video – How to Create a Certificate:

- <https://www.ethics.state.tx.us/filinginfo/videos/Form1295/CreateCertificate/CreateCertificate.html>

A person or business entity entering into a contract and/or agreement with ECISD is required by the new Government Code Statute 2252.908, to complete Form 1295 "Certificate of Interested Parties". This form must be submitted online at http://www.ethics.state.tx.us/whatsnew/elf_info_form1295.htm. Once the online submission has been processed and a claim number has been issued, the form must be printed with the claim number, notarized and then submitted along with this solicitation documents. IF Form 1295 is not submitted along with this solicitation documents, your response may be considered "non-responsive" and may be disqualified.

CERTIFICATE OF INTERESTED PARTIES		FORM 1295	
Complete Nos. 1 - 4 and 6 if there are interested parties. Complete Nos. 1, 2, 3, 5, and 6 if there are no interested parties.		OFFICE USE ONLY	
1 Name of business entity filing form, and the city, state and country of the business entity's place of business. Vendor Name			
2 Name of governmental entity or state agency that is a party to the contract for which the form is being filed. Edinburg CISD			
3 Provide the identification number used by the governmental entity or state agency to track or identify the contract, and provide a description of the goods or services to be provided under the contract. Use District's Bid # and Bid Title located on cover page of solicitation			
4 Name of Interested Party	City, State, Country (place of business)	Nature of Interest (check applicable)	
		Controlling	Intermediary
Owner's name	Primary location of Business	x	
5 Check only if there is NO Interested Party. <input type="checkbox"/>			
6 AFFIDAVIT I swear, or affirm, under penalty of perjury, that the above disclosure is true and correct.			
<div style="text-align: right; margin-bottom: 10px;"> _____ Signature of authorized agent of contracting business entity </div> <div style="text-align: center; margin-bottom: 10px;"> AFFIX NOTARY STAMP / SEAL ABOVE </div> <div style="text-align: center; margin-bottom: 10px;"> Sworn to and subscribed before me, by the said _____, this the _____ day of _____, 20_____, to certify which, witness my hand and seal of office. </div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div style="width: 30%;"> _____ Signature of officer administering oath </div> <div style="width: 30%;"> _____ Printed name of officer administering oath </div> <div style="width: 30%;"> _____ Title of officer administering oath </div> </div>			
ADD ADDITIONAL PAGES AS NECESSARY			

Example

(This form must be signed)

1. DEVIATION(S) – Any deviations to the attached specifications shall be listed below, or on a separate sheet of paper, and attached to the bid response form identifying the section number, item number and a clearly defined explanation for the deviations.
2. It is the bidder's responsibility to submit a bid that meets all mandatory specifications stated within. Because of the variations in manufacturer's construction, the bidder must compare their product bid with the required listed minimum specifications and identify any deviations.
3. Failure to properly identify deviations may render the bidder's proposal non-responsive and not capable of consideration for award.
4. Bidders should note that a descriptive brochure of the model bid may not be sufficient or acceptable as proper identification of deviations from the written specifications.

NO - Deviations: _____ YES - Deviations: _____

List any deviations your company is submitting below: (List on separate page, if necessary)

[illegible]

Company Name

Print Name of Authorized Company Official

Signature of Authorized Company Official

SECTION 00149 – WAGE RATE

PART 1 – GENERAL

1.1 PREVAILING WAGE RATE DETERMINATION INFORMATION

- A. The following information is from Chapter 2258 Texas Government Code:
1. **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 subdivision of the state.
 2. **2.2258.023 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.
 3. **2258.051 Duty of Public Body to Hear Complaints and Withhold Payment**
 - a. A public body awarding a contract, and an agent or officer of the public body, shall:
 - 1). Take organization to complaints of all violations of this chapter committed in the execution of the contract of the contract; and
 - 2). Withhold money forfeited or the contract 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 determination by the public body that there is good cause to believe that the contractor has violated this chapter.

1.2 PREVAILING WAGE RATES

- A. Comply with the requirements of the Vernon's civil statutes of the State of Texas, Annotated, revised 1995, Article 5159.
- B. In no case shall any laborer, workman or mechanic employed by the General Contractor or any Subcontractor, for the execution of the project, be paid less than the current federal minimum wage.
- C. Work Classification Definition: See Texas Government Code

Edinburg CISD

Texas Building Construction Trades
Prevailing Wage Rates Determination
4/26/2016

Code	Worker Classification	Prevailing Wage Rate
A-001	Carpenter	12.71
A-002	Flooring Installer	12.63
A-003	Concrete Finisher	11.10
A-004	Datacom/Telecom	13.17
A-005	Drywall/Ceiling Installer/Insulator	10.45
A-006	Electrician (Journeyman)	15.67
A-007	Electrician (Apprentice)	10.65
A-008	HVAC Mechanic	16.42
A-009	HVAC Mechanic (Helper)	11.80
A-010	Glazier	10.60
A-011	Heavy Equipment Operator	12.75
A-012	Piping/Ductwork Insulator	11.61
A-013	Iron Worker	10.63
A-014	Laborer	8.98
A-015	Lather/Plasterer	11.00
A-016	Light Equipment Operator	10.95
A-017	Mason/Bricklayer	12.25
A-018	Pipefitter (Incl. Fire Protection)	15.21
A-019	Plumber (Journeyman/Master)	15.61
A-020	Plumber (Apprentice/Helper)	11.86
A-021	Roofer	10.25
A-022	Sheetmetal Worker	11.77
A-023	Tile Setter	15.38
A-024	Waterproofer	10.38
A-025	Painter (Brush, Roller, and Sprayer)	13.17
A-026	Millwork	10.50

**EDINBURG CONSOLIDATED INDEPENDENT SCHOOL DISTRICT**

411 North 8th Avenue * Edinburg Texas 78541 * (956).289.2300

VENDOR AUTHORIZATION FOR DIRECT DEPOSIT

Vendor Name: _____ Contact Person: _____

Address: _____ City: _____ State: _____ Zip: _____

E-mail Address: _____ Phone Number: _____

Taxpayer Identification Section

District Employee SSN: _____ Vendor Federal EIN: _____

Financial Institution InformationBank information must be correct and complete. Please list **only one** bank account. **Please Attach a Voided Blank Check reflecting routing and account number.**

Bank Name: _____

Address: _____ City: _____ State: _____ Zip: _____

Routing Number: _____ Account Number: _____

Account Type (select only one): ☐ Checking **or** ☐ Savings

For the purpose of direct deposit of finance checks only, I hereby authorize Edinburg Consolidated Independent School District and the depository institution (bank) named above to initiate direct deposit (credit) entries to the depository account listed above.

This authorization is to remain in effect until the district has received written notification from me or authorized individual of its termination in such a manner as to afford Edinburg CISD and the bank a reasonable opportunity to act on the termination notice.

I agree to indemnify Edinburg CISD from any claims incident to the direct deposit of my finance check, including, without limitation, any claim based on alleged loss as a result of non-posting, of any credit, and any claim which may be made by any person as a result to the rejection of my finance check or because of insufficient funds arising from the failure of my financial institution to post the credit to my account.

I certify that I have read, understand and hereby authorize my payment(s) to be electronically deposited with the institution named in the designated account.

Signature: _____ Date: _____

For ECISD Business Office Use

Date Received: _____ Vendor Number: _____ Entered By: _____

Effective Date: _____ Bank Code: _____ Approved By: _____

Cancellation Date: _____ Cancelled By: _____

SECTION 00150 — TAX EXEMPT ORGANIZATION CERTIFICATE

PART 1 - GENERAL

1.1 DEFINITION

- A. This Contract is to be performed for an exempt organization as defined by Title 2; Subtitle E; Chapter 150 of the Texas Limited Sales, Excise and Use Tax Act and Section 151.311 of the State Statutes. The Owner will furnish the Contractor proof or Certificate of Exemption upon award of contract.
- B. Proposer shall not include sales tax in their Proposal.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

Form **W-9**
(Rev. January 2011)
Department of the Treasury
Internal Revenue Service**Request for Taxpayer
Identification Number and Certification****Give Form to the
requester. Do not
send to the IRS.**Print or type
See Specific Instructions on page 2.

Name (as shown on your income tax return)

Business name/disregarded entity name, if different from above

Check appropriate box for federal tax

classification (required): ☐ Individual/sole proprietor ☐ C Corporation ☐ S Corporation ☐ Partnership ☐ Trust/estate☐ Limited liability company. Enter the tax classification (C=C corporation, S=S corporation, P=partnership) ▶☐ Exempt payee☐ Other (see instructions) ▶

Address (number, street, and apt. or suite no.)

Requester's name and address (optional)

City, state, and ZIP code

List account number(s) here (optional)

Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. The TIN provided must match the name given on the "Name" line to avoid backup withholding. For individuals, this is your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the Part I instructions on page 3. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN* on page 3.

Note. If the account is in more than one name, see the chart on page 4 for guidelines on whose number to enter.

Social security number

				-				-				
--	--	--	--	---	--	--	--	---	--	--	--	--

Employer identification number

				-								
--	--	--	--	---	--	--	--	--	--	--	--	--

Part II Certification

Under penalties of perjury, I certify that:

1. The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me), and
2. I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding, and
3. I am a U.S. citizen or other U.S. person (defined below).

Certification instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. See the instructions on page 4.

**Sign
Here**Signature of
U.S. person ▶

Date ▶

General Instructions

Section references are to the Internal Revenue Code unless otherwise noted.

Purpose of Form

A person who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) to report, for example, income paid to you, real estate transactions, mortgage interest you paid, acquisition or abandonment of secured property, cancellation of debt, or contributions you made to an IRA.

Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN to the person requesting it (the requester) and, when applicable, to:

1. Certify that the TIN you are giving is correct (or you are waiting for a number to be issued),
2. Certify that you are not subject to backup withholding, or
3. Claim exemption from backup withholding if you are a U.S. exempt payee. If applicable, you are also certifying that as a U.S. person, your allocable share of any partnership income from a U.S. trade or business is not subject to the withholding tax on foreign partners' share of effectively connected income.

Note. If a requester gives you a form other than Form W-9 to request your TIN, you must use the requester's form if it is substantially similar to this Form W-9.

Definition of a U.S. person. For federal tax purposes, you are considered a U.S. person if you are:

- An individual who is a U.S. citizen or U.S. resident alien,
- A partnership, corporation, company, or association created or organized in the United States or under the laws of the United States,
- An estate (other than a foreign estate), or
- A domestic trust (as defined in Regulations section 301.7701-7).

Special rules for partnerships. Partnerships that conduct a trade or business in the United States are generally required to pay a withholding tax on any foreign partners' share of income from such business. Further, in certain cases where a Form W-9 has not been received, a partnership is required to presume that a partner is a foreign person, and pay the withholding tax. Therefore, if you are a U.S. person that is a partner in a partnership conducting a trade or business in the United States, provide Form W-9 to the partnership to establish your U.S. status and avoid withholding on your share of partnership income.

The person who gives Form W-9 to the partnership for purposes of establishing its U.S. status and avoiding withholding on its allocable share of net income from the partnership conducting a trade or business in the United States is in the following cases:

- The U.S. owner of a disregarded entity and not the entity,
- The U.S. grantor or other owner of a grantor trust and not the trust, and
- The U.S. trust (other than a grantor trust) and not the beneficiaries of the trust.

Foreign person. If you are a foreign person, do not use Form W-9. Instead, use the appropriate Form W-8 (see Publication 515, Withholding of Tax on Nonresident Aliens and Foreign Entities).

Nonresident alien who becomes a resident alien. Generally, only a nonresident alien individual may use the terms of a tax treaty to reduce or eliminate U.S. tax on certain types of income. However, most tax treaties contain a provision known as a "saving clause." Exceptions specified in the saving clause may permit an exemption from tax to continue for certain types of income even after the payee has otherwise become a U.S. resident alien for tax purposes.

If you are a U.S. resident alien who is relying on an exception contained in the saving clause of a tax treaty to claim an exemption from U.S. tax on certain types of income, you must attach a statement to Form W-9 that specifies the following five items:

1. The treaty country. Generally, this must be the same treaty under which you claimed exemption from tax as a nonresident alien.
2. The treaty article addressing the income.
3. The article number (or location) in the tax treaty that contains the saving clause and its exceptions.
4. The type and amount of income that qualifies for the exemption from tax.
5. Sufficient facts to justify the exemption from tax under the terms of the treaty article.

Example. Article 20 of the U.S.-China income tax treaty allows an exemption from tax for scholarship income received by a Chinese student temporarily present in the United States. Under U.S. law, this student will become a resident alien for tax purposes if his or her stay in the United States exceeds 5 calendar years. However, paragraph 2 of the first Protocol to the U.S.-China treaty (dated April 30, 1984) allows the provisions of Article 20 to continue to apply even after the Chinese student becomes a resident alien of the United States. A Chinese student who qualifies for this exception (under paragraph 2 of the first protocol) and is relying on this exception to claim an exemption from tax on his or her scholarship or fellowship income would attach to Form W-9 a statement that includes the information described above to support that exemption.

If you are a nonresident alien or a foreign entity not subject to backup withholding, give the requester the appropriate completed Form W-8.

What is backup withholding? Persons making certain payments to you must under certain conditions withhold and pay to the IRS a percentage of such payments. This is called "backup withholding." Payments that may be subject to backup withholding include interest, tax-exempt interest, dividends, broker and barter exchange transactions, rents, royalties, nonemployee pay, and certain payments from fishing boat operators. Real estate transactions are not subject to backup withholding.

You will not be subject to backup withholding on payments you receive if you give the requester your correct TIN, make the proper certifications, and report all your taxable interest and dividends on your tax return.

Payments you receive will be subject to backup withholding if:

1. You do not furnish your TIN to the requester,
2. You do not certify your TIN when required (see the Part II instructions on page 3 for details),
3. The IRS tells the requester that you furnished an incorrect TIN,
4. The IRS tells you that you are subject to backup withholding because you did not report all your interest and dividends on your tax return (for reportable interest and dividends only), or
5. You do not certify to the requester that you are not subject to backup withholding under 4 above (for reportable interest and dividend accounts opened after 1983 only).

Certain payees and payments are exempt from backup withholding. See the instructions below and the separate Instructions for the Requester of Form W-9.

Also see *Special rules for partnerships* on page 1.

Updating Your Information

You must provide updated information to any person to whom you claimed to be an exempt payee if you are no longer an exempt payee and anticipate receiving reportable payments in the future from this person. For example, you may need to provide updated information if you are a C corporation that elects to be an S corporation, or if you no longer are tax exempt. In addition, you must furnish a new Form W-9 if the name or TIN changes for the account, for example, if the grantor of a grantor trust dies.

Penalties

Failure to furnish TIN. If you fail to furnish your correct TIN to a requester, you are subject to a penalty of \$50 for each such failure unless your failure is due to reasonable cause and not to willful neglect.

Civil penalty for false information with respect to withholding. If you make a false statement with no reasonable basis that results in no backup withholding, you are subject to a \$500 penalty.

Criminal penalty for falsifying information. Willfully falsifying certifications or affirmations may subject you to criminal penalties including fines and/or imprisonment.

Misuse of TINs. If the requester discloses or uses TINs in violation of federal law, the requester may be subject to civil and criminal penalties.

Specific Instructions

Name

If you are an individual, you must generally enter the name shown on your income tax return. However, if you have changed your last name, for instance, due to marriage without informing the Social Security Administration of the name change, enter your first name, the last name shown on your social security card, and your new last name.

If the account is in joint names, list first, and then circle, the name of the person or entity whose number you entered in Part I of the form.

Sole proprietor. Enter your individual name as shown on your income tax return on the "Name" line. You may enter your business, trade, or "doing business as (DBA)" name on the "Business name/disregarded entity name" line.

Partnership, C Corporation, or S Corporation. Enter the entity's name on the "Name" line and any business, trade, or "doing business as (DBA)" name on the "Business name/disregarded entity name" line.

Disregarded entity. Enter the owner's name on the "Name" line. The name of the entity entered on the "Name" line should never be a disregarded entity. The name on the "Name" line must be the name shown on the income tax return on which the income will be reported. For example, if a foreign LLC that is treated as a disregarded entity for U.S. federal tax purposes has a domestic owner, the domestic owner's name is required to be provided on the "Name" line. If the direct owner of the entity is also a disregarded entity, enter the first owner that is not disregarded for federal tax purposes. Enter the disregarded entity's name on the "Business name/disregarded entity name" line. If the owner of the disregarded entity is a foreign person, you must complete an appropriate Form W-8.

Note. Check the appropriate box for the federal tax classification of the person whose name is entered on the "Name" line (Individual/sole proprietor, Partnership, C Corporation, S Corporation, Trust/estate).

Limited Liability Company (LLC). If the person identified on the "Name" line is an LLC, check the "Limited liability company" box only and enter the appropriate code for the tax classification in the space provided. If you are an LLC that is treated as a partnership for federal tax purposes, enter "P" for partnership. If you are an LLC that has filed a Form 8832 or a Form 2553 to be taxed as a corporation, enter "C" for C corporation or "S" for S corporation. If you are an LLC that is disregarded as an entity separate from its owner under Regulation section 301.7701-3 (except for employment and excise tax), do not check the LLC box unless the owner of the LLC (required to be identified on the "Name" line) is another LLC that is not disregarded for federal tax purposes. If the LLC is disregarded as an entity separate from its owner, enter the appropriate tax classification of the owner identified on the "Name" line.

Form W-9 (Rev. 1-2011)

Page **3**

Other entities. Enter your business name as shown on required federal tax documents on the "Name" line. This name should match the name shown on the charter or other legal document creating the entity. You may enter any business, trade, or DBA name on the "Business name/disregarded entity name" line.

Exempt Payee

If you are exempt from backup withholding, enter your name as described above and check the appropriate box for your status, then check the "Exempt payee" box in the line following the "Business name/disregarded entity name," sign and date the form.

Generally, individuals (including sole proprietors) are not exempt from backup withholding. Corporations are exempt from backup withholding for certain payments, such as interest and dividends.

Note. If you are exempt from backup withholding, you should still complete this form to avoid possible erroneous backup withholding.

The following payees are exempt from backup withholding:

1. An organization exempt from tax under section 501(a), any IRA, or a custodial account under section 403(b)(7) if the account satisfies the requirements of section 401(f)(2),
 2. The United States or any of its agencies or instrumentalities,
 3. A state, the District of Columbia, a possession of the United States, or any of their political subdivisions or instrumentalities,
 4. A foreign government or any of its political subdivisions, agencies, or instrumentalities, or
 5. An international organization or any of its agencies or instrumentalities.
- Other payees that may be exempt from backup withholding include:
6. A corporation,
 7. A foreign central bank of issue,
 8. A dealer in securities or commodities required to register in the United States, the District of Columbia, or a possession of the United States,
 9. A futures commission merchant registered with the Commodity Futures Trading Commission,
 10. A real estate investment trust,
 11. An entity registered at all times during the tax year under the Investment Company Act of 1940,
 12. A common trust fund operated by a bank under section 584(a),
 13. A financial institution,
 14. A middleman known in the investment community as a nominee or custodian, or
 15. A trust exempt from tax under section 664 or described in section 4947.

The following chart shows types of payments that may be exempt from backup withholding. The chart applies to the exempt payees listed above, 1 through 15.

IF the payment is for . . .	THEN the payment is exempt for . . .
Interest and dividend payments	All exempt payees except for 9
Broker transactions	Exempt payees 1 through 5 and 7 through 13. Also, C corporations.
Barter exchange transactions and patronage dividends	Exempt payees 1 through 5
Payments over \$600 required to be reported and direct sales over \$5,000 ¹	Generally, exempt payees 1 through 7 ²

¹ See Form 1099-MISC, Miscellaneous Income, and its instructions.

² However, the following payments made to a corporation and reportable on Form 1099-MISC are not exempt from backup withholding: medical and health care payments, attorneys' fees, gross proceeds paid to an attorney, and payments for services paid by a federal executive agency.

Part I. Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. If you are a resident alien and you do not have and are not eligible to get an SSN, your TIN is your IRS individual taxpayer identification number (ITIN). Enter it in the social security number box. If you do not have an ITIN, see *How to get a TIN* below.

If you are a sole proprietor and you have an EIN, you may enter either your SSN or EIN. However, the IRS prefers that you use your SSN.

If you are a single-member LLC that is disregarded as an entity separate from its owner (see *Limited Liability Company (LLC)* on page 2), enter the owner's SSN (or EIN, if the owner has one). Do not enter the disregarded entity's EIN. If the LLC is classified as a corporation or partnership, enter the entity's EIN.

Note. See the chart on page 4 for further clarification of name and TIN combinations.

How to get a TIN. If you do not have a TIN, apply for one immediately. To apply for an SSN, get Form SS-5, Application for a Social Security Card, from your local Social Security Administration office or get this form online at www.ssa.gov. You may also get this form by calling 1-800-772-1213. Use Form W-7, Application for IRS Individual Taxpayer Identification Number, to apply for an ITIN, or Form SS-4, Application for Employer Identification Number, to apply for an EIN. You can apply for an EIN online by accessing the IRS website at www.irs.gov/businesses and clicking on Employer Identification Number (EIN) under Starting a Business. You can get Forms W-7 and SS-4 from the IRS by visiting IRS.gov or by calling 1-800-TAX-FORM (1-800-829-3676).

If you are asked to complete Form W-9 but do not have a TIN, write "Applied For" in the space for the TIN, sign and date the form, and give it to the requester. For interest and dividend payments, and certain payments made with respect to readily tradable instruments, generally you will have 60 days to get a TIN and give it to the requester before you are subject to backup withholding on payments. The 60-day rule does not apply to other types of payments. You will be subject to backup withholding on all such payments until you provide your TIN to the requester.

Note. Entering "Applied For" means that you have already applied for a TIN or that you intend to apply for one soon.

Caution: A disregarded domestic entity that has a foreign owner must use the appropriate Form W-8.

Part II. Certification

To establish to the withholding agent that you are a U.S. person, or resident alien, sign Form W-9. You may be requested to sign by the withholding agent even if item 1, below, and items 4 and 5 on page 4 indicate otherwise.

For a joint account, only the person whose TIN is shown in Part I should sign (when required). In the case of a disregarded entity, the person identified on the "Name" line must sign. Exempt payees, see *Exempt Payee* on page 3.

Signature requirements. Complete the certification as indicated in items 1 through 3, below, and items 4 and 5 on page 4.

1. Interest, dividend, and barter exchange accounts opened before 1984 and broker accounts considered active during 1983. You must give your correct TIN, but you do not have to sign the certification.

2. Interest, dividend, broker, and barter exchange accounts opened after 1983 and broker accounts considered inactive during 1983. You must sign the certification or backup withholding will apply. If you are subject to backup withholding and you are merely providing your correct TIN to the requester, you must cross out item 2 in the certification before signing the form.

3. Real estate transactions. You must sign the certification. You may cross out item 2 of the certification.

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Page 4

4. Other payments. You must give your correct TIN, but you do not have to sign the certification unless you have been notified that you have previously given an incorrect TIN. "Other payments" include payments made in the course of the requester's trade or business for rents, royalties, goods (other than bills for merchandise), medical and health care services (including payments to corporations), payments to a nonemployee for services, payments to certain fishing boat crew members and fishermen, and gross proceeds paid to attorneys (including payments to corporations).

5. Mortgage interest paid by you, acquisition or abandonment of secured property, cancellation of debt, qualified tuition program payments (under section 529), IRA, Coverdell ESA, Archer MSA or HSA contributions or distributions, and pension distributions. You must give your correct TIN, but you do not have to sign the certification.

What Name and Number To Give the Requester

For this type of account:	Give name and SSN of:
1. Individual	The individual
2. Two or more individuals (joint account)	The actual owner of the account or, if combined funds, the first individual on the account ¹
3. Custodian account of a minor (Uniform Gift to Minors Act)	The minor ²
4. a. The usual revocable savings trust (grantor is also trustee) b. So-called trust account that is not a legal or valid trust under state law	The grantor-trustee ¹ The actual owner ¹
5. Sole proprietorship or disregarded entity owned by an individual	The owner ³
6. Grantor trust filing under Optional Form 1099 Filing Method 1 (see Regulation section 1.671-4(b)(2)(i)(A))	The grantor*
For this type of account:	Give name and EIN of:
7. Disregarded entity not owned by an individual	The owner
8. A valid trust, estate, or pension trust	Legal entity ⁴
9. Corporation or LLC electing corporate status on Form 8832 or Form 2553	The corporation
10. Association, club, religious, charitable, educational, or other tax-exempt organization	The organization
11. Partnership or multi-member LLC	The partnership
12. A broker or registered nominee	The broker or nominee
13. Account with the Department of Agriculture in the name of a public entity (such as a state or local government, school district, or prison) that receives agricultural program payments	The public entity
14. Grantor trust filing under the Form 1041 Filing Method or the Optional Form 1099 Filing Method 2 (see Regulation section 1.671-4(b)(2)(i)(B))	The trust

¹ List first and circle the name of the person whose number you furnish. If only one person on a joint account has an SSN, that person's number must be furnished.

² Circle the minor's name and furnish the minor's SSN.

³ You must show your individual name and you may also enter your business or "DBA" name on the "Business name/disregarded entity" name line. You may use either your SSN or EIN (if you have one), but the IRS encourages you to use your SSN.

⁴ List first and circle the name of the trust, estate, or pension trust. (Do not furnish the TIN of the personal representative or trustee unless the legal entity itself is not designated in the account title.) Also see *Special rules for partnerships* on page 1.

*Note. Grantor also must provide a Form W-9 to trustee of trust.

Note. If no name is circled when more than one name is listed, the number will be considered to be that of the first name listed.

Secure Your Tax Records from Identity Theft

Identity theft occurs when someone uses your personal information such as your name, social security number (SSN), or other identifying information, without your permission, to commit fraud or other crimes. An identity thief may use your SSN to get a job or may file a tax return using your SSN to receive a refund.

To reduce your risk:

- Protect your SSN,
- Ensure your employer is protecting your SSN, and
- Be careful when choosing a tax preparer.

If your tax records are affected by identity theft and you receive a notice from the IRS, respond right away to the name and phone number printed on the IRS notice or letter.

If your tax records are not currently affected by identity theft but you think you are at risk due to a lost or stolen purse or wallet, questionable credit card activity or credit report, contact the IRS Identity Theft Hotline at 1-800-908-4490 or submit Form 14039.

For more information, see Publication 4535, Identity Theft Prevention and Victim Assistance.

Victims of identity theft who are experiencing economic harm or a system problem, or are seeking help in resolving tax problems that have not been resolved through normal channels, may be eligible for Taxpayer Advocate Service (TAS) assistance. You can reach TAS by calling the TAS toll-free case intake line at 1-877-777-4778 or TTY/TDD 1-800-829-4059.

Protect yourself from suspicious emails or phishing schemes.

Phishing is the creation and use of email and websites designed to mimic legitimate business emails and websites. The most common act is sending an email to a user falsely claiming to be an established legitimate enterprise in an attempt to scam the user into surrendering private information that will be used for identity theft.

The IRS does not initiate contacts with taxpayers via emails. Also, the IRS does not request personal detailed information through email or ask taxpayers for the PIN numbers, passwords, or similar secret access information for their credit card, bank, or other financial accounts.

If you receive an unsolicited email claiming to be from the IRS, forward this message to phishing@irs.gov. You may also report misuse of the IRS name, logo, or other IRS property to the Treasury Inspector General for Tax Administration at 1-800-366-4484. You can forward suspicious emails to the Federal Trade Commission at: spam@uce.gov or contact them at www.ftc.gov/idtheft or 1-877-IDTHEFT (1-877-438-4338).

Visit IRS.gov to learn more about identity theft and how to reduce your risk.

Privacy Act Notice

Section 6109 of the Internal Revenue Code requires you to provide your correct TIN to persons (including federal agencies) who are required to file information returns with the IRS to report interest, dividends, or certain other income paid to you; mortgage interest you paid; the acquisition or abandonment of secured property; the cancellation of debt; or contributions you made to an IRA, Archer MSA, or HSA. The person collecting this form uses the information on the form to file information returns with the IRS, reporting the above information. Routine uses of this information include giving it to the Department of Justice for civil and criminal litigation and to cities, states, the District of Columbia, and U.S. possessions for use in administering their laws. The information also may be disclosed to other countries under a treaty, to federal and state agencies to enforce civil and criminal laws, or to federal law enforcement and intelligence agencies to combat terrorism. You must provide your TIN whether or not you are required to file a tax return. Under section 3406, payers must generally withhold a percentage of taxable interest, dividend, and certain other payments to a payee who does not give a TIN to the payer. Certain penalties may also apply for providing false or fraudulent information.

VENDOR NUMBER MASTER FORM

(Check One) New Change

MAIL PAYMENTS TO:

Name: _____
Address: _____
City/State/Zip: _____

OR: Social Security Number _____ (Nine Digits)

Accounts Payable Approval: _____ Date: _____

Signature: _____ Business Office Use Only

VENDOR NUMBER: _____

Processed By: _____ Date: _____

THIS FORM MUST BE FILLED OUT BY AN EDINBURG CISD EMPLOYEE.

**PROJECT MANUAL
CONSTRUCTION DOCUMENTS**

1611801

**EDINBURG CONSOLIDATED
INDEPENDENT SCHOOL DISTRICT
FREDDY GONZALEZ ELEMENTARY
GYMNASIUM IMPROVEMENTS**

EDINBURG, TX

Volume I

Set Number_____

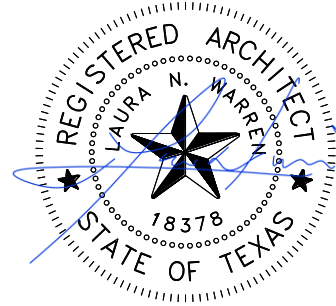
FEBRUARY 15, 2019

DOCUMENT 00 01 07
SEALS PAGE

1.1 DESIGN PROFESSIONALS OF RECORD

ARCHITECT

The Warren Group Architects Inc.
Texas Registration No. 30112289
Sections except where indicated
as prepared by other design
Professionals of record.



END OF DOCUMENT

DOCUMENT 00 01 07
SEALS PAGE

1.1 DESIGN PROFESSIONALS OF RECORD

CIVIL ENGINEER Melden & Hunt, Inc.
Texas Registration No. F-1435
Sections except where indicated
as prepared by other design
Professionals of record.

The following sections:

SECTION 02 22 00 DEMOLITION
SECTION 02 23 00 SITE PREPARATION
SECTION 02 30 00 EARTHWORK
SECTION 02 37 00 SLOPE PROTECTION AND EROSION CONTROL
SECTION 02 77 00 CURB AND SIDEWALKS

PROJECT ENGINEER:

Kelley A. Heller-Vela 2/15/19
KELLEY A. HELLER-VELA #97421
Melden and Hunt, Inc.
115 West McIntyre St.
Edinburg, TX 78541
TEXAS BPE Firm # F-1435
MHI Job # 19050.04



END OF DOCUMENT

DOCUMENT 00 01 07
SEALS PAGE

1.1 DESIGN PROFESSIONALS OF RECORD

STRUCTURAL ENGINEER:

Solorio, Inc.
Texas Registration No. 1616
Sections except where indicated
as prepared by other design
Professionals of record.

The following sections:

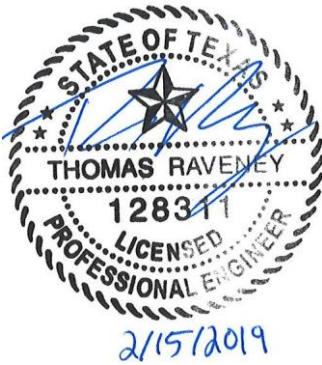
02200 Earthwork
02282 Termite Control
02311 Rough Grading
03100 Concrete Forms
03151 Concrete Anchoring
03200 Concrete Reinforcement
03300 Cast-In-Place Concrete
03350 Concrete Finishing
03390 Concrete Curing
05120 Structural Steel
05500 Metal Fabrications
07191 Vapor Barrier



END OF DOCUMENT

DOCUMENT 00 01 07
SEALS PAGE

1.1 DESIGN PROFESSIONALS OF RECORD



MEP ENGINEERS

DBR

Texas Registration No. 2234
Sections except where indicated
as prepared by other design
Professionals of record.

The following sections:

END OF DOCUMENT

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Section 00 01 07	Seals Page- TWG
Section 00 01 07	Seals Page- Civil
Section 00 01 07	Seals Page- Structural
Section 00 01 07	Seals Page- MEP
Section 00 01 10	Table of Contents
Section 00 25 13	Prebid Meeting
Section 00 26 00	Procurement Substitution Procedures
Section 00 43 23	Alternates Form
Section 00 43 73	Proposed Schedule of Values Form
Section 00 60 00	Forms
Section 00 72 00	General Conditions Notice
Section 00 73 00	Supplementary Conditions

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Section 01 15 00	Contract Standards and Procedures
Section 01 25 00	Substitution Procedures
Section 01 30 00	Administrative Requirements
Section 01 31 00	Project Management and Coordination
Section 01 32 33	Photographic Documentation
Section 01 33 00	Submittal Procedures
Section 01 33 23	Shop Drawings and Samples
Section 01 40 00	Quality Requirements
Section 01 45 23	Testing and Inspecting Services
Section 01 50 00	Temporary Facilities and Controls
Section 01 60 00	Product Requirements
Section 01 70 00	Project Closeout
Section 01 73 00	Execution

DIVISION 2 - SITE CONSTRUCTION

Section 022200	Demolition (Civil)
Section 02200	Earthwork (Structural)
Section 022300	Site Preparation (Civil)
Section 022820	Termite Control
Section 02282	Termite Control (Structural)
Section 023000	Earthwork (Civil)
Section 02311	Rough Grading (Structural)

Section 023700	Slope Protection Erosion Control (Civil)
Section 027700	Curb and Sidewalks (Civil)

DIVISION 3 - CONCRETE

Section 03100	Concrete Forms (Structural)
Section 03151	Concrete Fasteners Power (Structural)
Section 03200	Concrete Reinforcement (Structural)
Section 03300	Cast-in-Place Concrete (Structural)
Section 03350	Concrete Finishing (Structural)
Section 03390	Concrete Curing (Structural)

DIVISION 5 - METALS

Section 05120	Structural Steel (Structural)
Section 05 40 00	Cold-Formed Metal Framing
Section 05 50 00	Metal Fabrication (Structural)
Section 05 50 00	Miscellaneous Metal Work

DIVISION 6 – WOOD, PLASTICS, AND COMPOSITES

Section 06 10 00	Rough Carpentry
Section 06 11 40	Wood Blocking and Curbing
Section 06 16 43	Gypsum Sheathing

DIVISION 7 - THERMAL AND MOISTURE PROTECTION

Section 07 19 10	Vapor Barrier
Section 07 19 1	Vapor Retardant (Structural)
Section 07 21 00	Thermal Insulation
Section 07 30 10	Roofing Underlayment
Section 07 60 00	Sheet Metal Work
Section 07 61 00	Preformed Metal Roof
Section 07 62 00	Sheet Metal Flashing and Trim
Section 07 70 00	Roof and Wall Specialties and Accessories
Section 07 84 00	Firestopping
Section 07 90 00	Joint Protection
Section 07 92 00	Joint Sealants

DIVISION 8 - OPENINGS

Section 08 11 13	Hollow Metal Doors and Frames
Section 08 14 16	Flush Wood Doors
Section 08 71 00	Door Hardware

DIVISION 9 - FINISHES

Section 09 11 10	Non- Load-Bearing Metal Framing System
Section 09 29 00	Gypsum Wallboard
Section 09 65 13	Resilient Bases and Accessories
Section 09 65 19	Resilient (LVT) Flooring
Section 09 65 19	Resilient (VCT) Tile Flooring
Section 09 90 01	Paints and Coatings

DIVISION 10 - SPECIALTIES

Section 10 44 00	Fire Protection Specialties
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DIVISION 11 - EQUIPMENT

Section 11 06 00	Stage Curtain
	Porter- No. 570- super Safer FR Wall Pad
	Gared- PSS Performance Sports Systems Model 3103 Welded Single Post, Rear Braced, Front Folding Basketball Backstop
	Gared- PSS Performance Sports Systems Model 3111 Welded Single Post, Ceiling Rear Braced, Stationary Basketball Structure

DIVISION 12 - FURNISHINGS

Not Used

DIVISION 13 - SPECIAL CONSTRUCTION

Not Used

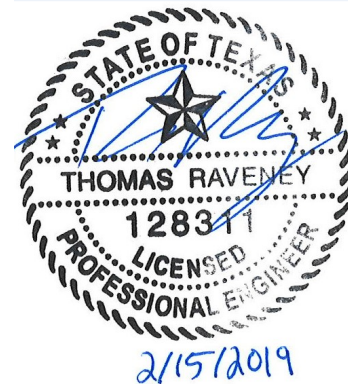
DIVISION 14 - CONVEYING SYSTEMS

Not used

MEP TABLE OF CONTENTS (FOLLOWS ON SEPARATE COVER)

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Edinburg CISD – Freddy Gonzalez ES – Gymnasium Improvements
188013.000

DBR Engineering Consultants, Inc.
February 15, 2019



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23 03 00 Mechanical Demolition for Remodeling	1-5
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DOCUMENT 00 25 13
PREBID MEETING

1.1 PREBID MEETING

- A. Owner and Architect, will conduct a Prebid meeting as indicated below:
 - 1. Meeting Date: March 5, 2019.
 - 2. Meeting Time: 3:00 p.m.
 - 3. Location: ECISD Facilities and Maintenance Department, 1305 E. Schunior, Edinburg, TX.
- B. Attendance:
 - 1. Prime Bidders: Strongly encouraged to attend.
 - 2. Subcontractors: No mandatory attendance Pre-Bid meeting requirement.
 - 3. Notice: No mandatory attendance Pre-Bid meeting requirement.
- C. Bidder Questions: Submit written questions to be addressed at Prebid meeting minimum of two business days prior to meeting.
- D. Agenda: Prebid meeting agenda will include review of topics that may affect proper preparation and submittal of bids, including the following:
 - 1. Procurement and Contracting Requirements:
 - a. Invitation for Competitive Sealed Proposals.
 - b. Bid Instructions.
 - c. Bid Proposal Form
 - d. Insurances.
 - e. Bid Security.
 - f. Bid Submittal Requirements.
 - g. Bid Submittal Checklist.
 - h. Notice of Award.

2. Communication during Bidding Period:
 - a. Obtaining documents.
 - b. Access to Project Web site.
 - c. Bidder's Requests for Information.
 - d. Bidder's Substitution Request/Prior Approval Request.
 - e. Addenda.
3. Contracting Requirements:
 - a. Agreement.
 - b. The General Conditions.
 - c. The Supplementary Conditions.
 - d. Other Owner requirements.
4. Construction Documents:
 - a. Scopes of Work.
 - b. Temporary Facilities.
 - c. Use of Site.
 - d. Work Restrictions.
 - e. Alternates and Allowances.
 - f. Substitutions following Award.
5. Separate Contracts:
 - a. Work by Owner.
 - b. Work of Other Contracts.
6. Schedule:
 - a. Project Schedule.
 - b. Contract Time.
 - c. Liquidated Damages.

- d. Other Bidder Questions.
- 7. Site Visits.
- 8. Post-Meeting Addendum.
- E. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes to attendees and others known by the issuing office to have received a complete set of Procurement and Contracting Documents. Minutes of meeting are issued as Available Information and do not constitute a modification to the Procurement and Contracting Documents. Modifications to the Procurement and Contracting Documents are issued by written Addendum only.
 - 1. Sign-in Sheet: Minutes will include list of meeting attendees.

END OF DOCUMENT

DOCUMENT 00 26 00
PROCUREMENT SUBSTITUTION PROCEDURES

1.1 DEFINITIONS

- A. Substitution Requests: Requests for changes in products, materials, equipment, and methods of construction from those indicated in the Contract Documents, submitted following Contract award. See Section 01 25 00 "Substitution Procedures" for conditions under which Substitution requests will be considered following Contract award.

1.2 QUALITY ASSURANCE

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

1.3 PROCUREMENT SUBSTITUTIONS

- A. Procurement Substitutions, General: By submitting a bid, the Bidder represents that its bid is based on materials and equipment described in the Procurement and Contracting Documents, including Addenda. Bidders are encouraged to request approval of qualifying substitute materials and equipment when the Specifications Sections list materials and equipment by product or manufacturer name.
- B. Procurement Substitution Requests will be received and considered by Owner when the following conditions are satisfied, as determined by Architect; otherwise requests will be returned without action:
 - 1. Extensive revisions to the Contract Documents are not required.
 - 2. Proposed changes are in keeping with the general intent of the Contract Documents, including the level of quality of the Work represented by the requirements therein.
 - 3. The request is fully documented and properly submitted.

1.4 SUBMITTALS

- A. Procurement Substitution Request: Submit to The Warren Group Architects, Inc. Procurement Substitution Request must be made in writing by prime contract Bidder only in compliance with the following requirements:
 - 1. Requests for substitution of materials and equipment will be considered if received no later than 3 days prior to date of bid opening.
 - 2. Submittal Format: Submit Procurement Substitution Request, using format provided on Project Web site.

- a. Identify the product or the fabrication or installation method to be replaced in each request. Include related Specifications Sections and drawing numbers.
 - b. Provide complete documentation on both the product specified and the proposed substitute, including the following information as appropriate:
 - 1) Point-by-point comparison of specified and proposed substitute product data, fabrication drawings, and installation procedures.
 - 2) Copies of current, independent third-party test data of salient product or system characteristics.
 - 3) Samples where applicable or when requested by Architect.
 - 4) Detailed comparison of significant qualities of the proposed substitute with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
 - 5) Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - 6) Research reports, where applicable, evidencing compliance with building code in effect for Project, from City of Pharr Ordinances.
 - 7) Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, which will become necessary to accommodate the proposed substitute.
 - c. Provide certification by manufacturer that the substitute proposed is equal to or superior to that required by the Procurement and Contracting Documents, and that its in-place performance will be equal to or superior to the product or equipment specified in the application indicated.
 - d. Bidder, in submitting the Procurement Substitution Request, waives the right to additional payment or an extension of Contract Time because of the failure of the substitute to perform as represented in the Procurement Substitution Request.
- B. Architect's Action:
- 1. Architect may request additional information or documentation necessary for evaluation of the Procurement Substitution Request. Architect will notify all bidders of acceptance of the proposed substitute by means of an Addendum to Architect's approval of a substitute during bidding does not relieve Contractor of the responsibility to submit required shop drawings and to comply with all other requirements of the Contract Documents.

END OF DOCUMENT

DOCUMENT 00 43 23
ALTERNATES FORM

1.1 BID INFORMATION

- A. Bidder: _____.
- B. Prime Contract: _____.
- C. Project Name: Edinburg Consolidated Independent School District Freddy Gonzalez Elementary Gymnasium Improvements.
- D. Project Location: 2401 Sugar Rd., Edinburg, Texas 78539
- E. Owner: Edinburg Consolidated Independent School District
411 N. 8th Street
Edinburg, Texas 78503
- F. Architect: Laura Nassri Warren, AIA/Principal, The Warren Group Architects, Inc.,
1801 S. 2nd Street, Suite 330, McAllen, Texas 78503.
- G. Architect Project Number: 1611801.

1.2 BID FORM SUPPLEMENT

- A. This form is required to be attached to the Bid Form.

1.3 DESCRIPTION

- A. The undersigned Bidder proposes the amount below be added to or deducted from the Base Bid if particular alternates are accepted by Owner. Amounts listed for each alternate include costs of related coordination, modification, or adjustment.
 - 1. Cost-Plus-Fee Contract: Alternate price given below includes adjustment to Contractor's Fee.
- B. If the alternate does not affect the Contract Sum, the Bidder shall indicate "NO CHANGE."
- C. If the alternate does not affect the Work of this Contract, the Bidder shall indicate "NOT APPLICABLE."
- D. The Bidder shall be responsible for determining from the Contract Documents the affects of each alternate on the Contract Time and the Contract Sum.
- E. Owner reserves the right to accept or reject any alternate, in any order, and to award or amend the Contract accordingly within 60 days of the Notice of Award unless otherwise indicated in the Contract Documents.

- F. Acceptance or non-acceptance of any alternates by the Owner shall have no affect on the Contract Time unless the "Schedule of Alternates" Article below provides a formatted space for the adjustment of the Contract Time.

1.4 SCHEDULE OF ALTERNATES

Alternate No. 1: General Contractor to provide cost for Stage Spot Lights. Additional Information for Stage Lighting is shown in the Construction Documents, Electrical Drawings, dated February 15, 2019.

1. ADD____ DEDUCT____ NO CHANGE____ NOT APPLICABLE____.
2. _____Dollars
(\$_____).
3. ADD____ DEDUCT____ calendar days to adjust the Contract Time for this alternate.

Alternate No. 2: General Contractor to provide cost to have 3'-6" stage floor finish. Additional information for the half wall is shown in Construction Documents Sheet A3.11 Partial Building Section Number 2, dated February 15, 2019.

1. ADD____ DEDUCT____ NO CHANGE____ NOT APPLICABLE____.
2. _____Dollars
(\$_____).
3. ADD____ DEDUCT____ calendar days to adjust the Contract Time for this alternate.

Alternate No. 3: General Contractor to provide cost to have a future projector and screen. Additional information refer to Electrical drawings Sheet A1.31, dated February 15, 2019.

1. ADD____ DEDUCT____ NO CHANGE____ NOT APPLICABLE____.
2. _____Dollars
(\$_____).
3. ADD____ DEDUCT____ calendar days to adjust the Contract Time for this alternate.

Alternate No. 4: General Contractor to provide cost to Bella TX Stage Curtains IFR Synthetic Woven Velour Prestige in cornflower (Blue). Additional information on stage opening refer to Construction Documents Sheet A1.11, A2.11, and A3.11 dated February 15, 2019.

1. ADD____ DEDUCT____ NO CHANGE____ NOT APPLICABLE____.
2. _____Dollars
(\$ _____).
3. ADD____ DEDUCT____ calendar days to adjust the Contract Time for this alternate.

1.5 SUBMISSION OF BID SUPPLEMENT

Respectfully submitted this ____ day of _____, 2019.

Submitted By:

(Name of bidding firm or corporation)

Authorized Signature:

(Handwritten signature)

Signed By:

(Type or print name)

Title:

(Owner/Partner/President/Vice President)

END OF DOCUMENT

DOCUMENT 00 43 73
PROPOSED SCHEDULE OF VALUES FORM

1.1 BID FORM SUPPLEMENT

- A. A completed Proposed Schedule of Values form is required to be attached to the Bid Form.

1.2 PROPOSED SCHEDULE OF VALUES FORM

- A. Proposed Schedule of Values Form: Provide a breakdown of the bid amount, including alternates, in enough detail to facilitate continued evaluation of bid. Coordinate with the Project Manual Table of Contents. Provide multiple line items for principal material and subcontract amounts in excess of five percent of the Contract Sum.
- B. Arrange schedule of values consistent with format of AIA Document G703 Continuation Sheet.
 - 1. Copies of AIA standard forms may be obtained from the American Institute of Architects; <http://www.aia.org/contractdocs/purchase/index.htm>; docspurchases@aia.org; (800) 942-7732.

END OF DOCUMENT

DOCUMENT 00 60 00
FORMS

1.1 1.1 FORM OF AGREEMENT AND GENERAL CONDITIONS

- A. The following form of Owner/Contractor Agreement and form of the General Conditions shall be used for Project:
 - 1. AIA Document A101, "Standard Form of Agreement between Owner and Contractor, Stipulated Sum."
 - a. The General Conditions for Project are AIA Document A201, "General Conditions of the Contract for Construction."
 - 2. The General Conditions are included in the Project Manual.
 - 3. The Supplementary Conditions for Project are separately prepared and included in the Project Manual.
 - 4. Owner's document(s) bound following this Document.

1.2 ADMINISTRATIVE FORMS

- A. Administrative Forms: Additional administrative forms are specified in Division 01 General Requirements.
- B. Copies of AIA standard forms may be obtained from the American Institute of Architects; <http://www.aia.org/contractdocs/purchase/index.htm>; docspurchases@aia.org.
- C. Forms:
 - 1. Form of Performance Bond and Labor and Material Bond: AIA Document A312, "Performance Bond and Payment Bond."
 - 2. Form of Certificate of Insurance: AIA Document G715, "Supplemental Attachment for ACORD Certificate of Insurance 25-S."
- D. Information and Modification Forms to be provided by General Contractor:
 - 1. Form for Requests for Information (RFIs): AIA Document G716, "Request for Information (RFI)."
 - 2. Form of Request for Proposal: AIA Document G709, "Work Changes Proposal Request."
 - 3. Change Order Form: AIA Document G701, "Change Order."
 - 4. Form of Architect's Memorandum for Minor Changes in the Work: AIA Document G707, "Architect's Supplemental Instructions."

5. Form of Change Directive: AIA Document G714, "Construction Change Directive."
- E. Payment Forms:
1. Schedule of Values Form: AIA Document G703, "Continuation Sheet."
 2. Payment Application: AIA Document G702/703, "Application and Certificate for Payment and Continuation Sheet."
 3. Form of Contractor's Affidavit: AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
 4. Form of Affidavit of Release of Liens: AIA Document G706A, "Contractor's Affidavit of Payment of Release of Liens."
 5. Form of Consent of Surety: AIA Document G707, "Consent of Surety to Final Payment."

END OF DOCUMENT

DOCUMENT 00 72 00
GENERAL CONDITIONS NOTICE

1.01 FORM OF GENERAL CONDITIONS

- A. The "General Conditions of the Contract for Construction", American Institute of Architects' A.I.A. Document A201, Latest Edition, and "Supplementary Conditions" on file in the offices of the Architect and the Owner's Supervising Engineer, are hereby a part of these Specifications, and shall apply and be binding to all Contractors as though written in full herein.
- B. The Contractors shall be held to have examined and become familiar with all provisions of the above referenced documents.
- C. Certain provisions of these standard "General Conditions of the Contract for Construction" have been revised or modified by portions of this "NOTICE" and the "SUPPLEMENTARY CONDITIONS". In all such cases, the provisions of the "NOTICE" and the "SUPPLEMENTARY CONDITIONS" shall take precedence, to the extent of any conflict or inconsistency, over these standard "General Conditions of the Contract for Construction".
- D. Wherever the word "Owner" appears in such "General Conditions", and elsewhere in these documents, it shall be interpreted as "Edinburg Consolidated Independent School District", so that the word "Board" is hereby substituted for the word "Owner" throughout these documents.
- E. Wherever the word "Contractor" or "Subcontractor" appears in these documents, it shall be interpreted to mean the Contractor whose Proposal has been accepted for that respective Section of the Work.

1.02 SUPPLEMENTARY CONDITIONS

- A. Refer to Section 00 73 00 for amendments to these General Conditions.

END OF SECTION

DOCUMENT 00 73 00
SUPPLEMENTARY CONDITIONS

ARTICLE 1 - GENERAL PROVISIONS

1.1 BASIC DEFINITIONS

The Agreement takes precedence over all other Contract Documents.

1.2 EXECUTION, CORRELATION AND INTENT

No allowance shall subsequently be made on behalf of the Contractor on account of an error on his part or his negligence or failure to acquaint himself with the conditions of the site.

1.2.2.1. Before submitting proposal for this work, each bidder shall be held responsible for having examined the premises and satisfied himself as to the existing conditions under which he will be obliged to operate and that will, in any manner, affect the work under this Contract. No allowance shall be made subsequently in the connection on behalf of the contractor for any error or negligence on his part, nor for slight discrepancies on drawings as to grades, slopes and elevations.

1.2.2.2 In case the bidder finds any discrepancy between the conditions at the site and the requirements of these plans and specifications, he shall notify the Owner in writing before the opening of bids and the Owner will issue the necessary instructions to all bidders.

1.2.2.2.1 In the event of inconsistencies within or between parts of the Contract Documents, or between the Contract Documents and applicable standards, codes, and ordinances, the Contractor shall (1) provide the better quality or greater quantity of Work or (2) comply with the more stringent requirement; either or both in accordance with the Architect's reasonable interpretation. The terms and conditions of this paragraph 1.2.3, however, shall not relieve the Contractor of any obligations set forth in Paragraphs 3.2 and 3.7. Before ordering any materials or doing any Work, the Contractor and each Subcontractor shall verify measurements at the Project site and shall be responsible for the correctness of such measurements. Any difference, which may be found, shall be submitted to the Architect for resolution before proceeding with the Work.

Add the following to Paragraph 1.2.4:

Such separations shall not operate to make the Architect an arbiter to establish subcontract limits.

Add the following after Paragraph 1.2.5:

1.2.6 Titles of Sections and Articles in these Specifications are introduced merely for convenience and are not to be construed as a correct or complete segregation or tabulation of the various units of material and/or work. The Contractor shall be solely responsible for omissions or duplications by the Contractor or any Subcontractors due to real or alleged error, either direct or implied, in arrangement of matter in the Contract Documents.

- 1.2.7 Contractor shall check Drawings and Specifications immediately upon their receipt, and shall notify Architect in writing not later than ten (10) days after receipt of them, of errors, discrepancies, or omissions. Contractor shall verify dimensions and details before ordering materials for laying out work and shall be responsible for errors that might have been avoided by such check. Deviations from Drawings and dimensions shall be made only with the Architect's permission. No exchange or compensation will be allowed on account of differences between actual dimensions and measurements indicated on the Drawings. Any difference, which may be found, shall be submitted to the Architect for instructions before proceeding with the work.
- 1.2.8 Specifications and Drawings are intended to be complementary and in agreement each with the other. All work or materials called for by either shall be Performed and/or furnished as if called for by both. In cases of discrepancy concerning dimensions, quantities, and location, the contractor shall, in writing, call to the attention of the Architect any discrepancies between Specifications, Plans, Details or Schedules. The Architect will then inform the Contractor, in writing, which document takes precedence. Should the Contractor not notify the Architect as per the prior instructions, the greater amount of work, cost and/or materials shall be included in the base bid or alternate bid amount as part of this agreement.
- 1.2.9 These Specifications are intended to supplement the Drawings, the two being considered cooperative and, therefore, it will not be the province of these Specifications to mention any portion of the construction which the Drawings are competent to explain, and such omission will not relieve the Contractor from carrying out such portions as are only indicated from the Drawings, and should items be required by these Specifications which are not indicated on the Drawings, they are to be supplied.
- 1.2.10 The Contractor shall supply all labor, materials, transportation, apparatus, light, energy, scaffolding and tools necessary for the entire proper completion of the Work.
- 1.2.11 Unless specified otherwise, all of the materials incorporated in the work shall be new and of the best of the kind of grades specified and all workmanship be up to the best recognized standard known to the various trades.
- 1.3.1 The Drawings, Specifications, and other similar or related documents and copies thereof are furnished to the Contractor for the purpose of performing the Work and are, and shall remain, the property of the Architect.

ARTICLE 2 - OWNER

2.2 INFORMATION AND SERVICE REQUIRED OF THE OWNER

Architect will furnish Contractor Online Procurement and Contracting Documents: Contact Natanael Perez at nperez@twgarch.com for a download link. Files are available for download after 10:00 a.m. on Thursday, February 21, 2018. Any other questions to be in written/e-mailed format to the attention of Laura Nassri Warren at lwarren@twgarch.com and a copy to Andrina De Anda at andrina@twgarch.com. Online access will be provided to prime bidders only. A hard

copy of the Construction Documents and any Addendums can be purchased at RGV Reprographics, Inc., 956-686-1525, located at 519 S Broadway St, McAllen, TX 78501. Please note the Notices of Addendums are to be issued digitally.

2.2.7 OWNER'S RIGHT TO SEPARATE CONTRACT

Although it is contemplated that this Contract shall include all of the work intended to be done at this time, it is possible that the Owner may let other Contract in connection with the work herein specified. In any event, the Owner reserves the right to do so, in which case the Contractor shall afford reasonable opportunity for the storage of materials and the execution of work by others.

ARTICLE 3 - CONTRACTOR

3.2 VIEW OF CONTRACT DOCUMENTS

3.2.1 Contractor shall carefully study and compare the Agreement, Conditions of the Contract, Drawings, Specifications, Addenda and Modifications and shall at once report, in writing, to the Architect any error, inconsistency or omission he may discover. Contractor shall be liable for any damage to Owner for failure to so report any error, inconsistency or omission he may discover or should have discovered, but he shall not be liable to Owner or Architect for any damage resulting from any such error, inconsistency or omission he should not have discovered or which he did discover and at once so reported. Contractor shall do no work without approved Drawings and Specifications.

3.2.4 Should the Specifications and Drawings fail to particularly describe the material or kind of goods to be used in any place, then it shall be the duty of the Contractor to make inquiry of the Architect as to what is best-suited. The material that would normally be used in this place to produce first quality finished Work shall be considered a part of the Contract.

3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

3.3.5 In laying out the work, the Contractor shall verify all measurements and dimensions and shall immediately report any errors to the Architect. The Contractor shall employ an experienced and competent instrument person to lay out the structure and establish a permanent and accessible bench mark from which the grades may be established and checked from time to time during the progress of the work. Contractors shall lay out building corners accurately and secure approval of the Architect before proceeding with excavation.

3.4 LABOR AND MATERIALS

3.4.1.1 Not later than ten (10) days from the Contract Date, the Contractor shall provide a list of the names of the manufacturers proposed to be used for each of the following products listed in the Instruction to Bidders and, where applicable, the name of the installing subcontractor. The Architect will promptly reply in writing to the Contractor stating whether the Owner or the Architect have any reasonable objection to any such proposal. If adequate data on any proposed manufacturer or installer is not available, the Architect may state that action will be deferred until the Contractor provides further data. Failure of the Owner or the Architect to reply promptly shall not constitute a waiver of any of the requirements of the

Contract Documents and all products furnished by the listed manufacturer must conform thereto.

3.4.1.2 Products are generally specified by ASTM and other reference standard, and/or by manufacturer's name and model number or trade name. When specified only by reference standard, the Contractor may select any product meeting this standard, by any manufacturer. When several products or manufacturers are specified as being equally acceptable, the Contractor has the option of using any product and manufacturer combination listed, but may not substitute others except as provided in Paragraph 4.4.1.3 below. When only one product and manufacturer is Specified, this is the basis of the Contract, without substitution or exception.

3.4.1.3 After the Contract has been executed, the Owner and Architect will consider a formal request for the substitution of products in place of those specified, under the following conditions:

The request complies with requirements of Section 01600 and Section 012500 and additionally complies with the following:

The request is accompanied by complete data on the proposed substitution substantiating compliance with the Contract Documents including product identification and description, performance and test data, references and samples where applicable, and an itemized comparison of the proposed substitution with the products specified with data relating to Contract time schedule, design and artistic effect where applicable, and its relationship to any separate contracts."

The request is accompanied by accurate cost data on the proposed substitution with the product specified, whether or not modification of the Contract sum is to be a consideration.

3.4.1.4 By making requests for substitutions based on Paragraph 3.4.1.3 above, when forwarded by the Contractor to the Architect, the Contractor:

Represents that he has personally investigated the proposed substitute product and determined that it is equal or superior in all respects to that specified. Will provide the same guarantee for the substitution that he would for that specified.

Certifies that the cost data presented is complete and includes all related costs under this Contract, but excludes costs under any separate contracts and the Architect's redesign costs, and that he waives all claims for additional costs related to the substitution which subsequently become apparent.

Will coordinate the installation of the accepted substitute, making such changes as may be required for the work to be complete in all respects.

States that the proposed substitution is in full compliance with the Contract Documents and applicable codes.

Will provide a list of other trades, (if any), which may be affected by the substitution. Shall be responsible for any effect upon related work in the Project of any substitution and shall pay any additional costs generated by any substitutions.

3.4.1.5 Substitutions will not be considered if:

They are indicated or implied on Shop Drawings, Product Data or Sample submissions without the formal request required in paragraph 3.4.1.3 above.

For their implementation, they require a substantial revision of the Contract Documents or work of the owner or separate Contractors in order to accommodate their use.

- 3.4.4 After the Contract has been executed, the owner and the Architect will consider a formal request for the substitution of products in place of those specified only under the conditions set forth herein and in the Contract Documents. By making request for substitution, the Contractor (a) represents that the Contractor has personally investigated the proposed substitute product and determined that it is equal or superior in all respects to that specified; (b) represents that the Contractor will provide the same warranty for the substitution that the Contractor would for that specified; (c) certifies that the cost data presented is complete and includes all related costs under this Contract but excludes cost under separate contracts and excludes the Architect's redesign costs, and waives all claims for additional costs related to the substitution which subsequently become apparent; and (d) will coordinate the installation of the accepted substitute, making such changes as may be required for the Work to be complete in all respects.

3.5 WARRANTY

3.5.2 Guarantees:

Contractor shall guarantee all work performed under this Contract as specified, delivering written guarantees to Owner, through Architect, upon completion in accordance with Section 01700.

For the convenience of the General Contractor, the following is a summary including, but not limited to, releases, warranties, and the guarantees mentioned in the various Section of these Specifications to be furnished to the Owner, through the Architect, upon completion of the Project. Where the requirements listed herein conflict with those in the various sections of these Specifications, the stricter requirements will take precedence.

General Contractor's notarized affidavit that all bills for labor and materials have been paid in full.

General Contractor's guarantee for ONE YEAR FROM DATE OF FINAL ACCEPTANCE OF THE WORK against defective materials and/or workmanship.

Roofing subcontractor shall furnish a TEN YEAR written certificate guaranteeing that all roofing materials are installed in accordance with Plans and specifications, that all roofing work is free from faulty materials and workmanship, that pitch will not leak or drip or stain any part of the building, and providing for repair and replacement of any faulty materials and/or workmanship.

The Flashing subcontractor's guarantee for a period of FIVE YEARS against defective materials and/or workmanship.

Caulking subcontractor's guarantee for a period of TWO YEARS from the date of final acceptance of the work.

Electrical subcontractor's guarantee for a period of ONE YEAR from time his work is accepted, against defective materials and/or workmanship.

All other guarantees not listed above but specified in the technical portion of the Specifications shall be furnished to the Owner upon completion of the Project.

- 3.5.3 Without limiting any other warranty, the Contractor shall warrant for a period of twelve (12) months that the buildings shall be watertight and leak proof at every point and in every area, except where leaks can be attributed to damage to the building by external forces beyond Contractor's control. The Contractor shall, immediately upon notification by the Owner of water penetration, determine the source of water penetration and, at its own expense, do any work necessary to make the building watertight. Contractor shall also, at its own expense, repair or replace any other damaged material, finishes, and furnishings, damaged as a result of this water penetration, to return the building to its original condition.

ARTICLE 3.6 - TAXES

- 3.6.2 This project is exempt from state taxes. A sales tax exemption certificate may be obtained from the State Comptroller.

3.7 - PERMITS, FEES AND NOTICES

- 3.7.5 Upon completion of the work, Contractor shall deliver to the owner through the Architect, all required Certificates of Inspection.
- 3.7.6 Any reference in the Specifications text to codes, standard specifications or manufacturer's instructions shall mean the latest printed edition of each in effect at the contract date.

3.9 - SUPERINTENDENT

- 3.9.1 Contractor and his prime subcontractors shall employ competent superintendents and necessary assistants who shall be in attendance at the Project site during the progress of the work. The superintendents shall be satisfactory to the Architect and shall not be changed except with the consent of the Architect, unless the superintendents leave the employ of the Contractor or the prime subcontractor.
- 3.9.2 At the beginning of Project, Contractor shall submit, in writing, to the Architect the name of his superintendent and the names of the superintendents of his prime subcontractors, this to include a list of past projects on which each superintendent has worked or been in charge of.
- 3.9.3 Superintendents shall not be removed from the Project by Contractor or his prime subcontractor without written requests and approval by the Architect.

- 3.9.4 Superintendent shall represent Contractor and all communications given superintendent shall be as binding as if given Contractor. Important communications will be confirmed in writing. Other communications will be so confirmed on written request in each case.

3.10 CONTRACTOR'S CONSTRUCTION SCHEDULE

- 3.10.3 The progress schedule shall be of a type similar to the CPM, PERT, DYliA-PERT schedules or their equivalent in the opinion of the Architect. The number of activities and structure of the progress schedule shall be adequate to explain the various stages of construction. Completed progress schedule shall be submitted to Architect no later than thirty (30) calendar days after date of Agreement and shall be updated during construction as required to keep it current. Nothing in this requirement shall be deemed to be usurpation of the Contractor's authority and responsibility to plan and schedule the work as he sees fit, subject to all other requirements of the Contract Documents.

3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

- 3.12.11 Submission of Shop Drawings and Samples to Architect required for ONLY those times specifically mentioned in the Specification Sections. If Contractor submits Shop Drawings for items other than the above, Architect will not be obliged to review them. Contractor shall be responsible for procuring Shop Drawings for his own use as he may require for the progress of the work.
- 3.12.12 The term "shop drawing" as used herein also includes, but is not limited to, fabrication, erection, layout and setting drawings, manufacturer's standard drawings, descriptive literature, catalogues, brochures, performance and test data, wiring and control diagrams, all other drawings and descriptive data pertaining to materials, equipment or systems and the position thereof conforms to the Contract requirements. As used herein, the term "manufactured" applied to standard units usually mass produced; and "fabricate" means items specifically assemble or made out of selected materials to meet individual design requirements. Shop Drawings shall establish the actual detail of all manufactured or fabricated items; indicate proper relation to adjoining work; amplify design details or mechanical and electrical equipment in proper relation to physical spaces in the structure; and incorporate minor changes of design or construction to suit actual conditions.
- 3.12.13 Following Contractor's review and approval, he shall submit to the Architect shop drawings and submittals in the quantities listed in Section 01300. Architect, at Owner's expense, will make prints for himself, Owner and Project Representative and then return the reproducible copy to Contractor in order that as many additional prints may be made, at Contractor's expense, as he may require for the remaining parties concerned.
- 3.12.14 Manufacturers instructions: Where any item of work is required by specification to be furnished, installed or performed in accordance with a specified product manufacturer's instructions, contractor shall procure and distribute the necessary copies of such instructions to all concerned parties.

3.12.15 Materials in the Specifications may be followed by the words "or as approved by the Architect". In these cases, wherever the name or brand of a manufacturer's article is specified, it is used as a measure of quality and utility or a standard. If Contractor desires to use any other brand or manufacturer of same quality, appearance and utility to that specified, he shall request substitution as provided in paragraph 4.4.

3.13 USE OF THE SITE

3.13.2 The Contractor shall arrange and maintain material and equipment in orderly manner keeping walks, drives, roads and entrances unencumbered.

3.15 CLEANING UP

3.15.3 Besides the "broom cleaning", the following special cleaning is required just prior to acceptance:

Remove stains; wash and polish glass, inside and outside. This work shall be done by persons skilled and equipped for such work.

Remove foreign matter, marks, stains, foreign paint, fingerprints, soil and dirt from (and have in a polished condition where appropriate) the following:
Painted, decorated and stained work.

All hardware, fixtures and incorporated equipment.

All finished surface and metal surfaces, whether interior or exterior.

All doors and windows.

3.15.4 In addition to clean-up provisions of the Specifications, Contractor shall take appropriate steps to prevent air-borne dust due to work under this contract. Water shall be applied wherever practical to settle and hold dust to a minimum, particularly during the excavation and moving of materials.

3.18 INDEMNIFICATION

3.18.3 The obligations of the Contractor under this paragraph 3.18.3 shall not extend to the liability of the Architect, his agents or employees arising out of (1) the preparation of approval of maps, drawings, opinions, reports, surveys, change orders, designs or specifications or (2) the giving of direction or instructions by the Architect, his agents or employees provided such giving is the primary cause of the injury or damage.

ARTICLE 4 - ADMINISTRATION OF THE CONTRACT

4.2 ARCHITECT'S ADMINISTRATION OF THE CONTRACT

The term 'aesthetic effect' as used herein refers to color, texture, profile and juxtaposition of masses. The Architect shall be the sole interpreter of the design intent with respect to such matters, but the Architect's authority with respect thereto shall not contravene any

other rights of either the Owner or the Contractor ascribed to them by other provisions of the Contract.

ARTICLE 5 - SUBCONTRACTORS

- 5.5 No subcontractor shall be let until the list of proposed subcontractors as submitted at the bid opening is approved, in writing, by the Owner.
- 5.6 The General Contractor shall bind all Subcontractors, the Mechanical Contractor and the Electrical Contractor to the terms of the Contract Documents.
- 5.7 The General Contractor agrees that he is as fully responsible to the Owner or the acts and omissions of his Subcontractors and of persons either directly or indirectly employed by them as he is for the acts and omissions of persons directly employed by him.
- 5.8 Nothing contained in the Contract Documents shall create any contractual relations between any Subcontractor and the owner.

ARTICLE 6 - CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

6.2 MUTUAL RESPONSIBILITY

- 6.2.7 Contractor shall be responsible for the proper fitting of all work and for the coordination of the operations of the trades, other contractors, subcontractors, and material suppliers engaged upon or in connection with the work as well as those of his own employees, and he shall exercise every effort to assure a harmonious cooperative working relationship on the part of all concerned. He shall be prepared to guarantee to each of his subcontractors and foremen all of the dimensions which they may require for the fitting of their own to adjoining work and shall do or shall cause his agents to do, all fitting and adjusting necessary to make the several parts of the work come together properly and fit the work to receive or be received by, the work of other Contractors.

ARTICLE 7 - CHANGES IN THE WORK

7.2 CHANGE ORDERS

- 7.2.2 Any adjustment to contract sum shall be determined by methods described in 7.3.3, 7.3.10 and 7.3.11.

7.3 CONSTRUCTION CHANGE DIRECTIVES

- 7.3.3.5 In subparagraphs 7.3.3.1 and 7.3.3.3 the allowance for overhead and profit combined, included in the total cost to the Owner shall be based on the schedule in the Bid Form.
- 7.3.6 In allowance for overhead and profit in accordance with the schedule the Contractor is to provide – “In the Bid Form.”
- 7.3.10 Cost to which overhead and profit is to be applied shall be determined in accordance with subparagraph 7.3.6.

- 7.3.11 In order to facilitate checking of quotations for extras or credit, all proposals, except those so minor that their property can be seen by inspection, shall be accompanied by a complete itemization of costs including labor, materials and subcontractors. 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 involving over \$100.00 be approved without such itemization. Every change itemization shall be submitted on attached Change in work/Cost Analysis forms.

ARTICLE 8 - TIME

8.1 DEFINITIONS

- 8.1.5 Contract Time commences at the time of Notice to Proceed.

8.3 DELAYS AND EXTENSIONS OF TIME

- 8.3.4 Contractor shall have all materials delivered at the site in such quantities as required for the uninterrupted progress of the work and the least obstruction of the premises and the adjoining property. No extension of time or extra cost will be allowed for failure by Contractor to order the material on time or in insufficient quantities.

WEATHER DELAY

- 8.3.5 For the purpose of calculating extensions of time due to inclement weather, the local climatological data will be used.
- 8.3.6 Unless the Owner considers that unusual circumstances warrant consideration, extensions of time because of inclement weather will be granted for any work only to the extent that the number of days of precipitation (.04" or more) and/or the number of days of freezing weather (32 degrees and below) exceeds the mean for that month; provided that no one day will be counted more than once; and provided further, that if a day lost because of weather falls immediately before a non working day or days, such as a holiday or weekend, such working days shall be considered as lost time. The mean number of days of Precipitation and freezing weather shall be established by the tabulation of normals, means and extremes published by National Oceanic and Atmospheric Administration in the most recent Local Climatological Data for the closest reporting station to the site of the work. No claim will be considered unless it is accompanied by the attached "Time Extension Request" form completed within two weeks of the time referenced inclement period.

LIQUIDATED DAMAGES

For each day after Substantial Completion that the work remains incomplete, a penalty of \$1,000.00 per day will be charged to the Contractor.

ARTICLE 9 - PAYMENTS AND COMPLETION

9.1 CONTRACT SUM

- 9.1.2 All costs of overtime work require by the nature of this work, except emergencies as covered in Article 10.3.1 shall be included in the Bid.

9.3 APPLICATIONS FOR PAYMENTS

- 9.3.1 In each Application for Payment, the Contractor shall certify that such Application for Payment represents a just estimate of cost reimbursable to the Contractor and also shall certify as follows:

- (a) There are no known mechanic's or materialmen's liens outstanding at the date of this requisition, that all due and payable bills with respect to the Work have been paid to date or are included in the amount requested in the current application, and that, except for such bills not paid but so included, there is no known basis for the filing of any mechanic's or materialmen's liens on the Work, and that waivers from all Subcontractors and materialmen's have been obtained in such form as to constitute an effective waiver of lien under the laws of the location of the Project.
- (b) The Contractor shall within thirty (30) days of receipt of notice of the existence of any lien filed against the Project by any subcontractor, supplier of materials or any other person or entity claiming to be a creditor of the Contractor, cause the same to be removed as of record or provide a bond to indemnify or a cash deposit to the Title Company in an amount equal to the lien.

- 9.3.1.3 Along with the Progress Schedule, specified herein before, Contractor shall submit to Architect a schedule of the anticipated amount of each monthly payment that will become due the Contractor in accordance with the Progress Schedule. On or about the tenth of each month, the Owner agrees to pay to the Contractor an amount to be determined by taking ninety percent (90%) of the value of labor and materials incorporated in the work, plus material not incorporated in the work, but approved by the Architect under the provisions of the Contract Documents, up to the date of payment proposed to be made, less the aggregate of all previous payments and deductions provided for in the Contract Documents.

The ten percent (10%) retention shall be paid thirty-five (35) calendar days after the date of recording by the Owner of the Notice Completion of all the work to be done under this contract, providing there are no undercharged or unsecured liens, attachments or claims in connection with the work.

- 9.3.2 Payments made on account of materials not incorporated in the work shall only be made on material which has been worked to a special design according to the Drawings and specifications. No payment shall be made on standard manufactured items. The Architect's decision as to which category a specific item qualifies under shall be final.

9.8 SUBSTANTIAL COMPLETION

- 9.8.1 Substantial Completion. Edinburg Consolidated Independent School District, Edinburg Texas.

ARTICLE 10 - PROTECTION OF PERSONS AND PROPERTY

10.2 SAFETY OF PERSONS AND PROPERTY

- 10.2.8 Protection of Plant Life: Solvents, oils and any other material which may be harmful to plant life shall be disposed of in containers as directed by the Architect and removed from the site. At completion of work, any contaminated soil shall be removed and replaced with good soil by this Contractor at no expense to the Owner.
- 10.2.9 The Contractor shall secure and pay for all necessary permits and shall comply with all ordinances pertaining to his work. He shall provide and maintain suitable temporary walkways, where needed, fences and other structures required by law and city ordinances in such a manner as not to interfere with traffic in public streets. He shall leave access to fire hydrants and protect the public and adjacent property at all times during the progress of the Contract. The proper signs shall be posted at truck entrances, and all other possible safety precautions observed.
- 10.2.10 The Contractor shall, as a cost of the Work, provide and maintain in good order, any firefighting equipment required by local authorities during Contract operations.
- 10.2.11 The Contractor shall immediately report to the Owner all accidents arising out of the Work and involving injury to employees of the Contractor, any member of the public or property damage to the property. The Owner's liability insurance will not be responsible for claims, accidents and losses arising out of the Contractor's operations.

ARTICLE 11 - INSURANCE AND BONDS

11.1 CONTRACTORS LIABILITY INSURANCE

- 11.1.1.8 The liability insurance required shall be on a comprehensive basis, including:

Premises - Operations

Independent Contractor's Protective

Products and Completed Operations.

Add the following to Paragraph 11.1.2:

1. Workmen's Compensation - Statutory
Employer's Liability - \$100,000 per occurrence.
2. Comprehensive General Liability (Public Liability)
 - a. Bodily injury - \$ 1,000,000 each occurrence.

- b. Personal injury - \$ 1,000,000 each person,
\$ 1,000,000 aggregate.
 - c. Property damage - \$ 1,000,000 each person,
\$ 1,000,000 each occurrence,
\$ 1,000,000 aggregate.
 - 3. Automobile Liability:
 - a. Bodily injury - \$ 1,000,000 each person,
\$ 1,000,000 each occurrence,
 - b. Property damage - \$ 1,000,000 each occurrence.
 - 4. Independent Contractors: Same limits as above.
 - 5. Products and Completed Operations: same limits as above for one year, commencing with issuance of the Final Certificate for Payment.
 - 6. Contractual Liability: Same limits as above.
 - 7. Umbrella Liability: Excess over underlying limits above \$ 1,000,000.
 - 8. Builder's All Risk: The Contractor shall provide and maintain Builder's All Risk Insurance with minimum coverage consisting of fire, extended coverage, vandalism and malicious protection sufficient to amply indemnify himself, the Owner and the Architect against loss or damage that may occur to the premises and improvements supplied by the Contractor until final completion and acceptance by the Owner.
- 11.1.3.1 Furnish one copy of the Certificates herein required for each copy of the Agreement; specifically set forth evidence of all coverage required by paragraphs 11.1.1 and 11.1.2. The form of the Certificate shall be AIA Document G705. Furnish the owner copies of any endorsements that are subsequently issued amending.

11.4 PERFORMANCE BOND AND PAYMENT BOND

Both a Performance Bond and a Payment Bond will be required, each in an amount equal to 100 percent of the Contract Sum.

ARTICLE 12 - UNCOVERING AND CORRECTION OF WORK

12.2 CORRECTION OF WORK

Add the following to Paragraph 12.2.2:

The above stated ONE YEAR guarantee by the General Contractor may be extended to longer periods if stated in the Specific Section of the Specifications".

Substitute "Date of Final Acceptance of the Project" in lieu of "Date of Substantial Completion" or "Substantial Completion". The date of Final Acceptance shall be the date of the Final Application of Payment is approved by the Architect.

12.3 ACCEPTANCE OF DEFECTIVE OR NON-CONFORMING WORK

Add the following after Paragraph 12.3.1:

"Appropriate reduction" is hereby defined as an amount equal to the entire cost of replacing the work to make it as originally shown or specified.

ARTICLE 13 - MISCELLANEOUS PROVISIONS

13.1 AHERA

Pursuant to Federal Public Law 99-519, otherwise known as the Asbestos Hazard Emergency Response Act (AHERA) there shall be no asbestos containing products and/or materials used in this project.

OTHER CONDITIONS OR PROVISIONS

Contractor understands and agrees that time is of the essence hereof and in order to comply with Article 3 and meet all applicable completion dates, Contractor warrants and represents that Contractor will undertake proper coordination of the Work so as to not interfere, disrupt, delay or adversely affect in any way the on-going business functions and operations of the owner. Contractor understands and agrees that in order to comply herewith, it may be necessary for work to continue under this Contract on holidays, weekends and other calendar days on which Work is not ordinarily performed; cost of which shall be by the Contractor.

All risk insurance described in Article 11, Section 11.3.1.1 shall be purchased and carried by the contractor. The additional cost for this insurance will be paid by the Owner.

The term Products is utilized throughout this Specification Manual to encompass the many other words often used in specifications they are defined in the paragraph below:

1. Products: Means new material, machinery, components, equipment, fixtures, and systems forming the Work, but does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work. Products may also include existing materials or components required for reuse.
2. Furnish or Supply: To supply and deliver, unload, inspect for damage.
3. Install: To unpack, assemble, erect, apply, place, finish, cure, protect, clean, and ready for use.
4. Provide: To furnish or supply, plus install.

END OF DOCUMENT

SECTION 01 15 00
CONTRACT STANDARDS AND PROCEDURES

The requirements of the "General Conditions", the "Supplementary Conditions", and "Division 1" sections of the Specifications, shall apply to this section of the Specifications.

PART 1 - GENERAL

1.01 SCOPE

- A. Work Included: This section consists of establishing standards and procedures.

1.02 OPERATIONS

- A. Layout: Locate and layout the Work, and establish lines and levels accurately. Report any discrepancies to the Architect immediately upon discovery.
- B. Use of Premises: Confine apparatus, storage of materials, and operations of workmen to limits indicated by law, ordinance, permit, or arrangement with the Owner. Do not unreasonably encumber the premises with materials.
- C. Project Meetings:
1. Progress Meetings: Schedule and conduct regular periodic progress meetings. All Key personnel of contractor and subcontractors shall attend. Notify other parties as the Owner's Representative or Architect might designate, as job conditions and progress might warrant.
 - a. Contractor's Construction Schedule: Review progress since last meeting, determine whether each activity is on time, ahead schedule, or behind schedule, in relation to the Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that correct and subsequent activities will be completed within Contract Time.
 - 1) Review schedule for next scheduled progress meeting period.
 - b. Agenda: Review present and future needs of each entity present, including the following:

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- 1) Interface requirement.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Deliveries.
 - 5) Off-site fabrication.
 - 6) Access and site utilization.
 - 7) Temporary facilities and controls.
 - 8) Progress Cleaning
 - 9) Quality and work standards
 - 10) Status of correction of deficient items.
 - 11) Field observations.
 - 12) Status of RFIs.
 - 13) Status of proposal requests.
 - 14) Pending changes and Status of Change Orders.
 - 15) Pending claims and disputes.
 - 16) Documentation of information for payment requests.
- c. Meeting Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
2. Pre-construction Meeting: Schedule and conduct a preconstruction meeting before starting construction, at a time convenient to Owner and Architect, but no later than 10 days after execution of the Agreement. All Key personnel of owner, design professionals and contractors shall attend. Notify other parties as the Owner's Representative or Architect might designate, as job conditions and progress might warrant.

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- a. Agenda: Discuss items of significance that could affect progress, including the following:
- 1) Tentative construction schedule.
 - 2) Phasing and Staging.
 - 3) Critical work sequencing and long-lead items.
 - 4) Designation of key personnel and their duties.
 - 5) Lines of communications.
 - 6) Procedures for processing field decisions and Change Orders.
 - 7) Procedures for RFIs.
 - 8) Procedures for testing and inspecting.
 - 9) Procedures for processing Application for Payment.
 - 10) Distribution of the Contract Documents.
 - 11) Submittal procedures.
 - 12) Preparation of record documents.
 - 13) Use of the premises.
 - 14) Work restrictions.
 - 15) Working hours.
 - 16) Owner's occupancy requirements.
 - 17) Responsibility for temporary facilities and controls.
 - 18) Procedures for moisture and mold control.
 - 19) Procedures for disruptions and shutdowns.
 - 20) Construction waste management and recycling.

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- 21) Parking Availability.
 - 22) Office, work, and storage areas.
 - 23) Equipment deliveries and priorities.
 - 24) First Aid.
 - 25) Security.
 - 26) Progress cleaning.
 - 27) Safety.
- b. Meeting Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
4. Pre-installation Meetings: Conduct a preinstallation meeting at Project site before each construction activity that requires coordination with other construction. All Key personnel of contractor, subcontractors, manufacturer representative and Owner's Commissioning Authority shall attend. Notify other parties as the Owner's Representative or Architect might designate, as job conditions and progress might warrant.
- a. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - 1) Contract Documents.
 - 2) Options.
 - 3) Related RFIs.
 - 4) Related Change Orders.
 - 5) Purchases and Deliveries.
 - 6) Submittals.
 - 7) Review of Mockups.
 - 8) Possible conflicts and Compatibility problems.

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- 9) Time schedules and weather limitations.
 - 10) Manufacturer's written recommendations.
 - 11) Warranty requirements.
 - 12) Compatibility of materials and acceptability of substrates.
 - 13) Temporary facilities and controls.
 - 14) Space and access limitations.
 - 15) Regulations of authorities having jurisdiction.
 - 16) Testing and inspecting requirements.
 - 17) Installation procedures and coordination with other work.
 - 18) Required performance results.
 - 19) Protection of adjacent work, construction and personnel.
- b. Meeting Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
5. Project Closeout Meetings: Schedule and conduct a Project closeout meeting, at a time convenient to Owner and Architect, but no later than 90 days prior to the scheduled date of Substantial Completion. All Key personnel of contractor, subcontractors, owner, owner's commissioning authority and design professionals shall attend. Notify other parties as the Owner's Representative or Architect might designate, as job conditions and progress might warrant.
 - a. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
 - 1) Submission of record documents.
 - 2) Procedures required prior to inspection for Substantial Completion and for Final inspections for acceptance.
 - 3) Submittal of written warranties.
 - 4) Requirements for preparing operations and maintenance data.

- 5) Requirements for demonstrations and training.
 - 6) Preparation of Contractor's punch list.
 - 7) Procedures for processing Applications for Payment at Substantial Completion and for final payment.
 - 8) Submittal Procedures.
 - 9) Coordination of separate contracts.
 - 10) Owner's partial occupancy requirements.
 - 11) Installation of Owner's furniture, fixtures, and equipment.
 - 12) Responsibility for removing temporary facilities and controls.
- b. Meeting Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

1.03 RECORDS

- A. Record Drawings: Maintain on site a complete set of Construction Documents and Shop Drawings as required by Section 01 70 00 - Project Closeout.
- B. Construction Photographs: Refer to Sections 01 32 33 - Photographic Documentation.

1.04 SUBMITTALS

- A. Subcontractor List: Submit list of subcontractors with addresses, telephone numbers and e-mail addresses for approval within twenty-four (24) hours after notification of intent to enter into Contract. Prepare list on the form of a sworn statement attesting to the validity of such. Do not change the name of subcontractors or vendors on the approved list without the specific written form stating sufficient reason to warrant such a change.
- B. Schedule of Values: Prepare detailed accounting of Contract Sum on the basis of "trades" Sections indicated in the Table of Contents. Submit and obtain approval before first application for payment. Use only approved breakdown for payment requests.
- C. Payment Schedule: Submit to the Architect at least twenty (20) days prior to the submission of the first request for payment, a schedule detailing projected monthly requests for payment for the duration of the Project.

D. Shop Drawings and Samples:

1. Refer to Section 01 33 23 - Shop Drawings and Samples.
2. In addition to Section 01 33 23, the Contractor shall furnish the Owner with one (1) copy of all approved Shop Drawings and manufacturers product data bound in loose leaf form, for the Owner's records, prior to Owner issuing the Certificate of Substantial Completion.

E. Test Reports: Submit copies as required herein, with distribution as directed by the Architect.

1.05 DOCUMENTS

A. Performance and Labor and Material Payment Bonds:

1. If required, deliver to the Owner within five (5) days of the date of the notification of intent to enter into Contract.
2. Condition bonds for the faithful performances of the Contract and for the payment of labor and material, each in the sum of 100% of the amount of the Contract as set forth in notification of intent to enter into Contract.
3. The Owner, at the Owner's discretion, reserves the right to accept or reject the company underwriting the bonds on the basis of their previous performance.

B. Agreement: Use AIA Form A111.

C. Application for Payment: Use AIA Form G702 and G703.

D. Sworn Statements: Use uniform commercial format designated by the Owner.

E. Insurance Certificate: Use form selected by Owner. Owner may, at the Owner's option, require a certified copy of Contractor's insurance policies in addition to insurance certificates.

1.06 QUALITY CONTROL

- A. Standards: Establish a quality control system to perform sufficient inspection and tests of all Work, including subcontractors, to ensure conformance to applicable Specifications and Drawings, with respect to materials, workmanship, construction, finish, functional performance, and identification. Control system shall specifically include observation, supervision, and tests required in the Specifications.

- B. Testing: Provide testing in accordance with Section 01 45 23 - Testing and Inspecting Services.

1.07 SCHEDULE

- A. Dates: Work shall commence and be substantially completed as specified in the Contract Agreement.
- B. Schedule:
 - 1. Prepare a "Plan of Operations and Progress Schedule" to indicate the manner in which different phases of the Work are to be started, when Shop Drawings and submittals are to be submitted, colors selected, methods and speed for progressing different phase actions, and dates upon which subcontractors are dependent upon other sub-contracts. Schedule shall indicate major items of Work, including foundations, column footings, steel erection, floor finishes, underfloor plumbing and electrical Work, roof mounted HVAC equipment, concrete floor pours, partition Work, and date of Final Completion.
 - 2. Plan of Operations and Progress Schedule shall be "weighted" to schedule each trade in proportion to the entire Project, physically and financially.
 - 3. Revise schedule monthly to indicate actual progress compared to the estimated progress.
 - 4. Post schedule in the Contractor's field office and distribute copies to the Owner, Architect, Project Representative, and all prime Subcontractors.

1.09 PAYMENT

- A. Requests:
 - 1. On or before the tenth (10th) day of each month, the Contractor shall make application for payment in quadruplicate based on percentage of completion of items of cost breakdown.
 - 2. Each application after the first one shall be accompanied by waivers of lien and sworn statements that all labor, materials, and services included in the previous and prior statements have been paid, less only the retained percentage stated herein, and any disputed amounts which shall be stated. In addition, the Contractor shall request and file with the request for payment a sworn statement from each Subcontractor that the Contractor has direct contractual relations with.

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- B. Payment: The Owner shall make payments on account of each contract as provided herein. Within thirty (30) days after submission and approval of the application for payment the Owner will pay ninety (90) percent of the value except as may be modified as follows, based on the Contract prices, including executed change orders amending the Contract, on labor and materials incorporated in the Work, and material suitably stored at the site up to the first day of that month as certified by the Architect, less the aggregate of the previous payments.
- C. Retained Percentage:
1. Ten (10) percent of the estimated amounts shall be retained until the final completion and acceptance of all Work covered by the Contract.
 2. The retained percentage shall be paid thirty (30) days after Owner's acceptance of the building, providing that all requirements of the Contract are met. Refer to Closing Procedure.
- D. Substantial Completion Payment: Upon issuance of Certificate of Substantial Completion, a sum shall be paid sufficient to increase the payments to the total of the Contract, less the retained percentage.
- E. Final Certificate:
1. After the Contractor has complied with the closing requirements specified herein, and provided the Architect with appropriate documentation, the Architect shall certify such, issuing a Final Certificate.
 2. Issuance of such Certificate does not relieve the Contractor of the responsibilities related to guaranteeing the performance of the facility, as specified herein or otherwise provided.

1.10 CLEANING

- A. Keep the premises free from accumulation of waste materials or rubbish caused by Work operations at all times. At the completion of the Work remove all waste materials and rubbish from and about the Project, as well as all tools, construction equipment, machinery, and surplus materials.
- B. Establish and enforce a daily system for collecting and disposing waste materials from construction areas and elsewhere at Project site. Do not hold collected materials at site for more than three (3) days. Handle hazardous, dangerous, unsanitary, contaminating, pollution and similar harmful wastes separately from inert materials by containerizing in an appropriate manner. Dispose of each category of waste material in a lawful manner. Do not bury or burn waste materials on Owner's property.

1.10 CLOSING PROCEDURES

A. Financial:

1. Furnish ample evidence to Architect and Owner that all financial obligations have been met, including sworn statements and final waivers of lien.
2. Obtain a written statement releasing the Owner and the Architect from any and all obligations which might arise out of any unpaid, defaulted, or otherwise unsatisfied accounts.

B. Punch List:

1. Complete and correct all items on the Punch List as originally issued, and amended.
2. If contemplating application for final payment, schedule a joint inspection visit to the Project with the Architect one (1) week in advance to determine if the Contracts have been fully executed.

C. Record Drawings: Deliver not less than three (3) sets of documents to the office of the Architect.

D. Warranties and Guarantees:

1. Submit all written warranties and guarantees.
2. Submit as applicable, list of contacts, including company name, personal contact, address, telephone number, and e-mail address for building equipment and components which may require periodic service, including roofing, power actuated doors, mechanical equipment, fire protection, plumbing, and electrical equipment.

C. Other Documents:

1. Furnish reports of all tests and the performance of completed systems, as required in the Specifications, and all certificates of approval.
2. Furnish all schedules, instructions, and equipment operation and service manuals as necessary to ensure safe and proper operation and maintenance of products installed in the building.

E. Final Certificate: Issuance of Final Certificate does not relieve the Contractors of the responsibilities related to warranting and guarantying the performance of the Work.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 – EXECUTION (NOT APPLICABLE)

END OF SECTION

SECTION 01 25 00
SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2. SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.
- B. Related Requirements:
 - 1. Section 01 23 00 "Alternates" for products selected under an alternate.
 - 2. Section 016000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.3 DEFINITIONS

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

1.4 ACTION SUBMITTALS

- A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Substitution Request Form: Use Industry Standard Form.

2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
 - b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
 - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. Certificates and qualification data, where applicable or requested.
 - g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
 - h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES, NFPA, and related codes adopted by the City of Edinburg.
 - j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.

- k. Cost information, including a proposal of change, if any, in the Contract Sum.
 - l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
 - m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor through Construction Manager of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
- a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
 - b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

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

1.6 PROCEDURES

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

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 10 days prior to time required for preparation and review of related submittals.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - b. Substitution request is fully documented and properly submitted.
 - c. Requested substitution will not adversely affect Contractor's construction schedule.
 - d. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - e. Requested substitution is compatible with other portions of the Work.
 - f. Requested substitution has been coordinated with other portions of the Work.
 - g. Requested substitution provides specified warranty.
 - h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- B. Substitutions for Convenience: Not allowed unless otherwise indicated.
- C. Substitutions for Convenience: Architect will consider requests for substitution if received within 30 days after commencement of the Work. Requests received after that time may be considered or rejected at discretion of Architect.
 1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 - a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and

evaluation services, increased cost of other construction by Owner, and similar considerations.

- b. Requested substitution does not require extensive revisions to the Contract Documents.
- c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
- d. Substitution request is fully documented and properly submitted.
- e. Requested substitution will not adversely affect Contractor's construction schedule.
- f. Requested substitution has received necessary approvals of authorities having jurisdiction.
- g. Requested substitution is compatible with other portions of the Work.
- h. Requested substitution has been coordinated with other portions of the Work.
- i. Requested substitution provides specified warranty.
- j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 30 00
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Coordination and project conditions.
- B. Field engineering.
- C. Pre-construction meeting.
- D. Site mobilization meeting.
- E. Progress meetings.
- F. Pre-installation meetings.
- G. Equipment electrical characteristics and components.
- H. Cutting and patching.
- I. Special procedures.

1.2 COORDINATION AND PROJECT CONDITIONS

- A. Coordinate scheduling, submittals, and Work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
- B. Verify utility requirements and characteristics of operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- C. Coordinate space requirements, supports, and installation of mechanical and electrical work, which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- D. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
- E. Coordinate completion and clean up of Work of separate sections in preparation for Substantial Completion and for portions of Work designated for Owner's occupancy.

- F. After Owner occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

1.3 FIELD ENGINEERING

- A. Employ a Land Surveyor registered in the State of project and acceptable to Architect/Engineer.
- B. Contractor shall locate and protect survey control and reference points. Promptly notify Architect/Engineer of any discrepancies discovered.
- C. Control datum for survey is that established by Owner provided survey.
- D. Verify set-backs and easements; confirm drawing dimensions and elevations.
- E. Provide field engineering services. Establish elevations, lines, and levels, utilizing recognized engineering survey practices.
- F. Submit a copy of site drawing and certificate signed by the Land Surveyor that the elevations and locations of the Work are in conformance with the Contract Documents.
- G. Maintain a complete and accurate log of control and survey work as it progresses.
- H. On completion of foundation walls and major site improvements, prepare a certified survey illustrating dimensions, locations, angles, and elevations of construction and site work.
- I. Protect survey control points prior to starting site work; preserve permanent reference points during construction.
- J. Promptly report to Architect/Engineer the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.
- K. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect/Engineer.

1.4 PRECONSTRUCTION MEETING

- A. Owner and Architect/Engineer will schedule a meeting after Notice of Award.
- B. Attendance Required: Owner, Architect/Engineer, and Contractor.

- C. Agenda:
 - 1. Execution of Owner-Contractor Agreement.
 - 2. Submission of executed bonds and insurance certificates.
 - 3. Distribution of Contract Documents.
 - 4. Submission of list of Subcontractors, list of products, schedule of values, and progress schedule.
 - 5. Designation of personnel representing the parties in Contract, Owner and the Architect/Engineer.
 - 6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
 - 7. Scheduling.
 - 8. Scheduling activities of a Geotechnical Engineer.
- D. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect/Engineer, Owner, participants, and those affected by decisions made.

1.5 SITE MOBILIZATION MEETING

- A. Architect/Engineer and Owner will schedule a meeting at the Project site prior to Contractor occupancy.
- B. Attendance Required: Owner, Architect/Engineer, Special Consultants, Contractor, Contractor's Superintendent, and major Subcontractors.
- C. Agenda:
 - 1. Use of premises by Owner and Contractor.
 - 2. Owner's requirements.
 - 3. Construction facilities and controls provided by Owner.
 - 4. Temporary utilities provided by Owner.
 - 5. Survey and building layout.

6. Security and housekeeping procedures.
 7. Schedules.
 8. Application for payment procedures.
 9. Procedures for testing.
 10. Procedures for maintaining record documents.
 11. Requirements for start-up of equipment.
 12. Inspection and acceptance of equipment put into service during construction period.
- D. Record minutes and distributes copies within two days after meeting to participants, with two copies to Architect/Engineer, Owner, participants, and those affected by decisions made.

1.6 PROGRESS MEETINGS

- A. Schedule and administer meetings throughout progress of the Work at maximum monthly intervals.
- B. Contractor shall coordinate with Architect/Engineer arrangements for meetings, prepare agenda with copies for participants, and preside at meetings.
- C. Attendance Required: Job superintendent, major subcontractors and suppliers, Owner, Architect/Engineer, as appropriate to agenda topics for each meeting.
- D. Agenda:
 1. Review minutes of previous meetings.
 2. Review of work progress.
 3. Field observations, problems, and decisions.
 4. Identification of problems, which impede planned progress.
 5. Review of submittals schedule and status of submittals.
 6. Review of off-site fabrication and delivery schedules.
 7. Maintenance of progress schedule.

8. Corrective measures to regain projected schedules.
 9. Planned progress during succeeding work period.
 10. Coordination of projected progress.
 11. Maintenance of quality and work standards.
 12. Effect of proposed changes on progress schedule and coordination.
 13. Other business relating to Work.
- E. Record minutes and distributes copies within two days after meeting to participants, with two copies to Architect/Engineer, Owner, participants, and those affected by decisions made.

1.7 PREINSTALLATION MEETING

- A. When required in individual specification sections, convene a pre-installation meeting at the site prior to commencing work of the section.
- B. Require attendance of parties directly affecting, or affected by, Work of the specific section.
- C. Notify Architect/Engineer seven days in advance of meeting date.
- D. Prepare agenda and preside at meeting:
 1. Review conditions of installation, preparation and installation procedures.
 2. Review coordination with related work.
- E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect/Engineer, Owner, participants, and those affected by decisions made.

PART 2 PRODUCTS

2.1 EQUIPMENT ELECTRICAL CHARACTERISTICS AND COMPONENTS

- A. Motors: Specific motor type is specified in individual specification sections.
- B. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Include lugs for terminal box.

- C. Cord and Plug: Provide minimum 6 foot cord and plug including grounding connector for connection to electric wiring system. Cord of longer length is specified in individual specification sections.

PART 3 EXECUTION

3.1 CUTTING AND PATCHING

- A. Employ skilled and experienced installer to perform cutting and patching.
- B. Submit written request in advance of cutting or altering elements which affect:
 - 1. Structural integrity of element.
 - 2. Integrity of weather-exposed or moisture-resistant elements.
 - 3. Efficiency, maintenance, or safety of element.
 - 4. Visual qualities of sight exposed elements.
 - 5. Work of Owner or separate contractor.
- C. 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 or correct 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.
- D. Execute work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.
- E. Cut masonry and concrete materials using masonry saw or core drill.
- F. Restore Work with new products in accordance with requirements of Contract Documents.
- G. Fit Work tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

- H. Maintain integrity of wall, ceiling, or floor construction; completely seal voids.
- I. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with applicable codes, to full thickness of the penetrated element.
- J. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for an assembly, refinish entire unit.
- K. Identify hazardous substances or conditions exposed during the Work to the Architect/Engineer for decision or remedy.

3.2 SPECIAL PROCEDURES

- A. Materials: As specified in product sections; match existing with new products and salvaged products for patching and extending work.
- B. Employ skilled and experienced installer to perform alteration work.
- C. Cut, move, or remove items as necessary for access to alterations and renovation Work. Replace and restore at completion.
- D. Remove unsuitable material not marked for salvage, such as rotted wood, corroded metals, and deteriorated masonry and concrete. Replace materials as specified for finished Work.
- E. Remove debris and abandoned items from area and from concealed spaces.
- F. Prepare surface and remove surface finishes to provide for proper installation of new work and finishes.
- G. Close openings in exterior surfaces to protect existing work from weather and extremes of temperature and humidity.
- H. Remove, cut, and patch Work in a manner to minimize damage and to provide means of restoring products and finishes to specified condition.
- I. Refinish existing visible surfaces to remain in renovated rooms and spaces, to specified condition for each material, with a neat transition to adjacent finishes.
- J. Where new Work abuts or aligns with existing, provide a smooth and even transition. Patch Work to match existing adjacent Work in texture and appearance.
- K. When finished surfaces are cut so that a smooth transition with new Work is not possible, terminate existing surface along a straight line at a natural line of division and submit recommendation to Architect/Engineer for review.

- L. Where a change of plane of $\frac{1}{4}$ inch or more occurs, submit recommendation for providing a smooth transition to Architect/Engineer for review.
- M. Trim existing doors as necessary to clear new floor finish. Refinish trim as required.
- N. Patch or replace portions of existing surfaces, which are damaged, lifted, discolored, or showing other imperfections.
- O. Finish surfaces as specified in individual product sections.

END OF SECTION

SECTION 01 31 00
PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. General coordination procedures.
 - 2. Coordination drawings.
 - 3. Requests for Information (RFIs).
 - 4. Project Web site.
 - 5. Project meetings.
- B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.
- C. Related Requirements:
 - 1. Section 01 15 00 "Contract Standards and Procedures" for preparing and submitting Contractor's construction schedule.
 - 2. Section 01 73 00 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
 - 3. Section 01 70 00 "Project Closeout" for coordinating closeout of the Contract.

1.3 DEFINITIONS

- A. RFI: Request from Owner, Construction Manager, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

- A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
1. Name, address, and telephone number of entity performing subcontract or supplying products.
 2. Number and title of related Specification Section(s) covered by subcontract.
 3. Drawing number and detail references, as appropriate, covered by subcontract.
- B. Key Personnel Names: Within 10 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.
1. Post copies of list in project meeting room, in temporary field office, on Project Web site, and by each temporary telephone. Keep list current at all times.

1.5 GENERAL COORDINATION PROCEDURES

- A. Coordination: Each contractor shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each contractor shall coordinate its operations with operations, included in different Sections that depend on each other for proper installation, connection, and operation.
1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 2. Coordinate installation of different components with other contractors to ensure maximum performance and accessibility for required maintenance, service, and repair.
 3. Make adequate provisions to accommodate items scheduled for later installation.

- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
 - 1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
 - 1. Preparation of Contractor's construction schedule.
 - 2. Preparation of the schedule of values.
 - 3. Installation and removal of temporary facilities and controls.
 - 4. Delivery and processing of submittals.
 - 5. Progress meetings.
 - 6. Preinstallation conferences.
 - 7. Project closeout activities.
 - 8. Startup and adjustment of systems.
- D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
 - 1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

1.6 COORDINATION DRAWINGS

- A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.

1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
 - a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
 - b. Coordinate the addition of trade-specific information to the coordination drawings by multiple contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
 - c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
 - e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
 - f. Indicate required installation sequences.
 - g. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
- B. Coordination Drawing Organization: Organize coordination drawings as follows:
 1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
 2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings. Indicate areas of conflict between light fixtures and other components.

3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Mechanical and Plumbing Work: Show the following:
 - a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
 - b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
 - c. Fire-rated enclosures around ductwork.
7. Electrical Work: Show the following:
 - a. Runs of vertical and horizontal conduit 1-1/4 inches in diameter and larger.
 - b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
 - c. Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.
 - d. Location of pull boxes and junction boxes dimensioned from column center lines.
8. Fire-Protection System: Show the following:
 - a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.
9. Review: Architect will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are

not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make changes as directed and resubmit.

10. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Section 01 33 00 "Submittal Procedures."

1.7 REQUESTS FOR INFORMATION (RFIs)

- A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.

1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

1. Project name.
2. Project number.
3. Date.
4. Name of Contractor.
5. Name of Architect and Construction Manager.
6. RFI number, numbered sequentially.
7. RFI subject.
8. Specification Section number and title and related paragraphs, as appropriate.
9. Drawing number and detail references, as appropriate.
10. Field dimensions and conditions, as appropriate.
11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.

12. Contractor's signature.
 13. 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 and Construction Manager's Action: Architect and Construction Manager will review each RFI, determine action required, and respond. Allow seven working days for Architect's response for each RFI. RFIs received by Architect or Construction Manager 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 of additional information.
 3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 012600 "Contract Modification Procedures."
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect and Construction Manager in writing within 10 days of receipt of the RFI response.

- D. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly Include the following:
 - 1. Project name.
 - 2. Name and address of Contractor.
 - 3. Name and address of Architect and Construction Manager.
 - 4. RFI number including RFIs that were returned without action or withdrawn.
 - 5. RFI description.
 - 6. Date the RFI was submitted.
 - 7. Date Architect's and Construction Manager's response was received.
- E. On receipt of Architect's and Construction Manager's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect and Construction Manager within seven days if Contractor disagrees with response.
 - 1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
 - 2. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

1.8 PROJECT WEB SITE

- A. Use Architect's Project Web site for purposes of hosting and managing project communication and documentation until Final Completion when file size surpasses e-mail max attachment limit, and when otherwise directed by Architect.
- B. Contractor, subcontractors, and other parties granted access by Contractor to Project Web site shall execute a data licensing agreement in the form of Agreement acceptable to Owner and Architect.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 32 33
PHOTOGRAPHIC DOCUMENTATION

The requirements of the "General Conditions", the "Supplementary Conditions", and "Division 1" sections of the Specifications, shall apply to this section of the specifications.

PART 1 - GENERAL

1.01 SCOPE

- A. This Section includes administrative and procedural requirements for the following:
 - 1. Preconstruction photographs.
 - 2. Periodic construction photographs.
 - 3. Final Completion construction photographs.

1.02 SUBMITTALS

- A. Construction Photographs: Submit digital photographs 14 days of taking photographs and digital copies with the monthly application for payment.
 - 1. Format: 3x5 inch smooth-surface matte prints on single-weight commercial-grade photographic paper, enclosed back to back in clear plastic sleeves that are punched for standard 3-ring binder.
 - 2. Identification: On back of each print, provide an applied label or rubber-stamped impression with the following information:
 - a. Name of Project.
 - b. Name and address of photographer.
 - c. Name of Architect.
 - d. Name of Contractor.
 - e. Date photograph was taken if not date stamped by camera.
 - f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
 - g. Unique sequential identifier.

3. Digital Images: Submit a complete set of digital image electronic files with each submittal of prints on CD-ROM. Identify electronic media with date photographs were taken. Submit images that have same aspect ratio as the sensor, uncropped.

PART 2 - PRODUCTS

2.01 PHOTOGRAPHIC MEDIA

- A. Digital Images: Provide images in uncompressed TIFF format, produced by a digital camera with minimum sensor size of 4.0 megapixels, and at an image resolution of not less than 1024 by 768 pixels.

PART 3 - EXECUTION

3.01 CONSTRUCTION PHOTOGRAPHS

- A. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.
 1. Maintain key plan with each set of construction photographs that identifies each photographic location.
- B. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
 1. Date and Time: Include date and time in filename for each image.
 2. Field Office Images: Maintain one set of images on CD-ROM in the field office at Project site, available at all times for reference. Identify images same as for those submitted to Architect.
- C. Pre-construction Photographs: Before commencement of construction the contractor shall document in digital photographs the project site and surrounding properties, including existing items to remain during construction, from different vantage points.
 1. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.
- D. Periodic Construction Photographs: Take color, digital photographs monthly, coinciding with timing each month adjusted to coincide with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.

- E. Final Completion Construction Photographs: Take ten color photographs after date of Substantial Completion for submission as Project Record Documents. Architect will direct photographer for desired vantage points.
 - 1. Do not include date stamp.
- F. Additional Photographs: Architect may issue requests for additional photographs, in addition to periodic photographs specified.
 - 1. Three days' notice will be given, where feasible.
 - 2. In emergency situations, take additional photographs within 24 hours of request.
 - 3. Circumstances that could require additional photographs include, but are not limited to, the following:
 - a. Special events planned at Project site.
 - b. Immediate follow-up when on-site events result in construction damage or losses.
 - c. Photographs to be taken at fabrication locations away from Project site. These photographs are not subject to unit prices or unit-cost allowances.
 - d. Substantial Completion of a major phase or component of the Work.
 - e. Extra record photographs at time of final acceptance.
 - f. Owner's request for special publicity photographs.

END OF SECTION

SECTION 01 33 00
SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. Related Requirements:
 - 1. Section 01 29 00 "Payment Procedures" for submitting Applications for Payment and the schedule of values.

1.3 DEFINITIONS

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

1.4 ACTION SUBMITTALS

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

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Architect's Digital Data Files: Electronic digital data files of the Contract Drawings will not be provided by Architect for Contractor's use in preparing submittals.
1. Architect will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings and Project record drawings.
 - a. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
 - b. Digital Drawing Software Program: The Contract Drawings are available in PDF drawings.
 - c. Contractor shall execute a data licensing agreement in the form of Agreement form acceptable to Owner and Architect.
 - d. Digital data drawing files will be made available in PDF Format.

- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
- a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on 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 15 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. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 3. Resubmittal Review: Allow 15 days for review of each resubmittal.
 4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.
 5. Insert list of submittals requiring sequential review in first subparagraph below, or delete and identify submittals in Sections where they are specified. Structural, HVAC, plumbing, and electrical components are examples of the Work that often require sequential review.
 6. Allowing procedure in "Concurrent Consultant Review" Subparagraph below may cause tracking problems for Architect and Construction Manager, if any. Delete if not allowed. See Evaluations.
 7. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow 15 days for review of each submittal. Submittal will be returned to Architect before being returned to Contractor.
- D. Paper Submittals: Place a permanent label or title block on each submittal item for identification.
1. Indicate name of firm or entity that prepared each submittal on label or title block.
 2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
 3. Include the following information for processing and recording action taken:

- a. Project name.
 - b. Date.
 - c. Name of Architect.
 - d. Name of Construction Manager.
 - e. Name of Contractor.
 - f. Name of subcontractor.
 - g. Name of supplier.
 - h. Name of manufacturer.
 - i. Submittal number or other unique identifier, including revision identifier.
 - 1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).
 - j. Number and title of appropriate Specification Section.
 - k. Drawing number and detail references, as appropriate.
 - l. Location(s) where product is to be installed, as appropriate.
 - m. Other necessary identification.
4. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
- a. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect.
5. Transmittal for Paper Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will return without review submittals received from sources other than Contractor.
- a. Transmittal Form for Paper Submittals: Use AIA Document G810.
 - b. Transmittal Form for Paper Submittals: Provide locations on form for the following information:
 - 1) Project name.
 - 2) Date.
 - 3) Destination (To:).
 - 4) Source (From:).
 - 5) Name and address of Architect.
 - 6) Name of Construction Manager.
 - 7) Name of Contractor.
 - 8) Name of firm or entity that prepared submittal.
 - 9) Names of subcontractor, manufacturer, and supplier.
 - 10) Category and type of submittal.
 - 11) Submittal purpose and description.
 - 12) Specification Section number and title.
 - 13) Specification paragraph number or drawing designation and generic name for each of multiple items.

- 14) Drawing number and detail references, as appropriate.
- 15) Indication of full or partial submittal.
- 16) Transmittal number, numbered consecutively.
- 17) Submittal and transmittal distribution record.
- 18) Remarks.
- 19) Signature of transmitter.

E. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:

1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
2. Name file with submittal number or other unique identifier, including revision identifier.
 - a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-061000.01.A).
3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.
4. Transmittal Form for Electronic Submittals: Use electronic form acceptable to Owner, containing the following information:
 - a. Project name.
 - b. Date.
 - c. Name and address of Architect.
 - d. Name of Construction Manager.
 - e. Name of Contractor.
 - f. Name of firm or entity that prepared submittal.
 - g. Names of subcontractor, manufacturer, and supplier.
 - h. Category and type of submittal.
 - i. Submittal purpose and description.
 - j. Specification Section number and title.
 - k. Specification paragraph number or drawing designation and generic name for each of multiple items.
 - l. Drawing number and detail references, as appropriate.
 - m. Location(s) where product is to be installed, as appropriate.
 - n. Related physical samples submitted directly.
 - o. Indication of full or partial submittal.
 - p. Transmittal number, numbered consecutively.
 - q. Submittal and transmittal distribution record.
 - r. Other necessary identification.
 - s. Remarks.
5. Metadata: Include the following information as keywords in the electronic submittal file metadata:

- a. Project name.
 - b. Number and title of appropriate Specification Section.
 - c. Manufacturer name.
 - d. Product name.
- F. Options: Identify options requiring selection by Architect.
- G. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.
- H. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
 - 1. Note date and content of previous submittal.
 - 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
 - 3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.
- I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- J. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

- A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
 - 1. Post electronic submittals as PDF electronic files directly to Architect's FTP site specifically established for Project.
 - a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
 - 2. Submit electronic submittals via email as PDF electronic files.
 - a. Architect, will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.

3. Action Submittals: Submit submittals in PDF Format or three paper copies of each submittal unless otherwise indicated. Architect will return two copies.
 4. Informational Submittals: Submit in PDF Format or submit two paper copies of each submittal unless otherwise indicated. Architect will not return copies.
 5. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
 - a. Provide a digital signature with digital certificate on electronically submitted certificates and certifications where indicated.
 - b. Provide a notarized statement on original paper copy certificates and certifications where indicated.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
 2. Mark each copy of each submittal to show which products and options are applicable.
 3. Include the following information, as applicable:
 - a. Manufacturer's catalog cuts.
 - b. Manufacturer's product specifications.
 - c. Standard color charts.
 - d. Statement of compliance with specified referenced standards.
 - e. Testing by recognized testing agency.
 - f. Application of testing agency labels and seals.
 - g. Notation of coordination requirements.
 - h. Availability and delivery time information.
 4. For equipment, include the following in addition to the above, as applicable:
 - a. Wiring diagrams showing factory-installed wiring.
 - b. Printed performance curves.
 - c. Operational range diagrams.
 - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
 5. Submit Product Data before or concurrent with Samples.
 6. Submit Product Data in the following format:
 - a. PDF electronic file.
 - b. Three paper copies of Product Data unless otherwise indicated. Architect will return two copies.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data, unless submittal based on Architect's digital data drawing files is otherwise permitted.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Identification of products.
 - b. Schedules.
 - c. Compliance with specified standards.
 - d. Notation of coordination requirements.
 - e. Notation of dimensions established by field measurement.
 - f. Relationship and attachment to adjoining construction clearly indicated.
 - g. Seal and signature of professional engineer if specified.
 2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches, but no larger than 30 by 42 inches.
 3. Submit Shop Drawings in the following format:
 - a. PDF electronic file.
 - b. Two opaque (bond) copies of each submittal. Architect, will return one copy(ies).
 - c. Three opaque copies of each submittal. Architect will retain two copies; remainder will be returned.
 4. BIM File Incorporation: Develop and incorporate Construction Manager will incorporate Contractor's Shop Drawing files into Building Information Model established for Project.
 - a. Prepare Shop Drawings in the following format: Same digital data software program, version, and operating system as the original Drawings.
 - b. Refer to Section 013100 "Project Management and Coordination" for requirements for coordination drawings.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 2. Identification: Attach label on unexposed side of Samples that includes the following:
 - a. Generic description of Sample.
 - b. Product name and name of manufacturer.
 - c. Sample source.
 - d. Number and title of applicable Specification Section.
 - e. Specification paragraph number and generic name of each item.
 3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
 4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

- a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
- 5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit one full set(s) 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.
- 6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - a. Number of Samples: Submit three sets of Samples. Architect will retain two Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a project record sample.
 - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
 - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.
- E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
 - 1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
 - 2. Manufacturer and product name, and model number if applicable.
 - 3. Number and name of room or space.
 - 4. Location within room or space.
 - 5. Submit product schedule in the following format:
 - a. PDF electronic file.
 - b. Three paper copies of product schedule or list unless otherwise indicated. Architect will return two copies.

- F. Coordination Drawing Submittals: Comply with requirements specified in Section 013100 "Project Management and Coordination."
- G. Contractor's Construction Schedule: Comply with requirements specified in Section 013200 "Construction Progress Documentation."
- H. Application for Payment and Schedule of Values: Comply with requirements specified in Section 012900 "Payment Procedures."
- I. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 014000 "Quality Requirements."
- J. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 017000 "Project Closeout."
- K. Maintenance Data: Comply with requirements specified in Section 017823 "Operation and Maintenance Data."
- L. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- M. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.
- N. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- O. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- P. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- Q. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- R. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- S. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

- T. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
 - 1. Name of evaluation organization.
 - 2. Date of evaluation.
 - 3. Time period when report is in effect.
 - 4. Product and manufacturers' names.
 - 5. Description of product.
 - 6. Test procedures and results.
 - 7. Limitations of use.

- U. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

- V. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

- W. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

- X. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

2.2 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file and three paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

- C. BIM File Incorporation: Construction Manager will incorporate delegated-design drawing and data files into Building Information Model established for Project.
 - 1. Prepare delegated-design drawings in the following format: Same digital data software program, version, and operating system as the original Drawings.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

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

3.2 ARCHITECT'S ACTION

- A. Action Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.
- B. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- E. Submittals not required by the Contract Documents may be returned by the Architect without action.

END OF SECTION

SECTION 01 33 23
SHOP DRAWINGS AND SAMPLES

The requirements of the "General Conditions", the "Supplementary Conditions", and "Division 1" sections of the Specifications, shall apply to this section of the Specifications.

PART 1 - GENERAL

1.01 SUBMITTALS

- A. Summary Listing and Schedule: General Contractor shall prepare a summary listing and schedule for submission of Shop Drawings, Samples, and Product Data to the Architect for review of the various items of Work. Schedule shall allow approximately two (2) calendar weeks or ten (10) working days for review; however, this may vary depending upon the quantity of the material submitted. Schedule shall also allow time for submission of Shop Drawings, Samples, and Brochures which may not be approved.
- B. Substitution Requests: Submit a PDF digital copy of each request for consideration. Identify product or fabrication or installation method to be replaced. Include specification section number and title and drawing numbers and titles.
 - 1. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
 - b. Coordination information, including a list of changes or revisions needed to other parts of the work and to construction performed by owner and separate contractors that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of signification qualities of proposed substitution with those of the work specified. Include annotated copy of applicable specification section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirement included. Indicate deviations, if any, from the work specified.
 - d. Product Data, including drawings and descriptions of product and fabrications and installation procedures.
 - e. Samples, where applicable or requested.
 - f. Certificates and qualification data, where applicable or requested.

- g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - h. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the work, including effect on overall contract time. If specified product or method of construction cannot be provided within contract time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
 - i. Cost information, including a proposal of change, if any, in contract sum.
 - j. Contractor's certification except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
 - k. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor through General Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
- a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the work.
 - b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.
 - c. Conditions of Acceptance: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 - (1) Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.

- (2) Requested substitution does not require extensive revisions to the contract documents.
- (3) Requested substitution is consistent with the contract documents and will produce indicated results.
- (4) Substitution request is fully documented and properly submitted.
- (5) Requested substitution will not adversely affect Contractor's construction schedule.
- (6) Requested Substitution has received necessary approvals of authorities having jurisdiction.
- (7) Requested Substitution is compatible and has been coordinated with other portions of the work.
- (8) Requested Substitution provides specified warranty.
- (9) If requested Substitution involves more than one contractor, requested substitution has been coordinated with other products, and is acceptable to all contractors involved.

C. Submittals: Each Subcontractor shall submit through the General Contractor, to the Architect at proper times, all Shop Drawings, Product Data, and setting diagrams which the Architect may deem necessary to illustrate the Work intended or show its relation to Work of other trades. Shop Drawings and Product Data shall contain manufacturer's name, material description, sizes and dimensions, and other pertinent information. All submittals, including resubmittals, shall have Product Data identifying the materials to be supplied by circling or denoting the intended materials on the Product Data sheets.

1. Prohibited Submittals: Contractors shall not duplicate Design/Working Drawings for use as Shop Drawings. Duplicated Drawings of this nature shall be rejected.
2. Required Information: Include in submittals sufficient drawings, plans, elevations, sections, performance data, dimensions, bolt locations, inserts, sound data, weights and schematics to clearly describe the equipment and to show compliance with the Specifications. Provide a cover or title sheet for each submittal containing the following:
 - a. Name of Contractor originating the submittal.
 - b. Name of Project for which the submittal is made.
 - c. An index of all items submitted.

- d. Identification of each item of material and equipment.
 - e. Date of submittal.
 - f. Contractor's certification.
- D. Deviations: Any and all deviations from the Specifications and/or Drawings must be brought to the Architect's attention by circling all items submitted for review.
- E. Identification: Shop Drawing submittals and transmittal letters shall be identified with title and location of Project, names of the Architect, the Contractor, and the submission date.
- F. Compliance Review: All Shop Drawings and Product Data submitted to the Architect shall be stamped by the General Contractor to indicate that the submittal has been reviewed for compliance with the Contract Documents, coordination between other Trade Work, and related details.
- G. Reimbursement of Architect's Costs:
 - 1. In the event substitutions are proposed to the Architect after the Contract has been awarded, the Architect will record all time used by the Architect and the Architect's consultants in evaluation of each proposed substitution.
 - 2. Whether or not the Architect approves a proposed substitution, the Contractor shall promptly upon receipt of the Architect's billing, reimburse the Architect at the rate of two and three-quarter (2-3/4) times the direct cost of the Architect and the Architect's consultants for all time spent in evaluating the proposed substitution.
- H. Architectural and Structural Shop Drawings: The General Contractor shall submit to the Architect, for review a PDF digital copy of each drawing.
 - 1. If the Shop Drawings are returned "Revise & Resubmit", the effected Contractor shall correct the original Drawings and resubmit the Shop Drawings as originally required, i.e., PDF digital copy to the Architect for review, file, and distribution.
 - 2. Submit PDF digital copies of Product Data such as catalog cuts and brochures.
- I. Mechanical and Electrical Shop Drawings: Submit for review PDF digital copy of all equipment and products in a brochure type format.
- J. Required Shop Drawings: Shop Drawings are required for, but are not necessarily limited to the items as required by the Drawings and/or Specifications within the Project Manual.

K. Review of Shop Drawings:

1. It shall be distinctly understood that the review of Shop Drawings shall be for General Scheme only. Review does not relieve the Contractor from the necessity of correcting, without charge, details on the Drawings and completed Work found deficient in strength or otherwise faulty.
2. The Architect assumes no responsibility for "figured dimensions" of Shop Drawings.
3. The review of Shop Drawings does not relieve or modify the responsibility for compliance with the Contract Documents or dimensions or errors contained in the submittal or quantity count. It is clearly understood that in the review process, noting of some discrepancies, but overlooking others, does not grant the Contractor permission to proceed in error. Regardless of any information contained in the Shop Drawings, layout drawings, catalog data and brochures, the Contract Documents govern the Work, and are neither waived nor suspended in any way by the review of Shop Drawings, layout drawings, catalog data and brochures.
4. Upon completion of the Project the Owner shall be given one (1) set of reviewed Shop Drawings.

- L. Authorization: Unless specifically otherwise required by the Architect and the Owner, no materials shall be ordered, delivered, fabricated, or erected until the proper written review by the Architect has been received by the General Contractor.

1.02 SAMPLES AND LETTERS OF INTENT

- A. Summary Listing: General Contractor shall prepare a summary listing of the Samples and Letters of Intent submittal requirements for review by the Architect and the Owner's Supervising Engineer.
- B. Material Samples and Letters of Intent: Samples and Letters of Intent as listed and requested in the respective trade Specifications enumerate, but do not necessarily limit, the material Samples or Letters of Intent indicating materials, specifications, and/or installation procedures, which shall be submitted for approval PRIOR to purchase or installation of materials. All material Samples shall be reviewed by the Architect, and/or Owner PRIOR to erection or fabrication.
- C. Samples: Submit to Architect for review, four (4) actual Samples of all materials to be used in the Work. All Samples shall have the same finish as that to be used in the completed Work. Manufacturer's color charts and/or color swatches shall not be acceptable as Samples. Samples shall be accompanied by a letter requesting approval and presenting all required data.

- D. Materials: All materials furnished shall be fully equal to the reviewed Samples.
- E. Selections: Where the choice of more than one make or style of article or material is specified, the final selection of the article or material shall be made by the Owner.
- F. Quality, Fitness, and Workmanship: The quality or fitness of materials or workmanship shall be based on the requirements that all Work done or materials furnished shall be first class in every respect, and what is usual or customary on other projects shall in no way enter into any consideration or decision.
- G. Differences in Price: Where any difference occurs in price of such articles or materials, such differences are to be given before the Contracts are signed. After the Contracts have been signed, the Owner reserves the right to choose whichever article or material the Owner desires, assuming, unless previously advised to the contrary, the price is not changed thereby. Where the Specifications require a specific item "equal or comparable products" or other words to that effect, the final selection will be by the Owner.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION

SECTION 01 40 00
QUALITY REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Quality control and control of installation.
- B. Tolerances
- C. References.
- D. Mock-up requirements.
- E. Testing and inspection services.
- F. Manufacturers' field services.
- G. Examination.
- H. Preparation.

1.2 QUALITY CONTROL AND CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.
- D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Perform Work by persons qualified to produce required and specified quality.
- F. Verify that field measurements are as indicated on Shop Drawings or as instructed by the manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

1.3 TOLERANCES

- A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

1.4 REFERENCES

- A. For products or workmanship specified by association, trades, or other consensus standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard by date of issue current on date of Contract Documents, except where a specific date is established by code.
- C. Obtain copies of standards where required by product specification sections.
- D. Should specified reference standards conflict with Contract Documents, request clarification from the Architect/Engineer before proceeding.
- E. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of the Architect/Engineer shall be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.5 MOCK-UP REQUIREMENTS

- A. Tests will be performed under provisions identified in this section and identified in the respective product specification sections.
- B. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.
- C. Accepted mock-ups shall be a comparison standard for the remaining Work.
- D. Where mock-up has been accepted by Architect/Engineer and is specified in product specification sections to be removed; remove mock-up and clear area when directed to do so by Architect/Engineer.

1.6 TESTING AND INSPECTION SERVICES

- A. Owner will employ services of an independent firm to perform testing and inspection. Contractor shall pay for services.
- B. The independent firm will perform tests, inspections and other services specified in individual specification sections and as required by the Architect/Engineer and Owner, or Authority having jurisdiction.
 - 1. Laboratory: Authorized to operate in location in which Project is located.
 - 2. Laboratory Staff: Maintain a full time specialist on staff to review services.
 - 3. Testing Equipment: Calibrated at reasonable intervals with devices of accuracy traceable to either National Bureau of Standards or accepted values of natural physical constants.
- C. Testing, inspections and source quality control may occur on or off the project site. Perform off-site testing as required by the Architect/Engineer or the Owner.
- D. Reports will be submitted by the independent firm to the Architect/Engineer and Contractor, in duplicate, indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents.
- E. Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested.
 - 1. Notify Architect/Engineer and independent firm 24 hours prior to expected time for operations requiring services.
 - 2. Make arrangements with independent firm and pay for additional samples and tests required for Contractor's use.
- F. Testing and employment of testing agency or laboratory shall not relieve Contractor of obligation to perform Work in accordance with requirements of Contract Documents.
- G. Re-testing or re-inspection required because of non-conformance to specified requirements shall be performed by the same independent firm on instructions by the Architect/Engineer. Payment for re-testing or re-inspection will be charged to the Contractor by deducting testing charges from the Contract Sum/Price.
- H. Agency Responsibilities:
 - 1. Test samples of mixes submitted by Contractor.
 - 2. Provide qualified personnel at site. Cooperate with Architect/Engineer and Contractor in performance of services.

3. Perform specified sampling and testing of products in accordance with specified standards.
 4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
 5. Promptly notify Architect/Engineer and Contractor of observed irregularities or non-conformance of Work or products.
 6. Perform additional tests required by Architect/Engineer.
 7. Attend preconstruction meetings and progress meetings.
- I. Agency Reports: After each test, promptly submit four copies of report to Architect/Engineer and to Contractor. When requested by Architect/Engineer, provide interpretation of test results. Include the following:
1. Date issued.
 2. Project title and number.
 3. Name of inspector.
 4. Date and time of sampling or inspection.
 5. Identification of product and specifications section.
 6. Location in the Project.
 7. Type of inspection or test.
 8. Date of test.
 9. Results of tests.
 10. Conformance with Contract Documents.
- J. Limits On Testing Authority:
1. Agency or laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.
 2. Agency or laboratory may not approve or accept any portion of the Work.
 3. Agency or laboratory may not assume any duties of Contractor.

4. Agency or laboratory has no authority to stop the Work.

1.7 MANUFACTURERS' FIELD SERVICES

- A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as applicable, and to initiate instructions when necessary.
- B. Submit qualifications of observer to Architect/Engineer 30 days in advance of required observations. Observer subject to approval of Architect/Engineer and Owner.
- C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.
- D. Refer to Section 01 33 0 - SUBMITTAL PROCEDURES, MANUFACTURERS' FIELD REPORTS article.

PART 2 PRODUCTS Not Used.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.
- B. Verify that existing substrate is capable of structural support or attachment of new Work being applied or attached.
- C. Examine and verify specific conditions described in individual specification sections.
- D. Verify that utility services are available, of the correct characteristics, and in the correct locations.

3.2 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

END OF SECTION

SECTION 01 45 23
TESTING AND INSPECTING SERVICES

The requirements of the "General Conditions", the "Supplementary Conditions", and "Division 1" sections of the Specifications, shall apply to this section of the Specifications.

PART 1 - GENERAL

1.01 SCOPE

A. Work Included:

1. Owner will obtain the services of an Independent Testing Laboratory to perform testing services for concrete, steel and other materials as required, specified or directed. The Testing Laboratory shall evaluate and approve all soils testing performed by the Project Soils Engineer.
2. Requirements for testing are described in various sections of the Specifications. Where no testing requirements are described, but the Owner determines that testing is required, the Owner may require testing to be performed under currently recognized standards for testing.

B. Related Work:

1. Selection of Testing Laboratory: The Owner will select and approve a qualified, unbiased, and recognized independent commercial testing agency.

1.02 CODES AND STANDARDS

- A. Testing, when required, shall be in accordance with all pertinent codes and regulations, and with selected ASTM International Standard Specifications.

1.03 TEST REPORTS AND RELATED INSTRUCTIONS

- A. Promptly process and distribute all required copies of test reports and related instructions to ensure all necessary retesting and/or replacement of materials with the least possible delay to progress of the Work.

1.04 PAYMENT FOR TESTING SERVICES

- A. Initial Services: The General Contractor is to pay for all Owner Selected initial testing services.

- B. Retesting: When the initial tests indicate non-compliance with Contract Documents, all subsequent retesting occasioned by the non-compliance shall be performed by the same agency, and the costs thereof will be paid by the General Contractor.

1.05 CODE COMPLIANCE TESTING

- A. Responsibility of Inspection and Testing: Inspection and testing required by laws, ordinances, rules, regulations, orders or approvals of public authorities or a legally constituted authority, shall be the responsibility of, and shall be paid for by the Contractor, unless otherwise provided in the Contract Documents.

1.06 TESTING LABORATORY DUTIES

- A. Cooperation: Cooperate with Architect/Engineer and Contractor; provide qualified personnel after due notice.
- B. Perform Specified Inspections, Sampling and Testing of Materials and Methods of Construction:
 - 1. Take all specimens and samples.
 - 2. Provide all sampling equipment and personnel.
 - 3. Make all deliveries of specimens and samples to the Testing Laboratory.
 - 4. Comply with specified standards.
 - 5. Ascertain compliance of materials, and Work, with requirements of Contract Documents.
- C. Irregularities and Deficiencies: Immediately notify Architect/Engineer, Owner's Supervising Engineer, and Contractor of observed irregularities or deficiencies of Work or products in the field or laboratory as a result of testing. All irregularities and deficiencies encountered shall not go unresolved. Testing reports submitted to Architect/Engineer shall be for file purposes only and shall include the resolution of these irregularities and/or deficiencies.
- D. Reports of Tests and Inspections: Promptly submit written report of each test and inspection; one (1) copy each to Owner's Supervising Engineer, Owner, and Contractor, and three (3) copies to Architect/Engineer. Each report shall include:
 - 1. Date issued.
 - 2. Detailed listing.

3. Project title and number.
 4. Testing Laboratory name, address and telephone number.
 5. Name and signature of laboratory inspector.
 6. Date and time of sampling or inspection.
 7. Record of temperature and weather conditions.
 8. Date of test.
 9. Identification of product and Specification section.
 10. Location of sample or test in the Project.
 11. Name of person taking sample or making test.
 12. Type of inspection or test.
 13. Results of tests and compliance with Contract Documents.
 14. Interpretation of test results, when requested by Architect/Engineer.
- E. Additional Tests: Perform additional tests as required by Architect/Engineer, Owner's Supervising Engineer, or Owner.
- F. Special Inspections: Submit "Statement of Special Inspections" and a certified written report of each special inspection, test or similar service; one (1) copy each to Owner's Supervising Engineer, Owner, and Contractor, and three (3) copies to Architect/Engineer. Submit additional copies of each report to governing authority, when the authority so directs.
1. Report Data: Written inspection or test reports for the Project shall include, but shall not necessarily be limited to applicable special inspections listed below:
 - a. Inspection of Fabrication per Building Code Section 1704.2, and as required by Structural Drawings.
 - b. Inspection of Steel Construction per Building Code Section 1704.3, and as required by Structural Drawings.

- c. Inspection of Concrete Construction per Building Code Section 1704.4, and as required by Structural Drawings.
- d. Inspection of Masonry Construction per Building Code Section 1704.5, and as required by Structural Drawings.
- e. Inspection of Soils per Building Code Section 1704.7, and as required by Structural Drawings.
- f. Inspection of Pier Foundations per Building Code Section 1704.9, and as required by Structural Drawings.
- g. Inspection of Wall Panels and Veneers (seismic) per Building Code Section 1704.10, and as required by Structural Drawings.
- h. Inspection of Exterior Insulation and Finish Systems (EIFS) per Building Code Section 1704.12.

1.07 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.

1.08 CONTRACTOR'S RESPONSIBILITIES

- A. General: Cooperate with laboratory personnel, provide access to Work, to material manufacturer's operations.
- B. Samples: Secure and deliver to the laboratory adequate quantities of representational samples of materials proposed to be used and which require testing.
- C. Preliminary Design Mixes: Provide to the laboratory the preliminary design mix proposed to be used for concrete, and other materials mixes which require control by the Testing Laboratory.
- D. Test Reports: Furnish copies of Products test reports as required.
- E. Furnish Incidental Labor and Facilities:

1. To provide access to Work to be tested.
 2. To obtain and handle samples at the source of the product to be tested.
 3. To facilitate inspections and tests.
 4. For storage and curing of test samples.
- F. Notification to Laboratory: Notify laboratory sufficiently in advance of operations to allow for laboratory assignment of personnel and scheduling of tests.
1. When tests or inspections cannot be performed after such notice, reimburse Owner for laboratory personnel and travel expenses incurred due to Contractor's negligence.
- G. Contractor's Convenience Testing: For testing performed exclusively for Contractor's convenience, employ and pay for the services of a separate, equally qualified Independent Testing Laboratory.
- H. Payment for Testing Services: Pay for services of Owner selected Testing Laboratory to extent previously specified in Article 1.04 PAYMENT FOR TESTING SERVICES.

1.09 SCHEDULES FOR TESTING

- A. Time Required for Testing: By advance discussion with the testing agency selected by the Owner, determine the time required for the testing agency to perform its tests and to issue each of its findings. Provide all required time within the construction schedule.
- B. Changes in Construction Schedules: When changes of construction schedules are necessary during construction, coordinate all such changes of schedules with the testing agency as required.

PART 2 – PRODUCTS (NOT APPLICABLE)

PART 3 – EXECUTION (NOT APPLICABLE)

END OF SECTION

SECTION 01 50 00
TEMPORARY FACILITIES AND CONTROLS

The requirements of the "General Conditions", the "Supplementary Conditions", and "Division 1" sections of the Specifications, shall apply to this section of the Specifications.

PART 1 - GENERAL

1.01 SCOPE

- A. Work Included: Provide all labor, materials, equipment, transportation, protection, and services necessary for, and incidental to, the proper execution and completion of all Temporary Facilities and Control Work, as indicated on the Drawings and as specified herein. Work includes, but is not necessarily limited to the following:
 - 1. Temporary Utilities: Water service and distribution, Temporary electric power and light, temporary heat, Telephone service and sanitary facilities, including drinking water.
 - 2. Support Facilities: Field Offices, Storage sheds, Temporary Enclosures, Construction Aids and Miscellaneous services and facilities.
 - 3. Security and Protection Facilities: Temporary fire protection, Barricades, Warning signs and Lights.

1.02 USE CHARGES

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

1.03 INFORMATIONAL SUBMITTALS

- A. Site Plan: Show temporary facilities, Utility hookups, Staging areas, and Parking areas for construction personnel.
- B. Erosion and Sedimentation Control Plan: Show compliance with requirements of EPA Construction General Permit of authorities having jurisdiction, whichever is more stringent. Coordinate with the Civil Engineer's drawings and specifications.
- C. Moisture Protection Plan: Describe procedures and controls for protecting materials and construction from absorption and damage; including delivery, handling, and storage provisions for materials subject to water absorption or water damage, discarding water-damaged materials, protocols for mitigating water intrusion into completed work, and replacing water damaged work.
 - 1. Indicate sequencing of work that requires water, such as plastering and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
- D. Dust Control and HVAC Control Plan: Submit coordination drawing and narrative that indicated the dust-control and HVAC control measures proposed for use, proposed locations, and proposed time frame for their operations. Dust Control shall be per TCEQ (Texas Commission of Environmental Quality) and City Ordinance requirements. Identify further options if proposed measures are later determined to be inadequate. Include the following:
 - 1. Location of dust control partitions at each phase of the work.
 - 2. HVAC system isolation schematic drawing.
 - 3. Location of proposed air filtration system discharge.
 - 4. Other dust control measures.
 - 5. Waste management plan.

1.04 QUALITY ASSURANCE

- A. General: Comply with industry standards and applicable laws and regulations of authorities having jurisdiction including, but not limited to, Building Code, City Ordinance Requirements, Health and safety regulations and Utility Company Regulations.

- B. Standards: Comply with NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations," ANSI A10 Series standards for "Safety Requirements for Construction and Demolition," and NECA Electrical Design Library "Temporary Electrical Facilities."
 - 1. Electrical Service: Comply with NECA, NEMA, and UL Standards and regulations and requirements of authority having jurisdiction for temporary electric service. Install service in compliance with NFPA 70 "National Electric Code."
 - 2. Accessible Temporary Egress: Comply with applicable provisions in ADA-ABA Accessibility Guidelines and ANSI A117.1.
- C. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.05 PROJECT CONDITIONS

- A. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Relocate temporary services and facilities as the work progresses. Do not overload facilities or permit them to interfere with progress. Take necessary fire prevention measures. Do not allow hazardous, dangerous, or unsanitary conditions, or public nuisances to develop or persist on-site.
- B. Temporary Use of Permanent Facilities: Engage installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before the Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. General: Provide new materials. If acceptable to the Architect, the Contractor may use undamaged, previously used materials in serviceable condition. Provide materials suitable for use intended.
- B. Chain Link Fencing: Minimum 0.148 inch thick, galvanized steel, chain link fabric fencing; minimum 8 feet high with galvanized steel pipe posts; minimum 2 3/8 inch OD line posts and 2 7/8 inch OD corner and pull posts, with 1 5/8 inch OD top rails.
- C. Portable Chain Link Fencing: Minimum 0.148 inch thick, galvanized steel, chain link fabric fencing; minimum 8 feet high with galvanized steel pipe posts; minimum 2 3/8 inch OD line posts and 2 7/8 inch OD corner and pull posts, with 1 5/8 inch OD top and bottom rails. Provide galvanized steel bases for supporting post.

- D. Lumber and Plywood: Comply with requirements in Division 6 Section "Rough Carpentry."
- E. Tarpaulins: Provide waterproof, fire resistant, UL Labeled tarpaulins with flame spread rating of 15 or less per ASTM E84. For temporary enclosures, provide translucent, nylon reinforced, laminated polyethylene or poly vinyl chloride, fire retardant tarpaulins.
- F. Polyethylene Sheet: Reinforced, fire resistance sheet, 10 mils minimum thickness, with flame spread rating of 15 or less per ASTM E84.
- G. Dust control Adhesive Surface Walk-Off Mats: Provide mats minimum 36 by 60 inches.
- H. Insulation: Unfaced mineral fiber blanket, manufacturer from glass, slag wool, or rock wool; with maximum flame spread of 25 and smoke developed indexes of 50 per ASTM E84.
- I. Water: Provide potable water approved by local health authorities.

2.02 TEMPORARY FACILITIES

- A. Field Offices: Prefabricated or mobile units with serviceable finishes, temperature controls and foundations adequate for normal loading.
- B. A Job Site Trailer: Of sufficient size to accommodate needs of the Owner and construction personnel office activities and to accommodate project meetings. Keep office clean and orderly. Furnish and equip offices as follows:
 - 1. Furniture required for project site documents including file cabinets, plan table, plan racks, and bookcases.
 - 2. Conference room of sufficient size to accommodate meeting of 10 individuals. Provide electrical power service and 120 V AC duplex receptacles, with not less than 1 receptacle on each wall. Furnish room with conference table, chairs, and 4 foot square tack and marker boards.
 - 3. Drinking water and private toilet.
 - 4. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F.
 - 5. Lighting fixtures capable of maintaining average illumination of 20 fc at desk height.
- C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

1. Store combustible materials apart from building.

2.03 EQUIPMENT

- A. General: Provide new materials. If acceptable to the Architect, the Contractor may use undamaged, previously used equipment in serviceable condition. Provide equipment suitable for use intended.
- B. Water Hoses: Provide $\frac{3}{4}$ inch, heavy-duty, abrasion resistant, flexible rubber hoses 100 feet long, with pressure rating greater than the maximum pressure of the water distribution system. Provide adjustable shutoff nozzles at hose discharge.
- C. Electrical Outlets: Provide properly configured, NEMA polarized outlets to prevent insertion of 110 to 112 Volt plugs into higher voltage outlets. Provide receptacle outlets equipped with ground fault circuit interrupters, reset button, and pilot light for connection of power tools and equipment.
- D. Electrical Power Cords: Provide grounded extension cords. Use hard service cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage ratio.
- E. Lamps and Light fixtures: Provide general service efficient lamps of wattage required for adequate illumination. Provide guard cages or tempered glass enclosures where exposed to breakage. Provide exterior fixtures where exposed to moisture.
- F. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system; provide vented, self contained, liquid propane gas or fuel oil heaters with individual thermostatic control.
 1. Use of gasoline burning heaters, open flame heaters, or salamander type heating units is prohibited.
 2. Heating Units: Provide temporary heating units that have been tested and labeled by UL, FM, or another recognized trade association related to the type of fuel being consumed.
 3. Permanent HVAC Systems: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return air grille in system and remove at the end of construction and clean HVAC system as required in Division 01 Section "Closeout Procedures."

- G. Temporary Offices: Provide prefabricated or mobile units or similar job built construction with lockable entrances, operable windows, and serviceable finishes. Provide heat heated and air conditioned unit on foundations adequate for normal loading.
- H. Temporary Toilet Units: Provide self contained, single occupant toilet units of chemical, aerated recirculation, or combustion type. Provide units properly vented and fully enclosed with a glass fiber reinforced polyester shell or similar nonabsorbent material.
- I. Fire Extinguishers: Provide hand carried, portable, UL rated, Class A fire extinguishers for temporary offices and similar spaces. In other locations, provide hand carried, portable, UL rated, Class ABC, dry chemical extinguishers or a combination of extinguishers of NFPA recommended classes for the exposures.
 - 1. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

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

3.02 TEMPORARY UTILITY INSTALLATION

- A. General: Engage the appropriate local utility company to install temporary service or connect to existing service. Where company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with company recommendations.
 - 1. Arrange with company and existing users for a time when service can be interrupted, if necessary, to make connections for temporary services.
 - 2. Provide adequate capacity at each stage of construction. Prior to temporary utility availability, provide trucked in services.

3. Use Charges: Neither the Owner nor Architect will accept cost or use charges as a basis of claims for Change Orders. The contractor can connect to existing water and electrical service and the owner will pay use charges for water and electricity. The contractor shall provide all other use charges including cost for temporary heat.
- B. Water Service: Install water service and distribution piping of sizes and pressures adequate for construction until permanent water service is in use. Obtain all required permits.
- C. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- D. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
- E. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have harmful effects on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
 1. Provide dehumidification systems to maintain the facilities when required to reduce substrate moisture levels to level required to allow installation or application of finishes.
- F. Electric Power Service: Provide power service and distribution system of sufficient size, number of phases, capacity, and power characteristics required for construction operation and testing of all installed equipment.
 1. Install electric power service overhead, unless otherwise indicated.
- G. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
 1. Install and operate temporary lighting that fulfills security and protection requirements without operating the entire system.
- H. Telephones Service: Provide temporary telephone service in Owner's use facilities for use by all construction personnel. Install two telephone lines for each field office. One telephone to be dedicated for facsimile machine in each field office.

1. At each telephone, post a list of important telephone numbers, including but not limiting to, Police & Fire departments, Contractor's home Office, Design Professional's office, Testing Consult's office, Owner's office, principal subcontractors' field & home offices and superintendent's cellular telephone.

3.03 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Provide construction for temporary offices, shops, and sheds located within the construction area or within 30 feet of building lines that is noncombustible according to ASTM E 136. Comply with requirements of NFPA 241
2. Maintain support facilities until near Substantial Completion inspection date is scheduled. Remove prior to substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to the Owner.

B. Temporary Use of Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.

1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
2. Prepare sub grade and install sub base and base for temporary roads and paved areas specified in individual specification sections.
3. Delay installation of final course of permanent hot mix asphalt pavement until immediately before Substantial Completion. Repair hot mix asphalt base course pavement before installation of final course.

C. Traffic Controls: comply with requirements of authorities having jurisdiction.

1. Protect existing site improvements to remain including curbs, pavement, and utilities.
2. Maintain access for firefighting equipment and access to fire hydrants.

D. Parking: Provide temporary areas for construction personnel.

- E. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain the project site, excavations, and construction free of water.
 - 1. Dispose of rainwater in a lawful manner that will not result in flooding the project or adjoining properties nor endanger permanent work of temporary facilities.
 - 2. Remove snow and ice as required to minimize accumulations.
- F. Waste Disposal Facilities: Provide waste collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction.
- G. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
 - 1. Truck cranes and similar devices used for hoisting materials are considered “tools and equipment” and not temporary facilities.
- H. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, freezing, other construction operations, and similar activities.
 - 1. Where heat is needed and the permanent building enclosure is not complete, provide temporary enclosures where there is no other provision for containment of heat. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.
 - 2. Install tarpaulins securely, with incombustible wood framing and other materials. Close openings of 25 sq. ft. or less with plywood or similar material.
 - 3. Close openings through floor or roof decks and horizontal surfaces with load bearing, wood framed construction.
 - 4. Where temporary wood or plywood enclosure exceeds 100 sq. ft. in area, use UL labeled, fire retardant treated material for framing and main sheathing.

3.04 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
- B. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil bearing water runoff and airborne dust to undisturbed areas and to

adjacent properties and walkways, according to erosion and sedimentation control drawings.

- C. Storm water Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and sub grade construction to prevent flooding by runoff of storm water from heavy rains.
- D. Tree and Plant Protection: Install temporary fencing outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
- E. Site Enclosure Fence: Before construction operations begin furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.
 - 1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
 - 2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to the Owner.
- F. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.
- G. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- H. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weather tight enclosure for building exterior.
 - 1. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.
- I. Temporary Fire Protection: Install and maintain temporary fire protection facilities of the type needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 10 "Standard for Portable Fire Extinguishers" and NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations."
 - 1. Locate fire extinguishers where convenient and effective for their intended purpose.

2. Store combustible materials in containers in fire safe locations.
3. Maintain unobstructed access to fire extinguishers, fire hydrants, and other access routes for fighting fires. Prohibit smoking in hazardous fire exposure areas.
4. Provide supervision of welding operations, combustion type temporary heating units, and similar sources of fire ignition.

3.05 MOSTURE AND MOLD CONTROL

- A. Contractor's Moisture-Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.
- B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:
 1. Protect porous materials from water damage.
 2. Protect stored and installed material from flowing or standing water.
 3. Keep porous and organic materials from coming into prolonged contact with concrete.
 4. Remove standing water from decks.
 5. Keep deck openings covered or dammed.
- C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
 1. Do not load or install drywall or other porous materials or components, or items with High organic content, into partially enclosed building.
 2. Keep interior spaces reasonably clean and protected from water damage.
 3. Periodically collect and remove waste containing cellulose or other organic matter.
 4. Discard or replace water-damaged material.
 5. Do not install material that is wet.
 6. Discard, replace or clean stored or installed material that begins to grow mold.

7. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.
- D. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
 2. Use permanent HVAC system to control humidity.
 3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
 - a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are considered defective.
 - b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record daily readings over a forty eight hour period. Identify materials containing moisture levels higher than allowed. Report findings in writing to the Design Professional.
 - c. Remove materials that cannot be completely restored to their manufactured moisture level within 48 hours.

3.06 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. Limit availability of temporary facilities to essential and intended uses to minimize waste and abuse.
- B. Maintenance: Maintain facilities in good operating conditional until removal. Protect from damage by freezing temperatures and similar elements.
 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24 hour basis where required to achieve indicated results and to avoid possibility of damage.
 2. Protection: Prevent water filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.

- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D. Termination and Removal: Unless the Architect requests that it be maintained longer, remove each temporary facility when the need has ended, when replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with the temporary facility. Repair damaged work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 - 1. Material and facilities that constitute temporary facilities are the Contractor's property. The Owner reserves the right to take possession of project identification signs.
 - 2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
 - 3. At Substantial Completion, clean and renovate permanent facilities used during the construction period. Comply with final cleaning requirements specified in Section 01 70 00 – Project Closeout.

END OF SECTION

SECTION 01 60 00
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Products.
- B. Product delivery requirements.
- C. Product storage and handling requirements.
- D. Product options.
- E. Product substitution procedures.

1.2 PRODUCTS

- A. Provide products of qualified manufacturers suitable for intended use. Provide products of each type by a single manufacturer unless specified otherwise.
- B. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.
- C. Provide interchangeable components of the same manufacturer for components being replaced.

1.3 PRODUCT DELIVERY REQUIREMENTS

- A. Transport and handle products in accordance with manufacturer's instructions.
- B. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
- C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

1.4 PRODUCT STORAGE AND HANDLING REQUIREMENTS

- A. Store and protect products in accordance with manufacturers' instructions.
- B. Store with seals and labels intact and legible.

- C. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.
- D. For exterior storage of fabricated products, place on sloped supports above ground.
- E. Provide bonded off-site storage and protection when site does not permit on-site storage or protection.
- F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- G. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- H. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- I. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

1.5 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers: products of one of manufacturers named and meeting specifications, no options or substitutions allowed.
- C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named in accordance with the following article.

1.6 PRODUCT SUBSTITUTION PROCEDURES

- A. Architect/Engineer will consider requests for Substitutions only within 15 days after date established in Notice to Proceed.
- B. Substitutions may be considered when a product becomes unavailable through no fault of the Contractor.
- C. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.

- D. A request constitutes a representation that the Contractor:
1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
 2. Will provide the same warranty for the Substitution as for the specified product.
 3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.
 4. Waives claims for additional costs or time extension which may subsequently become apparent.
 5. Will reimburse Owner and Architect/Engineer for review or redesign services associated with re-approval by authorities.
- E. Substitutions will not be considered when they are indicated or implied on Shop Drawing or Product Data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.
- F. Substitution Submittal Procedure:
1. Submit four copies of request for Substitution for consideration. Limit each request to one proposed Substitution.
 2. Submit Shop Drawings, Product Data, and certified test results attesting to the proposed product equivalence. Burden of proof is on proposer.
 3. The Architect/Engineer will notify Contractor in writing of decision to accept or reject request.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01 70 00
PROJECT CLOSEOUT

The requirements of the "General Conditions", the "Supplementary Conditions", and "Division 1" sections of the Specifications, shall apply to this section of the Specifications.

PART 1 - GENERAL

1.01 SCOPE

- A. Work Included: Closeout Work shall include preparation for final acceptance, occupancy, and similar actions evidencing completion of the Work. The time of closeout is recognized to be directly related to "Substantial Completion", and therefore may be either a single time period for the entire Work or a series of time periods for individual parts of the Work which have been certified as substantially complete at different dates. That time variation (if any) shall be applicable to other provisions of this section, regardless of whether resulting from "phased completion" originally specified by the Contract Documents or subsequently agreed upon.

1.02 PREREQUISITES FOR SUBSTANTIAL COMPLETION

- A. General: Prior to Certification of Substantial Completion, submit one (1) set of the following documents to the Owner, and list known exceptions:
 - 1. Submit statement showing final accounting of changes to the Contract Sum.
 - 2. Advise of pending insurance change-over requirements.
 - 3. Submit guarantees, warranties, workmanship bonds, maintenance agreements, final certifications and similar documents. Submit list of contacts, including company name, personal contact, address, telephone number and e-mail for building equipment and components which may require periodic service, including roofing, mechanical and electrical equipment.
 - 4. Obtain and submit occupancy permits, operating certificates, final inspection/test certificates, and similar releases enabling full and unrestricted use of the Work and access to services and utilities.
 - 5. Submit record (As-Built) Drawings, operation and maintenance manuals, Subcontractor listing with address, telephone number and e-mail, final Project photographs, damage or settlement survey, property survey, and similar final record information.
- B. Tools, Spare Parts, and Extra Stock Materials: Deliver tools, spare parts, extra stocks of materials, and similar physical items.

- C. Locks and Keys: Make final change-over of locks and transmit keys to Owner or Tenant, and advise to change-over in security provision. G.C. to coordinate with Owner on Grand & Master key quantities.
- D. Testing of Systems: Complete start-up testing of systems, and instruction of operating/maintenance personnel.
- E. Temporary Facilities and Services: Discontinue (or change over) and remove from the Project site temporary facilities and services, along with construction tools and facilities, mock-ups, and similar elements.
- F. Final Cleaning: Complete the final cleaning.
- G. Exposed Finish Surfaces: Touch-up, repair, and restore marred exposed finishes.
- H. Meter Readings for Temporary Utilities: Submit final meter readings for temporary utilities, measured record of stored fuel, and similar data as of the time of substantial completion or when Owner took possession of, and responsibility for, corresponding elements of the Work.

1.03 PREREQUISITES TO FUNCTIONAL COMPLETION

- A. All TAB (Test, Adjust and Balance) work and the commissioning of Section 01 91 13 must be complete prior to Functional Completion, unless approved in writing by the Owner's Project Manager. Exceptions to this are the planned control system training performed after occupancy and any required seasonal or approved deferred testing. This includes for all systems, but is not limited to:
 - 1. Completed and signed start-up and prefunctional checklist documentation.
 - 2. Requested trend log data.
 - 3. Submission of final approved TAB report.
 - 4. Completion of all functional testing.
 - 5. Required training of Owner personnel completed and approved.
 - 6. Submission of the approved O & M manuals.
 - 7. All identified deficiencies have been corrected or are approved by the Owner to be accepted from this milestone.

1.04 RECORD DOCUMENT SUBMITTALS

- A. General: Specific requirements for record documents are indicated in individual sections of the Specifications. The general requirements are indicated in the General Conditions, with additional provisions indicated in Section 01 01 00 - General Scope of Work, and Specification Divisions as required for Mechanical and Electrical Work, respectively. DO NOT USE record documents for construction purposes; protect from deterioration and loss in a secure fire-resistive location.
- B. Record Drawings:
 - 1. Contractors shall keep an accurate record of "As-Built" conditions as the Work progresses. Mark-up Drawings to indicate variance, at the time the variance occurs.
 - 2. Maintain a white print set (blue line or black line) of complete Construction Documents and Shop Drawings, in clean undamaged condition, for the purpose of checking and recording all installations which vary substantially from the Work as originally shown. The records shall include changes in sizes, locations, and dimensions, as well as any resulting from Bulletins, Change Orders, or Field Orders.
 - 3. Mark whichever Drawing is most capable of showing the "As-Built" condition fully and accurately; however, where Shop Drawings are used for mark-up, record a cross-reference at the corresponding location on the Contract Drawings.
 - 4. Mark with red erasable pencil and, where feasible, use other colors to distinguish between variations of separate categories of Work.
 - 5. Mechanical and Electrical Contractors shall give particular attention to concealed Work, and record all concealed mechanical and electrical services by color code. Record shall include exact locations of pipe, conduit, wire and cable, valves and all underground or otherwise concealed Mechanical and Electrical Work, properly dimensioned from adjacent building walls and with invert elevations noted. Record shall include all principal dimensions of concealed Work and any special notations such as valve numbers.
 - 6. Obtain a complete set of reproducibles using the Architect's original tracings and any Shop Drawings used for Record Drawings. Transfer all corrections, changes, and revisions from the job record set to the reproducibles and add to the legend "Record Drawings" and the date of printing to each reproducible. Within thirty (30) days of completion of job, print one (1) complete set of blacklines or blueprints. The reproducibles and blacklines or blueprints shall become the property of the Owner.

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7. Organize Record Drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates and other identification on the cover of each set.
- C. Maintenance Manuals:
1. Organize maintenance and operating manual information into individual binders properly identified, indexed, and thumb tabbed; such as Building Maintenance, Tile Maintenance, Roof Maintenance. Include names, addresses, telephone numbers, and e-mails of equipment vendors and Subcontractors. Submit one (1) copy to the Owner within thirty (30) days of Substantial Completion to be retained by the Owner for his records and use.
 2. Include information such as emergency instructions, spare parts listing, warranties and guarantees with name, telephone number and e-mail of contact person, wiring diagrams, recommended "turn-around" cycles, inspection procedures, Shop Drawings, Product Data, names and addresses of each supplier, names and addresses of contractor and sub-contractors with contact person telephone number, e-mails, and similar applicable information.
 3. Bind each manual of each set in a heavy-duty, 3-ring, vinyl-covered binder (not less than 2" capacity), and include pocket folders for folded sheet information. Mark identification on the front and spine of each binder.

1.05 CLOSEOUT PROCEDURES

- A. General Operating/Maintenance Instructions: Arrange for each installer of Work requiring continuing maintenance or operation, to meet with personnel at the Project site to provide instructions needed for proper operation and maintenance of all equipment or components.
1. Include instructions by manufacturer's representatives where installers are not expert in the required procedures.
 2. Review maintenance manuals, record documentation, tools, spare parts and materials, lubricants, fuels, identification system, control sequences, hazards, cleaning and similar procedures and facilities.
 3. For operational equipment, demonstrate start-up, shut-down, emergency operations, noise and vibration adjustments, safety, economy/efficiency adjustments, and similar operations.
 4. Review maintenance and operations in relation with applicable guarantees, warranties, agreements to maintain, bonds, and similar continuing commitments.

1.06 FINAL CLEANING

- A. General: Provide cleaning for specific units of Work as specified within the Specifications Sections listed under the Table of Contents in the Project Manual. Provide final cleaning of the Work, at the time indicated, consisting of cleaning each surface or unit of Work to the normal "clean" condition expected for a first-class building cleaning and maintenance program. Comply with manufacturers' instructions for cleaning operations.
- B. Cleaning Requirements: The following are examples, but not by way of limitation, of the cleaning levels required, including removing all marks, stains, soil, and fingerprints from all completed Work.
 - 1. Remove manufacturer's or contractor's labels which are not required as permanent. Remove protective coverings and tags, except for those required to demonstrate compliance with building codes, fire-ratings and testing. Also remove all residue and glue remaining on the surface.
 - 2. Clean transparent and reflective glass materials, including window/door glass and mirrors with ammonia-type, non-streaking glass cleaner, to a polished condition, removing substances which are noticeable as vision-obscuring materials. Replace broken or damaged glass and mirrors.
 - 3. Clean exposed exterior and interior hard-surface finishes, including metals, masonry, stone, concrete, painted surfaces, plastics, tile, wood, and similar surfaces, to a dirt-free condition, free of dust, stains, films and similar noticeable distracting substances. Except as otherwise indicated; avoid the disturbance of natural weathering of exterior surfaces. Restore reflective surfaces to original reflective condition.
 - 4. Wipe surfaces of mechanical and electrical equipment clean, and remove excess lubrication and other substances. Change filters within HVAC equipment.
 - 5. Remove debris and surface dust from limited-access spaces including roofs, plenums, trenches, manholes, attics and similar spaces.
 - 6. Clean concrete floors in non-occupied spaces broom clean.
 - 7. Vacuum clean soft material surfaces, such as carpeted and similar surfaces.
 - 8. Clean, sanitize and polish all fixtures, and washable surfaces in the Toilet Rooms. Clean plumbing fixtures to a sanitary condition, free of stains including those resulting from water exposure.
 - 9. Damp wipes and cleans all fixtures, including light fixtures and lamps so as to function with full efficiency. Replace burned-out or broken lamps.

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- 10. Wash, clean and polish all porcelain and/or ceramic tile surfaces.
 - 11. Remove and dispose of all trash, scraps, packing, and all other construction debris.
 - 12. Clean Project site (yard and grounds), including landscape, development areas, of litter and foreign substances. Sweep paved areas to a broom-clean condition; remove stains, petro-chemical spills and other foreign deposits. Rake grounds which are neither planted nor paved, to a smooth, even-textured surface.
- C. Damages: Any damage caused by Contractors with cleaning equipment shall be repaired or replaced by the Contractor responsible for the damage.
 - D. Time of Final Cleaning: Following Certification of "Substantial Completion".

1.07 PEST CONTROL

- A. Engage an experienced exterminator to make a final inspection of the Project, and to eliminate the Project of rodents, insects, and other pests. Comply with governing regulations and applicable health and safety standards.

1.08 REMOVAL OF PROTECTION

- A. Except as otherwise indicated or requested, remove temporary protection devices and facilities which were installed during the course of the Work to protect previously completed Work during the remainder of the construction period.

1.09 COMPLIANCES

- A. Comply with safety standards and governing regulations for cleaning operations. Do not burn waste materials at the site, or bury debris or excess materials on the Owner's property, or discharge volatile or other harmful or dangerous materials into drainage systems; remove waste materials from the site and dispose of in a lawful manner. At no time during or at completion of construction, place any excess material, into Owner's compactor or container.

PART 2 – PRODUCTS (NOT APPLICABLE)

PART 3 – EXECUTION (NOT APPLICABLE)

END OF SECTION

SECTION 01 73 00
EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. Field engineering and surveying.
 - 3. Installation of the Work.
 - 4. Cutting and patching.
 - 5. Coordination of Owner-installed products.
 - 6. Progress cleaning.
 - 7. Starting and adjusting.
 - 8. Protection of installed construction.
 - 9. Correction of the Work.
- B. Related Requirements:
 - 1. Section 01 33 23 "Shop Drawings and Samples". Revise first subparagraph below to suit Project.
 - 2. Section 01 70 00 "Project Closeout" Procedures for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

1.3 DEFINITIONS

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

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For land surveyor professional engineer.
- B. Certificates: Submit certificate signed by land surveyor professional engineer certifying that location and elevation of improvements comply with requirements.
- C. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:
 - 1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
 - 2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
 - 3. Products: List products to be used for patching and firms or entities that will perform patching work.
 - 4. Dates: Indicate when cutting and patching will be performed.
 - 5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.
 - a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.
- D. Final Property Survey: Submit 6 copies showing the Work performed and record survey data.

1.5 QUALITY ASSURANCE

- A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.
- B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
 - 1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection
 - 2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include the following; but not limited to:
 - a. Primary operational systems and equipment.
 - b. Fire separation assemblies.
 - c. Air or smoke barriers.
 - d. Fire-suppression systems.
 - e. Mechanical systems piping and ducts.
 - f. Control systems.
 - g. Communication systems.
 - h. Fire-detection and -alarm systems.
 - i. Conveying systems.
 - j. Electrical wiring systems.
 - k. Operating systems of special construction.

3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or those results in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:
 - a. Water, moisture, or vapor barriers.
 - b. Membranes and flashings.
 - c. Exterior curtain-wall construction.
 - d. Sprayed fire-resistive material.
 - e. Equipment supports.
 - f. Piping, ductwork, vessels, and equipment.
 - g. Noise- and vibration-control elements and systems.
 4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- C. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.
- D. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
- B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.
 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
 1. Description of the Work.
 2. List of detrimental conditions, including substrates.
 3. List of unacceptable installation tolerances.
 4. Recommended corrections.

- D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

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

3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect and Construction Manager promptly.
- B. General: Engage a land surveyor professional engineer to lay out the Work using accepted surveying practices.
 - 1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
 - 2. Establish limits on use of Project site.
 - 3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 - 4. Inform installers of lines and levels to which they must comply.

5. Check the location, level and plumb, of every major element as the Work progresses.
 6. Notify Architect and Construction Manager when deviations from required lines and levels exceed allowable tolerances.
 7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.
- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
- E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect and Construction Manager.

3.4 FIELD ENGINEERING

- A. Identification: Owner will identify existing benchmarks, control points, and property corners.
- B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect and Construction Manager. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect and Construction Manager before proceeding.
 2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.
- C. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.

1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
 2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
 3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.
- D. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.
- E. Final Property Survey: Engage a land surveyor to prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.
1. Show boundary lines, monuments, streets, site improvements and utilities, existing improvements and significant vegetation, adjoining properties, acreage, grade contours, and the distance and bearing from a site corner to a legal point.
 2. Recording: At Substantial Completion, have the final property survey recorded by or with authorities having jurisdiction as the official "property survey."

3.5 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
1. Make vertical work plumb and make horizontal work level.
 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
 4. Maintain minimum headroom clearance of 96 inches in occupied spaces and 90 inches in unoccupied spaces.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

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

3.6 CUTTING AND PATCHING

- A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
- C. Temporary Support: Provide temporary support of work to be cut.
- D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 011000 "Summary."
- F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to interruption to occupied areas.
- G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.

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

3.7 OWNER-INSTALLED PRODUCTS

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

3.8 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
 - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 - 2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
 - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
 - a. Use containers intended for holding waste materials of type to be stored.
 - 4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 - 1. Remove liquid spills promptly.

2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 015000 "Temporary Facilities and Controls."
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to assure that no part of the construction completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.9 STARTING AND ADJUSTING

- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Manufacturer's Field Service: Comply with qualification requirements in Section 01 40 0 "Quality Requirements."

3.10 PROTECTION OF INSTALLED CONSTRUCTION

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

END OF SECTION

SECTION 02 22 00
DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Demolition of designated site structures, retaining walls, foundations and removal of materials from site.
- B. Demolition and removal of pavements, curbs and gutters, drainage structures, utilities, signage or landscaping.
- C. Disconnecting and capping or removal of identified utilities.
- D. Filling or removal of underground tanks and piping.
- E. Filling voids in subgrade created as a result of removals or demolition.
- F. Hazardous Material Compliance.

1.02 RELATED SECTIONS

- A. Section 0022300 - Site Preparation: Clearing outside periphery of structures.
- B. Construction drawings.

1.03 PROJECT RECORD DOCUMENTS

Accurately record actual locations of capped utilities, and subsurface obstructions.

1.04 REGULATORY REQUIREMENTS

- A. Conform to applicable local code for demolition of structures, safety of adjacent structures, dust control and runoff control.
- B. Obtain required permits and licenses from authorities. Pay associated fees including disposal charges.
- C. Notify affected utility companies before starting work and comply with their requirements.
- D. Do not close or obstruct roadways, sidewalks or hydrants without permits.
- E. Conform to applicable regulatory procedures when discovering hazardous or contaminated materials.
- F. Test soils around buried tanks for contamination.

1.05 JOB CONDITIONS

- A. Structures to be demolished will be discontinued in use and vacated prior to start of work.
- B. Owner assumes no responsibility for condition of structures to be demolished.
- C. Conditions existing at time of inspection for bidding purposes will be maintained by Owner in so far as practicable. Variations within structures may occur by Owner's removal and salvage operations prior to start of demolition work.
- D. Unless otherwise indicated in the Construction Documents or specified by the Owner's representative, all items of salvageable value to Contractor shall be removed from the site and structure. Storage or sale of removed items on site will not be permitted and shall not interfere with any other work specified in the contract documents.
- E. Explosives shall not be brought to site or used without written consent of authorities having jurisdiction. Such written consent will not relieve Contractor of total responsibility for injury to persons or for damage to property due to blasting operations. The performance of any required blasting shall comply with governing regulations.

PART 2 PRODUCTS

2.01 FILL MATERIALS

Aggregate materials specified in 023150.

PART 3 EXECUTION

3.01 PREPARATION

- A. Provide, erect, and maintain erosion control devices, temporary barriers and security devices at locations indicated
- B. Protect existing landscaping materials, appurtenances and structures which are not to be demolished. Repair damage caused by demolition operations at no cost to Owner.
- C. Prevent movement or settlement of adjacent structures. Provide bracing and shoring.
- D. Mark location of utilities. Protect and maintain in safe and operable condition the utilities to remain. Prevent interruption of existing utility service to occupied or used facilities, except when authorized in writing by authorities having jurisdiction. Provide temporary services during interruptions to existing utilities as acceptable to governing authorities and the Owner's representative.

3.02 DEMOLITION REQUIREMENTS

- A. Conduct demolition to minimize interference with adjacent structures or pavements.
- B. Cease operations immediately if adjacent structures appear to be in danger. Notify authority having jurisdiction. Do not resume operations until directed.
- C. Conduct operations with minimum interference to public or private access. Maintain access and egress at all times.
- D. Obtain written permission from adjacent property owners when demolition equipment will traverse, infringe upon or limit access to their property.
- E. Sprinkle Work with water to minimize dust. Provide hoses and water connections for this purpose.
- F. Comply with governing regulations pertaining to environmental protection.
- G. Clean adjacent structures and improvements of dust, dirt, and debris caused by demolition operations. Return adjacent areas to condition existing prior to start of work.

3.03 DEMOLITION

- A. Demolish buildings completely and remove from site using methods as required to complete work within limitations of governing regulations. Small structures may be removed intact when acceptable to owner and authorities having jurisdiction.
- B. Proceed with demolition in systematic manner, from top of structure to ground and complete demolition work above each floor or tier before disturbing supporting members on lower levels.
- C. Locate demolition equipment and remove materials so as to prevent excessive loading to supporting walls, floors, or framing.
- D. Remove structural framing members and lower to ground by hoists, derricks, or other suitable methods.
- E. Demolish concrete and masonry in small sections. Break up concrete slabs-on-grade that are 2 or more feet below proposed subgrade. Remove slabs within 2 feet of proposed subgrade.
- F. Demolish and remove below grade construction and concrete slabs on grade to a minimum depth of two feet below proposed subgrade.

3.04 FILLING BASEMENTS AND VOIDS

-
- A. Completely fill below grade areas and voids resulting from demolition or removal of structures (underground fuel storage tanks, wells, cisterns, etc.) using approved select fill materials consisting of stone, gravel, and sand free from debris, trash, frozen materials, roots, and other organic matter.
 - B. Ensure that areas to be filled are free of standing water, frost, frozen, or unsuitable material, trash, and debris prior to fill placement.
 - C. Place fill materials in horizontal layers not exceeding 8" in loose depth and compact each layer at optimum moisture content of fill material to proposed density, unless subsequent excavation for new work is required.
 - D. Grade surface to match adjacent grades and to provide flow of surface drainage after fill placement and compaction.

3.05 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove from site debris, rubbish, and other materials resulting from demolition operations.
- B. No burning of any material, debris, or trash on-site or off-site will be allowed, except when allowed by the appropriate governing authority and the Owner's representative. If allowed as stated above, burning shall be performed in manner prescribed by governing authority. Attend burning materials until fires have burned out or have been extinguished.
- C. Transport materials removed from demolished structures with appropriate vehicles and dispose off-site to areas which are approved for disposal by governing authorities and appropriate property owners.

END OF SECTION

**SECTION 02200
EARTHWORK**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Preparing subgrades for slabs-on-grade, walks, pavements, lawns, and plantings.
 - 2. Excavating and backfilling for buildings and structures.
 - 3. Drainage course for slabs-on-grade.
 - 4. Subbase course for concrete walks.
 - 5. Excavating and backfilling trenches within building lines.
 - 6. Excavating and backfilling trenches for buried mechanical and electrical utilities and pits for buried utility structures.
- B. Related Sections include the following:
 - 1. Division 1 Section "Construction Facilities and Temporary Controls."
 - 2. Division 2 Section "Site Clearing" for site stripping, grubbing, removing topsoil, and protecting trees to remain.
 - 3. Division 2 Section "Excavation Support and Protection."
 - 4. Division 15 and 16 Sections for excavating and backfilling buried mechanical and electrical utilities and buried utility structures.

1.3 DEFINITIONS

- A. Backfill: Soil materials 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 Course: Layer placed between the subbase course and asphalt paving.
- C. Bedding Course: Layer placed over the excavated subgrade in a trench before laying pipe.
- D. Borrow: Satisfactory soil imported from off-site for use as fill or backfill.
- E. Excavation: Removal of material encountered above subgrade elevations.
 - 1. Additional Excavation: Excavation below subgrade elevations as directed by Engineer. Additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
 - 2. Bulk Excavation: Excavations more than 10 feet in width and pits more than 30 feet in either length or width.
 - 3. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.
- F. Fill: Soil materials used to raise existing grades.
- G. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- H. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.
- I. Utilities include on-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.4 SUBMITTALS

- A. Product Data: For the following:
 - 1. Each type of plastic warning tape.
 - 2. Drainage fabric.
- B. Samples: For the following:
 - 1. 10-lb samples, sealed in airtight containers, of each proposed soil material from on-site or borrow sources.
- C. 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 on-site or borrow soil material proposed for fill and backfill.

2. Laboratory compaction curve according to ASTM D 698 for each on-site or borrow soil material proposed for fill and backfill.

1.5 QUALITY ASSURANCE

- A. Comply with applicable requirements of NFPA 495, "Explosive Materials Code."
- B. Geotechnical Testing Agency Qualifications: An independent testing agency qualified according to ASTM E 329 to conduct soil materials and rock-definition testing, as documented according to ASTM D 3740 and ASTM E 548.
- C. Pre-excavation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."

1.6 PROJECT CONDITIONS

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Architect and then only after arranging to provide temporary utility services according to requirements indicated:
 1. Notify Architect not less than two days in advance of proposed utility interruptions.
 2. Do not proceed with utility interruptions without Architect's written permission.
 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

2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Satisfactory Soils: ASTM D 2487 soil classification groups SC, GC, CL, or a combination of these group symbols; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
- C. Unsatisfactory Soils: ASTM D 2487 soil classification groups GC, GM, SC, SM, ML, MH, CL, CH, OL, OH, and PT, or a combination of these group symbols.
 1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.
- D. Backfill and Fill: Satisfactory soil materials.
- E. Sub-base: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2- inch sieve and not more than 12 percent passing a No. 200 sieve.
- F. Base: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve.
- G. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.
- H. Bedding: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.
- I. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

2.2 ACCESSORIES

- A. Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility; colored as follows:
 1. Red: Electric.
 2. Yellow: Gas, oil, steam, and dangerous materials.
 3. Orange: Telephone and other communications.
 4. Blue: Water systems.
 5. Green: Sewer systems.
- B. Drainage Fabric: Nonwoven geotextile, specifically manufactured as a drainage geotextile; made from polyolefins, polyesters, or polyamides; and with the following minimum properties determined according to ASTM D 4759 and referenced standard test methods:
 1. Grab Tensile Strength: 110 lbf; ASTM D 4632.
 2. Tear Strength: 40 lbf; ASTM D 4533.
 3. Puncture Resistance: 50 lbf; ASTM D 4833.
 4. Water Flow Rate: 150 gpm per sq. ft.; ASTM D 4491.
 5. Apparent Opening Size: No. 50; ASTM D 4751.

PART 3 - EXECUTION**3.1 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. Protect subgrades and foundation soils against freezing temperatures or frost. Provide protective insulating materials as necessary.
- C. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.2 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.
 - 2. Install a dewatering system to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.

3.3 EXCAVATION, GENERAL

- A. Unclassified Excavation: Excavation to subgrade elevations regardless of the character of surface and subsurface conditions encountered, including rock, soil materials, and obstructions.
 - 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

3.4 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. Extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
 - 1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
 - 2. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch. Do not disturb bottom of excavations intended for bearing surface.

3.5 EXCAVATION FOR WALKS

- A. Excavate surfaces under walks to indicated cross sections, elevations, and grades.

3.6 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.
 - 1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.
- B. Excavate trenches to uniform widths to provide a working clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit, unless otherwise indicated.
 - 1. Clearance: 12 inches on each side of pipe or conduit.
- C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.
 - 1. For pipes and conduit less than 6 inches in nominal diameter and flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
 - 2. For pipes and conduit 6 inches or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe circumference. Fill depressions with tamped sand backfill.
 - 3. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

3.7 APPROVAL OF SUBGRADE

- A. Notify Architect when excavations have reached required subgrade.
- B. If Architect determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
 - 1. Additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
- C. Proof roll subgrade with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof roll wet or saturated subgrades.
- D. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect.

3.8 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill may be used when approved by Architect.
 - 1. Fill unauthorized excavations under other construction or utility pipe as directed by Architect.

3.9 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow materials and satisfactory excavated soil materials. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

3.10 BACKFILL

- A. Place and compact backfill in excavations promptly, but not before completing the following:
 - 1. Construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.
 - 2. Surveying locations of underground utilities for record documents.
 - 3. Inspecting and testing 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.

3.11 UTILITY TRENCH BACKFILL

- A. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- B. Backfill trenches excavated under footings and within 18 inches of bottom of footings; fill with concrete to elevation of bottom of footings.
- C. Place and compact initial backfill of subbase material, free of particles larger than 1 inch, to a height of 12 inches over the utility pipe or conduit.
 - 1. Carefully compact material under pipe haunches and bring backfill evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of utility system.
- D. Coordinate backfilling with utilities testing.
- E. Fill voids with approved backfill materials while shoring and bracing, and as sheeting is removed.
- F. Place and compact final backfill of satisfactory soil material to final subgrade.
- G. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.12 FILL

- A. Preparation: Remove vegetation, topsoil, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface before placing fills.
- B. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- C. 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.
 - 3. Under steps and ramps, use engineered fill.
 - 4. Under building slabs, use engineered fill.
 - 5. Under footings and foundations, use engineered fill.

3.13 MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill layer before compaction to within 2 percent of optimum moisture content.
 - 1. Do not place backfill or fill 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.

3.14 COMPACTION OF BACKFILLS AND FILLS

- A. Place backfill and fill materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.
- C. Compact soil to not less than the following percentages of maximum dry unit weight according to ASTM D 1557:
- D. Compact soil to not less than the following percentages of maximum dry unit weight according to ASTM D 698:
 - 1. Under structures, building slabs, steps, and pavements, scarify and recompact top 6 inches of existing subgrade and each layer of backfill or fill material at 95 percent.

2. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill material at 95 percent.
3. Under lawn or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill material at 85 percent.

3.15 GRADING

- A. General: Uniformly grade areas to a smooth surface, free from 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.
- B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
 1. Walks: Plus or minus 1 inch.
 2. Pavements: Plus or minus 1/2 inch.
- C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

3.16 SUBBASE AND BASE COURSES

- A. Under pavements and walks, place subbase course on prepared subgrade and as follows:
 1. Place base course material over subbase.
 2. Compact subbase and base courses at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.
 3. Shape subbase and base to required crown elevations and cross-slope grades.
 4. When thickness of compacted subbase or base course is 6 inches or less, place materials in a single layer.
 5. When thickness of compacted subbase or base course exceeds 6 inches, place materials in equal layers, with no layer more than 6 inches thick or less than 3 inches thick when compacted.

3.17 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.
- B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.
- C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Architect.
- D. 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 and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. or less of paved area or building slab, but in no case fewer than three tests.
 2. Foundation Wall Backfill: At each compacted backfill layer, at least one test for each 100 feet or less of wall length, but no fewer than two tests.
 3. Trench Backfill: At each compacted initial and final backfill layer, at least one test for each 150 feet or less of trench length, but no fewer than two tests.
- E. 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; recompact and retest until specified compaction is obtained.

3.18 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 Architect; 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 the greatest extent possible.

3.19 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 02300

SECTION 02 23 00
SITE PREPARATION

PART 1 GENERAL

1.01 SECTION INCLUDES:

- A. Cleaning site of debris, grass, trees and other plant life in preparation for site or building excavation work.
- B. Protection of existing structures, trees or vegetation indicated on the contract documents to remain.
- C. Stripping topsoil from areas that are to be incorporated into the limits of the project and where so indicated on the construction drawings.

1.02 RELATED SECTIONS

- A. Section 022200 - Demolition
- B. Section 023000 - Earthwork
- C. Section 023700 - Slope Protection and Erosion Control
- D. Construction Drawings
- E. Geotechnical Engineering Report

1.03 ENVIRONMENTAL REQUIREMENTS

- A. Construct temporary erosion control systems as shown on the plans or as directed by the engineer to protect adjacent properties and water resources from erosion and sedimentation.
- B. Site work on this project will disturb more than one (1) or more acres. As such, the contractor shall **NOT** begin construction without a "National Pollution Discharge Elimination System" (NPDES) permit governing the discharge of storm water from the construction site for the entire construction period. The permit requires a "Storm Water Pollution Prevention Plan" (SWPPP) to be in place during construction which includes monitoring of storm water flows during construction.

The contractor shall be totally responsible for conducting the storm water management practices in accordance with the NPDES permit and for any enforcement action taken or imposed by Federal or State agencies, including the cost of fines, construction delays and remedial actions resulting from the contractor's failure to comply with all provisions of the NPDES permit.

SWPPP must be approved by the City of Edinburg prior to start of construction.

1.04 JOB CONDITIONS

- A. Conditions existing at time of inspection for bidding purposes will be maintained by owner in so far as practical.
- B. Variations to conditions or discrepancy in actual conditions as they apply to site preparation operations are to be brought to the attention of the owner prior to the commencement of any site work.

PART 2 PRODUCTS

Not applicable.

PART 3 EXECUTION

3.01 PREPARATION

Verify that existing plant life and clearing limits are clearly tagged, identified and marked in such a manner as to insure their safety throughout construction operations.

3.02 PROTECTION

- A. Locate and identify existing utilities that are to remain and protect them from damage.
- B. Protect trees, plant growth and features designated to remain as final landscape.
- C. Conduct operations with minimum interference to public or private accesses and facilities. Maintain access and egress at all times and clean or sweep any roadways daily or as required by the governing authority. At such times as deemed necessary by the owner, dust control shall be provided with sprinkling systems or equipment provided by the contractor.
- D. Protect bench marks, property corners and all other survey monuments from damage or displacement. If a marker needs to be removed it shall be referenced by a licensed land surveyor and replaced, as necessary, by the same.
- E. Provide traffic control as required, in accordance with the U.S. Department of Transportation "Manual of Uniform Traffic Control Devices" and the state highway department requirements.

3.03 CLEARING

- A. Clear areas required for access to site and execution of work.
- B. Unless otherwise indicated on the drawings, remove trees, shrubs, grass, other vegetation, improvements, or obstructions interfering with installation of new construction. Removal includes digging out stumps and roots. Depressions caused by clearing and grubbing operations are to be filled to subgrade elevation to avoid water ponding. Satisfactory fill material shall be placed in horizontal layers not exceeding 8" loose depth, and thoroughly compacted per fill requirements of this section and Section 02200. Contractor shall also refer to Geotechnical Report for fill requirements. In the case of discrepancies, the more restrictive of the two shall govern.
- C. Remove grass, trees, plant life, stumps and all other construction debris from the site to a dump site that is suitable for handling such material according to state laws and regulations.

3.04 TOPSOIL EXCAVATION

- A. Strip topsoil from areas that are to be filled, excavated, landscaped or re-graded to such a depth that it prevents intermingling with underlying subsoil or questionable material.
- B. Cut heavy growths of grass from areas before stripping and remove with the rest of the cleared vegetative material.
- C. Topsoil shall consist of organic soil found in depth of not less than 6". Satisfactory topsoil is reasonably free of subsoil, clay lumps, stones and other objects over 2" in diameter, weeds, roots, and other objectionable material.
- D. Stockpile topsoil in storage piles in areas shown or where directed. Construct storage piles to freely drain surface water. Cover storage piles as required to prevent windblown dust. Dispose of unsuitable topsoil as specified for waste material, unless otherwise specified by owner. Excess topsoil shall be removed from the site by the Contractor unless specifically noted otherwise on the Drawings.

END OF SECTION

DOCUMENT 02 28 20
TERMITE CONTROL

PART I - GENERAL

1.01 DESCRIPTION

- A. Provide soil treatment for termite control, as herein specified.

1.02 QUALITY ASSURANCE

- A. In addition to the requirements of these specifications, comply with manufacturer's instructions and recommendations for the work, including preparation of substrate and application.
- B. Engage a professional pest control operator, licensed in accordance with regulations of governing authorities for application of soil treatment solution.
- C. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.03 JOB CONDITIONS

- A. Restrictions: Do not apply soil treatment solution until excavating, filling and grading operations are completed, except as otherwise required in construction operations.
- B. To insure penetration, do not apply soil treatment to frozen or excessively wet soils or during inclement weather. Comply with other handling and application instructions of the soil toxicant manufacturer.

1.04 SUBMITTALS

- A. Comply with applicable provisions of Section 01 33 23.
- B. Guarantee: Furnish 2 copies of written guarantee certifying that the applied soil poisoning treatment will prevent the infestation of subterranean termites and, that if subterranean termite activity is discovered during the guarantee period, the Contractor will retreat the soil and also repair or replace damage caused by termite infestation. Provide guarantee for a period of 5 years from date of treatment, signed by the Applicator and the Contractor.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Soil Treatment Solution

1. Use an emulsible concentrate insecticide for dilution with water, specially formulated to prevent infestation by termites. Fuel oil will not be permitted as a diluent. Provide a working solution of one of the following chemical elements and concentrations:
 - a. Dursban TC, 1.0% in water emulsion
 - b. Aldrin, 0.5% in water emulsion
 - c. Termide, 0.75% in water emulsion
 - d. Heptachlor, 0.5% in water emulsion
2. Other solutions may be used as recommended by Applicator and if acceptable to local governing authorities. Use only soil treatment solutions which are not injurious to planting.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Applicator must examine the areas and conditions under which soil treatment for termite control is to be installed and notify the Contractor in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Applicator.

3.02 APPLICATION

- A. Surface Preparation: Remove foreign matter which could decrease effectiveness of treatment on areas to be treated. Loosen, rake, and level soil to be treated, except previously compacted areas under slabs and foundations. Toxicant may be applied before placement of compacted fill under slabs, if recommended by toxicant manufacturer.

- B. Application Rates: Apply soil treatment solution as follows:
 - 1. Under slab-on-grade structures, treat the soil before concrete slabs are poured using either power sprayer or tank-type garden sprayer.
 - a. Apply 4 gallons (15.1 liters) of chemical solution per 10 lin. ft. (3.0 m) to the soil critical areas under the slab, such as along the inside of foundation walls, along both sides of interior partition walls, and around plumbing.
 - b. Apply one gallon (3.78 liters) of chemical solution per 10 sq. ft. (0.9 sq. m) as an overall treatment under the slab and attached slab areas where fill is soil or unwashed gravel. Apply 1-1/2 gallons (5.67 liters) is washed gravel or other coarse absorbent material.
 - c. Apply 4 gallons (15.1 liters) of chemical solution per 10 lin. ft. (3.0 m) of trench, for each foot (0.3 m) O.C. and apply chemical solution. Mix the chemical solution with the soil as it is being replaced in the trench.
- C. Allow not less than 12 hours for drying after application, before beginning concrete placement or other construction activities.
- D. Post signs in the areas of application warning workers that soil poisoning has been applied. Remove signs when areas are covered by other construction.
- E. Reapply soil treatment solution to areas disturbed by subsequent excavation or other construction activities following application.

END OF DOCUMENT

SECTION 02282
TERMITE CONTROL

GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

SUMMARY

Provide soil treatment for termite control, as herein specified, prior to placement of vapor barrier under concrete work.

SUBMITTALS

Product Data: Submit manufacturer's technical data and application instructions.

QUALITY ASSURANCE

In addition to requirements of these specifications, comply with manufacturer's instructions and recommendations for work, including preparation of substrate and application.

Engage a professional pest control operator, licensed in accordance with regulations of governing authorities for application of soil treatment solution.

Use only termiticides which bear a Federal registration number of the U.S. Environmental Protection Agency.

JOB CONDITIONS

Restrictions: Do not apply soil treatment solution until excavating, filling and grading operations are completed, except as otherwise required in construction operations.

To insure penetration, do not apply soil treatment to frozen or excessively wet soils or during inclement weather. Comply with handling and application instructions of the soil toxicant manufacturer.

SPECIFIC PRODUCT WARRANTY

Furnish written warranty certifying that applied soil termiticide treatment will prevent infestation of subterranean termites and, that if subterranean termite activity is discovered during warranty period, Contractor will retreat soil and repair or replace damage caused by termite infestation. Provide warranty for a period of 1 years from date of treatment, signed by Applicator and Contractor. This contract shall be renewable annually at the option of the Owner.

PRODUCTS

SOIL TREATMENT SOLUTION

Use an emulsible concentrate termiticide for dilution with water, especially formulated to prevent infestation by termites. Fuel oil will not be permitted as a diluent. Provide a solution consisting of one of following chemical elements and concentrations:

Chloropyrifos ("Dursban TC"); 1.0 percent is water emulsion.

Permethrin ("Dragnet", "Torpedo"); 0.5 percent in water emulsion.

Other solutions may be used as recommended by Applicator if also acceptable to Architect and approved for intended application by jurisdictional authorities. Use only soil treatment solutions which are not injurious to planting.

EXECUTION**APPLICATION**

Surface Preparation: Remove foreign matter which could decrease effectiveness of treatment on areas to be treated. Loosen, rake, and level soil to be treated, except previously compacted areas under slabs and foundations. Toxicants may be applied before placement of compacted fill under slabs, if recommended by toxicant manufacturer.

Application Rates: Apply soil treatment solutions as follows:

Under slab-on-grade structures, treat soil before concrete slabs are placed, using the following rates of application:

Apply 4 gallons of chemical solution per 10 lin. ft. to soil in critical areas under slab, including entire inside perimeter inside of foundation walls, along both sides of interior partition walls, around plumbing pipes and electric conduit penetrating slab, and around interior column footers.

Apply one gallon of chemical solution per 10 sq. ft. as an overall treatment under slab and attached slab areas where fill is soil or unwashed gravel. Apply 1-1/2 gallons of chemical solution to areas where fill is washed gravel or other coarse absorbent material.

Apply 4 gallons of chemical solution per 10 lin. ft. of trench, for each foot of depth from grade to footing, along outside edge of building. Dig a trench 6" to 8" wide along outside of foundation to a depth of not less than 12". Punch holes to top of footing at not more than 12" o.c. and apply chemical solution. Mix chemical solution with the soil as it is being replaced in trench.

At hollow masonry foundations or grade beams, treat voids at rate of 2 gal. per 10 lin. ft., poured directly into the hollow spaces.

At expansion joints, control joints, and areas where slabs will be penetrated, apply at rate of 4 gals. per 10 lin. ft. of penetration.

Post signs in areas of application to warn workers that soil termiticide treatment has been applied. Remove signs when areas are covered by other construction.

Reapply soil treatment solution to areas disturbed by subsequent excavation, landscape grading, or other construction activities following application.

Outside building perimeter in a strip at least 2' wide, 1 gallon per 5 square feet.

END OF SECTION

SECTION 02 30 00
EARTHWORK

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Protection, modification and/or installation of utilities as sitework progresses paying particular attention to grade changes and any necessary staging of work.
- B. Cutting, filling and grading to required lines, dimensions, contours and proposed elevations for proposed improvements.
- C. Scarifying, compaction, drying and removal of unsuitable material to ensure proper preparation of areas for fills or proposed improvements.

1.02 RELATED SECTIONS

- A. Section 022200 - Demolition
- B. Section 022300 - Site Preparation
- C. Section 023350 - Excavation, Backfill and Compaction for Pavement
- D. Geotechnical Report; In the case of discrepancies between this section and the geotechnical report, the more stringent of the two shall prevail.
- E. Construction Drawings
- F. Earthwork under architectural buildings will be dictated by the Geotechnical Requirements and the structural portion of the specifications.

1.03 REFERENCE STANDARDS

- A. American Society for Testing and Materials (ASTM) latest edition.
 - D 422 Method for Particle Size Analysis of Soils
 - D 698 Test for Moisture-Density Relations of Soils Using 5.5 lb. (2.5 kg) Rammer and 12-inch (304.8 mm) Drop (Standard Proctor)
 - D 1556 Test for Density of soil in Place by the Sand Cone method
 - D 1557 Test for Moisture-Density Relations of Soils Using 10-lb (4.5 Kg) Rammer and 18-inch (457 mm) Drop (Modified Proctor)
 - D 1559 Test Method for Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus
 - D 2167 Test for Density of Soil in Place by the Rubber Balloon Method
 - D 2216 Laboratory Determination of Moisture content of Soil
 - D 2487 Classification of Soils for Engineering Purposes
 - D 2922 Tests for Density of Soil and Soil- Aggregate in Place by Nuclear Methods (Shallow Depth)
 - D 3017 Test for Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
 - D 4318 Test for Plastic Limit, Liquid Limit, and Plasticity Index of Soils
 - C 25 Chemical Analysis of Limestone, Quicklime and Hydrate Lime
 - C110 Physical Testing for Quicklime and Hydrated Lime, Wet Sieve Method
 - C618 Specification for Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete

C977 Quicklime and Hydrated Lime for Soil Stabilization

- B. American Association of State Highway and Transportation Officials (AASHTO) latest edition
T88 Mechanical Analysis of Soils

1.04 QUALITY ASSURANCE

- A. Independent Testing Laboratory selected and paid by owner, shall be retained to perform construction testing on site based on the following:
1. Building Subgrade Areas, including 5' -0" Outside Exterior Building Lines: Refer to structural portion of the specifications.
 2. Areas of Construction exclusive of building subgrade: In cut areas, not less than one compaction test for every 10,000 square feet. In fill areas, same rate of testing for each 8" lift (measured loose).
- B. If compaction requirements are not complied with at any time during construction process, remove and recompact deficient areas until proper compaction is obtained at no additional expense to owner.
- C. In all areas to receive pavement, a CBR (or LBR) test shall be performed for each type of material imported from off-site.
- D. The following tests shall be performed on each type of on-site or imported soil material used as compacted fill as part of construction testing requirements.
1. Moisture and Density Relationship: ASTM D 698 or ASTM D1557.
 2. Mechanical Analysis: AASHTO T-88
 3. Plasticity Index: ASTM D 4318
- E. Field density tests for in-place materials shall be performed according to one of the following standards as part of construction testing requirements.
1. Sand-Cone Method: ASTM D 1556
 2. Balloon Method: ASTM D 2167
 3. Nuclear method: ASTM D 2922 (Method B-Direct Transmission)
- F. Independent Testing Laboratory shall prepare test reports that indicate test location, elevation data, and test results. Owner, architect, and contractor shall be provided with copies of reports within 96 hours of time test was performed. In event that any test performed fails to meet these Specifications, owner and contractor shall be notified immediately by independent testing laboratory.
- G. All costs related to retesting due to failures shall be paid for by the contractor at no additional expense to owner. Owner reserves the right to employ an Independent Testing Laboratory and to direct any testing that is deemed necessary. Contractor shall provide free access to site for testing activities.

1.05 SUBMITTALS

- A. Submit a sample of each type of off-site fill materials that is to be used at the site in an air tight, 10 lb container for the testing laboratory.
- B. Submit the name of each material supplier and specific type and source of each material. Any change in source throughout the job requires approval of the owner or engineer.
- C. For use of fabrics or geogrids, a design shall be submitted for approval by the Owner.

PART 2 PRODUCTS

2.01 MATERIALS

-
- A. Excavated and re-used material for subsoil fill as specified herein.
 - B. Imported subsoil material approved by the owner and specified herein.
 - C. Acceptable stabilization fabrics and Geogrids:
 - 1. Mirafi 50OX or 60OX
 - 2. Phillips 66 Supac 6WS
 - 3. Dupont Typar 3401 and 3601
 - 4. Trevira S1114 and S1120
 - 5. Tensar SS-1 and SS-2
 - 6. Exxon GTF-200 or 350
 - D. Filter/Drainage Fabrics
 - 1. Mirafi 14ONS
 - 2. Phillips 66 Supac 4NP
 - 3. Dupont Typar 3341

PART 3 EXECUTION

3.01 PREPARATION

- A. Identify required lines, levels, contours and datum.
- B. Locate and identify existing utilities that are to remain and protect them from damage.
- C. Notify utility companies to remove and/or relocate any utilities that are in conflict with the proposed improvements.
- D. Protect plant life, lawns, fences, existing structures, sidewalks, paving and curbs from excavating equipment and vehicular traffic.
- E. Protect benchmarks, property corners and all other survey monuments from damage or displacement. If a marker needs to be removed it shall be referenced by a licensed land surveyor and replaced, as necessary, by the same.
- F. Remove from site material encountered in grading operations that, in opinion of owner or owners representative, is unsuitable or undesirable for backfilling, subgrade or foundation purposes. Dispose of in a manner satisfactory to owner. Backfill areas with layers of suitable material and compact as specified.
- G. Prior to placing fill in low areas, such as previously existing creeks, ponds, or lakes, perform following procedures:
 - 1. Drain water out by gravity with ditch having flow line lower than lowest elevation in low area. If drainage cannot be performed by gravity ditch, use adequate pump to obtain same results.
 - 2. After drainage of low area is complete, remove mulch, mud, debris, and other unsuitable material by using acceptable equipment and methods that will keep natural soils underlying low areas dry and undisturbed.
 - 3. If proposed for fill, all muck, mud, and other materials removed from above low areas shall be dried on-site by spreading in thin layers for observation by owner or owner's

representative. Material shall be inspected and, if found to be suitable for use as fill material, shall be incorporated into lowest elevation of site filling operation, but not under the building area or within perimeter of building pad or paving subgrade. If, after observation by owner or owners representative, material is found to be unsuitable, all unsuitable material shall be removed from site.

3.02 EXCAVATION FOR FILLING AND GRADING

- A. Classification of Excavation: Contractor by submitting bid acknowledges that he has investigated the site to determine type, quantity, quality, and character of excavation work to be performed. Excavation shall be considered unclassified excavation, except as indicated by "Article 4 - Administration of the Contract" in the "Supplementary Conditions" portion of the specification.
- B. Perform excavation using capable, well maintained equipment and methods acceptable to owner and governing agencies.
- C. When performing grading operations during periods of wet weather, provide adequate drainage and ground water management to control moisture of soils.
- D. Shore, brace, and drain excavations as necessary to maintain safe, secure, and free of water at all times.
- E. Excavated material containing rock or stone greater than 6" in largest dimension is unacceptable as fill to within the proposed building and paving area.
- F. Rock or stone less than 6" in largest dimension is acceptable as fill to within 24" of surface of proposed subgrade when mixed with suitable material.
- G. Rock or stone less than 2" in largest dimension and mixed with suitable material is acceptable as fill within the upper 24" of proposed subgrade.

3.03 FILLING AND SUBGRADE PREPARATION

- A. Fill areas to contours and elevations shown with unfrozen materials.
- B. Place fill in continuous lifts specified herein.
- C. Refer to Section 023350 for filling requirements for pavements.
- D. Areas exposed by excavation or stripping and on which subgrade preparations are to be performed shall be scarified to minimum depth of 8" and compacted to minimum of 95% of optimum density, in accordance with ASTM D 698 (or 92% of optimum density, in accordance with ASTM D 1557), at a moisture content of not less than 1% below and not more than 3% above the optimum moisture content. These areas shall then be proofrolled to detect any areas of insufficient compaction. Proofrolling shall be accomplished by making a minimum of two (2) complete passes with a fully-loaded tandem-axle dump truck, or approved equivalent, in each of the two perpendicular directions under the supervision and direction of a field geotechnical engineer. Areas of failure shall be excavated and recompacted as stated above.
- E. Fill materials used in preparation of subgrade shall be placed in lifts or layers not to exceed 8" loose measure and compacted to a minimum density of 95% of optimum density, in accordance with ASTM D 698, (or 92% of the optimum density, in accordance with ASTM D 1557) at a moisture content of not less than it below and not more than 3% above the optimum moisture content.
- F. Material imported from off -site shall have a CBR (California Bearing Ratio) or LBR (Limerock Bearing Ratio) value equal to or above the pavement design subgrade CBR or LBR value indicated on the Drawings.

3.04 FINISH GRADING

- A. Grade all areas where finish grade elevations or contours are indicated on Drawings, other than paved areas and buildings, including excavated areas, filled and transition areas, and landscaped

areas. Graded areas shall be uniform and smooth, free from rock, debris, or irregular surface changes. Finished subgrade surface shall not be more than 0.10 feet above or below established finished subgrade elevation, and all ground surfaces shall vary uniformly between indicated elevations. Finish ditches shall be graded to allow for proper drainage without ponding and in a manner that will minimize erosion potential. For topsoil application, refer to Section 02900 Landscaping.

- B. Correct all settlement and eroded areas within one year after date of completion at no additional expense to owner. Bring grades to proper elevation. Replant or replace any grass, shrubs, bushes, or other vegetation that appears dead, dying or disturbed by construction activities. Refer to Section 023700 for slope protection and erosion control.

END OF SECTION

**SECTION 02311
ROUGH GRADING**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Cutting, grading, filling, rough contouring, compacting, and shaping the site around the area ways.

1.2 RELATED SECTIONS

- A. Section 01400 – Quality Requirements.
- B. Section 02200 – Earthwork

1.3 REFERENCES

- A. ASTM C136 - Method For Sieve Analysis of Fine and Coarse Aggregates.
- B. ASTM D1556 - Test Method for Density of Soil in Place by the Sand-Cone Method.
- C. ASTM D2419 - Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
- D. ASTM D2434 - Test Method for Permeability of Granular Soils (Constant Head).
- E. ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with ASTM C136.

1.5 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Section 01700.
- B. Accurately record actual locations of utilities remaining by horizontal dimensions.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Subsoil Fill: Common sandy loam typical to the agricultural area.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify site conditions under provisions of Section 01039.
- B. Verify that survey bench mark and intended elevations for the Work are as indicated.

3.2 PREPARATION

- A. Identify required lines, levels, contours, and datum.
- B. Stake and flag locations of known utilities.
- C. Locate, identify, and protect utilities that remain, from damage.
- D. Notify utility company to remove and relocate utilities to allow for the improvements to proceed.
- E. Protect above and below grade utilities that remain.
- F. Protect plant life, lawns, and other features remaining as a portion of final landscaping.
- G. Protect bench marks, survey control point, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

3.3 FILLING

- A. Install Work in accordance with designated requirements.
- B. Fill areas to contours and elevations with soil materials.
- C. Place fill material on continuous layers and compact.
- D. Maintain optimum moisture content of fill materials to attain required compaction density.
- E. Slope grade away from building minimum 2 inches in 10 ft unless noted otherwise.
- F. Make grade changes gradual. Blend slope into level areas.

3.4 TOLERANCES

- A. Top Surface of Subgrade: Plus or minus 6 inches from required elevation.

3.5 FIELD QUALITY CONTROL

- A. Section 01400 - Quality Requirements: Field inspection and testing for compaction. Compact to minimum 95 percent of maximum density.

END OF SECTION

SECTION 02 37 00
SLOPE PROTECTION AND EROSION CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Temporary and permanent erosion control systems.
- B. Slope Protection Systems.

1.02 RELATED SECTIONS

- A. Section 022300 - Site Preparation
- B. Section 023000 - Earthwork
- C. Erosion Control Plan
- D. Construction Drawings

1.03 ENVIRONMENTAL REQUIREMENTS

- A. The contractor shall protect adjacent properties and water resources from erosion and sediment damage throughout the life of the contract. Construct temporary erosion control systems as shown on the plans or as directed by the engineer to protect adjacent properties and water resources from erosion and sedimentation.
- B. Work on this project will disturb more than one (1) or more acres, the contractor shall **NOT** begin construction without a "National Pollution Discharge Elimination System" (NPDES) permit governing the discharge of storm water from the construction site for the entire construction period. The permit requires a "Storm Water Pollution Prevention Plan" (SWPPP) to be in place during construction which includes monitoring of storm water flows during construction. This must be approved by the City of Edinburg PRIOR to the start of construction.
- C. The contractor shall be totally responsible for conducting the storm water management practices in accordance with the NPDES permit and for any enforcement action taken or imposed by Federal or State agencies, including the cost of fines, construction delays and remedial actions resulting from the contractor's failure to comply with all provisions of the NPDES permit.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Quick growing grasses such as wheat, rye or oats.
- B. Hay or straw bales.
- C. Fencing for siltation control as specified on the plans.
- D. Curlex blankets by American Excelsior Company or approved equal.
- E. Bale stakes for each bale shall be a minimum of 4 feet in length and shall be either 2 #4 rebars, 2 steel pickets or 2-2"x2" hardwood stakes driven 1'-6" to 2'-0" into ground.
- F. Temporary mulches such as loose hay, straw, netting, wood cellulose or agricultural silage.
- G. Fence stakes shall be metal stakes a minimum of 8 feet in length.
- H. RipRap (See Section 02200)

PART 3 EXECUTION

3.01 PREPARATION

-
- A. Review site erosion control plan.
 - B. Deficiencies or changes in the erosion control plan as it is applied to current conditions will be brought to the attention of the Owner and the Engineer for remedial action.

3.02 EROSION CONTROL AND SLOPE PROTECTION IMPLEMENTATION

- A. Place erosion control systems in accordance with the erosion control plan.
- B. The Owner has the authority to limit the surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow and embankment operations and to direct the contractor to provide immediate permanent or temporary pollution control measures. The contractor will be required to incorporate all permanent erosion control features into the project at the earliest practical time to minimize the need for temporary controls. Cut slopes shall be permanently seeded and mulched as the excavation proceeds to the extent considered desirable and practical.
- C. The temporary erosion control systems installed by the contractor shall be maintained as directed by the Owner to control siltation at all times during the life of the -contract. The contractor must respond to any maintenance or additional work ordered by the Owner within a 48 hour period.
- D. Any additional material and work required and authorized by the Owner which is beyond the extent of the erosion control plan shall be paid for by the owner.
- E. Slopes that erode easily shall be temporary seeded as the work progresses with a wheat, rye or oats application.

END OF SECTION

**SECTION 02 77 00
CURB AND SIDEWALKS**

PART I GENERAL

1.01 SECTION INCLUDES

- A. Combination concrete curb and gutter
- B. Concrete Curb
- C. Concrete Flume
- D. Concrete Sidewalk

1.02 RELATED SECTIONS

- A. Section 022300 - Site Preparation.
- B. State Highway Department Standard Specifications.
- C. Construction Drawings.
- D. Geotechnical Report; in the case of discrepancies between the Geotechnical Report and this section, the more restrictive of the two shall govern.

1.03 REFERENCES

- A. ACI 304 - Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.
- B. ANSI/ASTM D1751 - Preformed Expansion Joint Fillers for Concrete Paving and Structural construction.
- C. ANSI/ASTM D1752 - Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
- D. AS774 C33 - Concrete Aggregates.
- E. ASTM C94 - Ready Mix Concrete.
- F. AS7M C150 - Portland Cement
- G. AS7M C260 - Air-Entraining Admixtures for Concrete.
- H. ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete.
- I. AS7M C494 - Chemical Admixtures for Concrete.
- J. FS TT-C-800 - Curing Compound, Concrete, for New and Existing Surfaces.

1.05 PERFORMANCE REQUIREMENTS

- A. Contractor shall maintain access for vehicular and pedestrian traffic as required for other construction activities. Utilize temporary striping, flagmen, barricades, warning signs, and warning lights as required.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Forms: Steel, wood, or other suitable material of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal. Use straight forms, free of distortion and defects. Use flexible spring steel forms or laminated boards to form radius bends as required. The forms shall be of a depth equal to the depth of curbing or sidewalk, and so designed as to permit secure fastening together at the tops. Coat forms with non-staining type coating that will not discolor or deface surface of concrete.
- B. Concrete Materials: Comply with requirements of applicable Section 03300 for concrete materials, admixtures, bonding materials, curing materials, and others as required.

- C. Joint Fillers: Resilient premolded bituminous impregnated fiberboard units complying with ASTM D 1751 FS HH-F-341, Type II, Class A; or AASHTO M 153, Type I.
- D. Joint Sealers: Non-priming, pourable, self -leveling polyurethane. Acceptable sealants are Sonneborn "Sonolastic Paving Joint Sealant" Sonneborn "Sonomeric CT 1 Sealant", Sonneborn "Sonomeric CT 2 Sealant", Mameco "Vulken 4511, or Woodmont Products 'Chem-Caulk".

2.02 MIX DESIGN AND TESTING

- A. Concrete mix design and testing shall comply with requirements of applicable Section 03300.
- B. Design mix to produce normal weight concrete consisting of Portland cement, aggregate, water-reducing admixture, air-entraining admixture, and water to produce the following properties:
 - 1. Compressive Strength: 3,500 psi, minimum at 28 days, unless otherwise indicated on the Drawings.
 - 2. Slump Range: maximum 5" at time of placement.
 - 3. Air Entrainment: 3% to 5%.

PART 3 EXECUTION

3.01 PREPARATION

- A. Proof-roll prepared base material surface to check for unstable areas. The paving work shall begin after any unsuitable areas have been corrected and are ready to receive paving. Compaction testing for the base material shall be completed prior to the placement of the paving.
- B. Surface Preparation: Remove loose material from compacted base material surface to produce a firm, smooth surface immediately before placing concrete.

3.02 INSTALLATION

- A. Form Construction
 - 1. Set forms to required grades and lines, rigidly braced and secured.
 - 2. Install sufficient quantity of forms to allow continuance of work and so that forms remain in place a minimum of 24 hours after concrete placement.
 - 3. Check completed formwork for grade and alignment to following tolerances:
 - Top of forms not more than 1/8" in 10' – 0".
 - Vertical face on longitudinal axis, not more than 1/4" in 10'-0".
 - 4. Clean forms after each use, and coat with form release agent as often as required to ensure separation from concrete without damage.
- B. Concrete Placement
 - 1. Comply with applicable requirements of Section 03300.
 - 2. Do not place concrete until base material and forms have been checked for line and grade. Moisten base material if required to provide uniform dampened condition at time concrete is placed. Concrete shall not be placed around manholes or other structures until they are at the required finish elevation and alignment.
 - 3. Place concrete using methods which prevent segregation of mix. Consolidate concrete along face of forms and adjacent to transverse joints with internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Consolidate with care to prevent dislocation of dowels, and joint devices.
 - 4. Deposit and spread concrete in continuous operation between transverse joints, as far as possible. If interrupted for more than 1/2 hours, place construction joint. Automatic machine may be used for curb and gutter placement at Contractor's option. machine

placement must produce curbs and gutters to required cross section, lines, grades, finish, and jointing as specified for formed concrete. If results are not acceptable, remove and replace with formed concrete as specified.

C. Joint Construction

1. Contraction Joints: Concrete curb, concrete gutter or concrete curb and gutter, where specified on the plans, shall be constructed in uniform sections of the length specified on the plans. The joints between sections shall be formed either by steel templates 1/8 inch in thickness, of a length equal to the width of the gutter and/or curb, and with a depth which will penetrate at least 2 inches below the surface of the curb and/or gutter; or with 3/4-inch thick preformed expansion joint filler cut to the exact cross section of the curb and/or gutter; or by sawing to a depth of at least 2 inches while the concrete is between 4 to 24 hours old. If steel templates are used, they shall be left in place until the concrete has set sufficiently to hold its shape, but shall be removed while the forms are still in place.
2. Longitudinal Construction Joints: Concrete curb, concrete gutter or combination concrete curb and gutter, where specified on the plans, shall be tied to concrete pavement with 1/2 inch round deformed reinforcement bars of the length and spacing shown on the plans.
3. Transverse Expansion Joints: Transverse expansion joint in curb, curb and gutter, gutter or sidewalk shall have the filler cut to the exact cross section of the curb, curb and gutter, gutter or sidewalk. The joints shall be similar to the type of expansion joint used in the adjacent pavement.

- D. Joint Fillers: Extend joint fillers full-width and depth of joint, and not less than 1/2" or more than 1" below finished surface where joint sealer is indicated. Furnish joint fillers in one-piece lengths for full width being placed, wherever possible where more than one length is required, lace or clip joint filler sections together.

- E. Joint Sealants: All joints shall be sealed with approved exterior pavement joint sealants and shall be installed per manufacturer's recommendations.

3.03 CONCRETE FINISHING

- A. After striking off and consolidating concrete, smooth surface by screeding and floating. Adjust floating to compact surface and produce uniform texture. After floating, test surface for trueness with 10'-0" straightedge. Distribute concrete as required to remove surface irregularities, and refloat repaired areas to provide continuous smooth finish.
- B. Work edges of sidewalks, gutters, back top edge of integral curb, and formed joints with an edging tool, and round to 1/21, radius. Eliminate tool marks on concrete surface. After completion of floating and troweling when excess moisture or surface sheen has disappeared, complete surface finishing, as follows:
1. Inclined Slab Surfaces: Provide coarse, non-slip finish by scoring surface with stiff-bristled broom perpendicular to line of traffic.
 2. Curbs, gutters, and walks: Broom finish by drawing fine-hair broom across surface perpendicular to line of traffic. Repeat operation as necessary to produce a fine line texture.
- C. Do not remove forms for 24 hours after concrete has been placed. After form removal, clean ends of joints and point up any minor honeycombed areas. Remove and replace areas or sections with major defects, as directed.
- D. Protect and cure finished concrete paving using acceptable moist-curing methods, more particularly described in the "water-curing" section of ACI 308-81.

3.04 BACKFILL

After the concrete has set sufficiently, the spaces in front and back of the curb and gutter or sidewalk shall be refilled to the required elevation with suitable material which shall be compacted until firm and solid and neatly graded.

3.05 CLEANING AND ADJUSTING

- A. Sweep concrete pavement and wash free of stains, discolorations, dirt, and other foreign material just prior to final inspection.
- B. Protect concrete from damage until acceptance of work. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials.

END OF SECTION

SECTION 03100
CONCRETE FORMS AND ACCESSORIES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Formwork for cast-in place concrete, shoring, bracing and anchorage for the south entrance and ramp and sidewalks.
- B. Form accessories.
- C. Form stripping.

1.2 PRODUCTS INSTALLED BUT NOT FURNISHED UNDER THIS SECTION

- A. Section 03300 – Cast-In-Place Concrete: Placement of concrete accessories.
- B. Section 05500 – Metal Fabrications: Placement of metal fabrications.
- C. Division Fifteen: Placement of mechanical items.
- D. Division Sixteen: Placement of electrical items.

1.3 RELATED SECTIONS

- A. Section 03200 - Concrete Reinforcement.
- B. Section 03300 - Cast-In-Place Concrete.
- C. Section 03350 - Concrete Finishing.

1.4 REFERENCES

- A. ACI 301 - Structural Concrete for Buildings.
- B. ACI 318 - Building Code Requirements for Reinforced Concrete.
- C. ACI 347 - Recommended Practice For Concrete Formwork.
- D. ANSI/ASTM A17.1 - Safety Code for Elevators, Dumbwaiters, Escalators, and Moving Walks.
- E. PS 1 - Construction and Industrial Plywood.

1.5 DESIGN REQUIREMENTS

- A. Design, engineer and construct formwork, shoring and bracing to conform to design and code requirements; resultant concrete to conform to required shape, line and dimension.

1.6 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Shop Drawings: Indicate pertinent dimensions, materials, bracing, and arrangement of joints and ties.

1.7 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 301 and 318.

1.8 REGULATORY REQUIREMENTS

- A. Conform to 2000 International Building Code for fabrication, erection and removal of formwork.

1.9 COORDINATION

- A. Coordinate work under provisions of section 01300.
- B. Coordinate this Section with other Sections of work which require attachment of components to formwork.

PART 2 PRODUCTS

2.1 WOOD FORM MATERIALS

- A. Plywood: Douglas Fir species; solid one side sound undamaged sheets with clean, true edges.
- B. Lumber: SPF species; #2 grade; with grade stamp clearly visible.

2.2 PREFABRICATED FORMS

- A. Preformed Steel Forms: Minimum 16 gauge matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.
- B. Glass Fiber Fabric Reinforced Plastic Forms: Matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished concrete surfaces.

2.3 FORMWORK ACCESSORIES

- A. Form Ties: Removable snap-off type, metal, fixed length, cone type, with waterproofing washer. 1 inch back break dimension, free of defects that could leave holes larger than 1 inch in concrete surface.
- B. Form Release Agent: Colorless mineral oil which will not stain concrete, or absorb moisture.
- C. Corners: Chamfer wood strip type; 3/4 x 3/4 inch.
- D. Dovetail Anchor Slot: Galvanized steel, 22 gauge thick, foam filled.
- E. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.
- F. Waterstops: Rubber, minimum 1,750 psi tensile strength, minimum 50 degrees F to plus 175 degrees F working temperature range,, 6 inches wide, maximum possible lengths, ribbed profile, preformed corner sections, heat welded jointing.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with drawings.

3.2 EARTH FORMS

- A. Hand trim sides and bottom of earth forms. Remove loose soil prior to placing concrete.

3.3 ERECTION – FORMWORK

- A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI 301.
- B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to over stressing by construction loads.
- C. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.
- D. Align joints and make watertight. Keep form joints to a minimum.
- E. Obtain approval before framing openings in structural members which are not indicated on Drawings.
- F. Provide fillet chamfer strips on external corners of beams and columns.

3.4 APPLICATION - FORM RELEASE AGENT

- A. Apply form release agent on formwork in accordance with manufacturer's recommendations.
- B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.
- C. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings which are effected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

3.5 INSERTS, EMBEDDED PARTS, AND OPENINGS

- A. Provide formed openings where required for items to be embedded in passing through concrete work.
- B. Locate and set in place items which will be cast directly into concrete.
- C. Coordinate with work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other Work.
- D. Position recessed reglets for brick veneer masonry anchors to spacing and intervals specified in Section 04820.
- E. Install accessories in accordance with manufacturer's instructions, straight, level, and plumb. Ensure items are not disturbed during concrete placement.
- F. Install waterstops continuous without displacing reinforcement. Heat seal joints watertight.
- G. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.
- H. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.

3.6 FORM CLEANING

- A. Clean forms as erection proceeds, to remove foreign matter within forms.
- B. Clean formed cavities of debris prior to placing concrete.
- C. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.

3.7 FORMWORK TOLERANCES

- A. Construct formwork to maintain tolerances required by ACI 301.
- B. Construct and align formwork for elevator hoistway in accordance with ANSI/ASME A17.1.
- C. Camber slabs and beams 1/4 inch per 10 feet in accordance with ACI 301.

3.8 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.

3.9 FORM REMOVAL

- A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.
- B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.
- C. Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.

END OF SECTION

SECTION 03151
CONCRETE ANCHORING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. General purpose anchors for horizontal and vertical applications.
- B. Adhesive anchors and inserts.
- C. Suspended ceiling hanger anchors.
- D. Anchors for light duty horizontal applications where holding power is not critical.
- E. Deck inserts for threaded rods or bolts.

1.2 RELATED SECTIONS

- A. Section 03300 - Cast-in-Place Concrete: Concrete that anchors are to be installed in, and other types of cast in place inserts.
- B. Section 04810 - Unit Masonry Assemblies: Masonry that anchors are to be installed in.
- C. Section 05120 - Structural Steel: Steel members that anchors are to be installed in.

1.3 REFERENCES

- A. ASTM A 193/A 193M - Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service; 2001b.
- B. ASTM A 194/A 194M - Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High-Pressure or High-Temperature Service, or Both; 2001a.
- C. ASTM A 307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength; 2000.
- D. ASTM A 563 - Standard Specification for Carbon and Alloy Steel Nuts; 2000.
- E. ASTM A 615/A 615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement; 2001b.
- F. ASTM B 633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 1998.
- G. ASTM B 695 - Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel; 2000.
- H. ASTM C 881 - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete; 1999.
- I. ASTM F 436 - Standard Specification for Hardened Steel Washers; 1993 (Reapproved 2000).
- J. ASTM F 593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs; 2002.
- K. SAE J429 - Mechanical and Material Requirements for Externally Threaded Fasteners; Society of Automotive Engineers; 1999.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Sizes, locations, and spacing.
 - 2. Installation methods.
- C. Engineering Design Data: For each structural application, provide data substantiating specified design requirements, signed by design engineer.

1.5 PROJECT CONDITIONS

- A. For adhesive anchors, maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Powers Fasteners, Inc; 2 Powers Square, New Rochelle, NY 10801. ASD. Tel: (914) 235-6300. Fax: (914) 576-6483. www.powers.com.
- B. Substitutions: Not permitted.
- C. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 MATERIALS

- A. Concrete Anchors - General: Select type and size to achieve required loading capacity using information provided by manufacturer.
 - 1. If required type is not indicated, select type appropriate to conditions and item being fastened.
 - 2. If required loading capacity is not indicated on the drawings, determine required loading capacity in

- accordance with accepted engineering principles and as required by applicable code.
3. For structural applications, provide engineering design by professional engineer licensed in the State in which the project is located.
 4. Use recommended and appropriate safety factors and load reduction factors.
 5. For non-structural applications, space anchors as required to support the material being anchored without sagging or deformation.
- B. Anchors for Horizontal Light Duty Applications Where Holding Power is Not Critical: Use one of the following:
1. Acceptable Product: Bantam Plug or Fluted Plastic Anchor; injection molded plastic expansion sleeve for sheet metal and wood screws.
 2. Acceptable Product: Scru-Lead; tubular lead alloy with flange, for sheet metal and wood screws.
 3. Acceptable Product: Fiberplug; tubular shaped braided jute fiber screw anchor with antimonial lead lining, for sheet metal and wood screws.
 4. Acceptable Product: Hammer Drive Pins; 1/4 inch (6 mm) diameter knob head pin with 0.14 inch (3.5 mm) shank and 3/8 inch (9.5 mm) diameter washer as tool guide; heat treated carbon steel, plated in accordance with ASTM B 633, SC1, Type III.
 5. Acceptable Product: Calk-In; tool-set expansion type, pre-assembled antimonial lead alloy calking sleeve and Zamac alloy internally-threaded expander cone, into which machine bolt or screw is inserted and tightened.
 6. Acceptable Product: Lag Shield; Zamac alloy screw style anchor for lag bolts.
 7. Acceptable Product: Single; expansion type pre-assembled machine bolt anchor with Zamac alloy expansion shield and internally threaded expander cone.
 8. Acceptable Product: Double; dual expansion type pre-assembled machine bolt anchor with twin tubular sleeves bound together with high tension spring steel bands that contain two protruding wedge shaped cones; Zamac alloy.
 9. Acceptable Product: Nylon Nailin; driven type, pre-assembled nail drive anchor with nylon body.
 - a. Mushroom head carbon steel nail plated in accordance with ASTM B 633, SC1, Type III.
 - b. Flat head carbon steel nail plated in accordance with ASTM B 633, SC1, Type III.
 - c. Round head carbon steel nail plated in accordance with ASTM B 633, SC1, Type III.
 - d. Mushroom head Type 304 stainless steel nail.
 10. Acceptable Product: Zamac Nailin; driven type, pre-assembled nail drive anchor with Zamac alloy body.
 - a. Mushroom head; carbon steel nail plated in accordance with ASTM B 633, SC1, Type III.
 - b. Flat head; carbon steel nail plated in accordance with ASTM B 633, SC1, Type III.
 - c. Mushroom head; Type 304 stainless steel nail.
- C. Deck Inserts: For installation through deck or forms prior to placement of concrete; different diameters color coded for threaded rods or bolts in sizes from 1/4 inch (6 mm) to 3/4 inch (19 mm) diameter; six-sided impact plate providing resistance to rotation; heat treated carbon steel insert plated in accordance with ASTM B 633.
1. For Steel Deck: Bang-It; for installation in pre-drilled holes, with protective sleeve protruding below deck to prevent applied materials from clogging threads or hiding location.
 2. For Wood Forms: Wood-Knocker, color coded flange on surface of concrete after stripping. Prior to pouring concrete over the wood form, place the Wood-Knocker Concrete Insert (break-off nails down) on the surface of the wood form at the desired location. Strike the impact plate of the insert with a hand held hammer, until the plastic color-coded flange is flush with the wood surface.
- D. Suspended Ceiling Hanger Anchors: Tie-wire head; use one of the following:
1. Acceptable Product: The Power-Stud; (formerly known as the Rawl-Stud), one piece, wedge type expansion anchor.
 - a. Mechanically galvanized carbon steel anchor body with stainless steel wedges.
 - b. Stainless steel Type 304.
 - c. Stainless steel Type 316.
 2. Acceptable Product: Drive; driven type, pre-expanded one-piece unit, heat treated carbon steel, plated in accordance with ASTM B 633, SC1, Type III.
 3. Acceptable Product: SPIKE; driven type, pre-expanded one-piece unit that develops compression forces at three different levels in bottom of anchor hole; carbon steel, Grade 8.2, plated in accordance with ASTM B 633, SC1, Type III.
 4. Acceptable Product: Lok-Bolt; torqued expansion type; pre-assembled sleeve style, with triple tined expansion sleeve; carbon steel plated in accordance with ASTM B 633, SC1, Type III.
- E. Vertical Rod Anchors: Rod hanger head internally threaded to accept steel threaded rod or threaded bolt; use

one of the following:

1. Acceptable Product: The Power-Stud; (formerly known as the Rawl-Stud), one piece, wedge type expansion anchor.
 - a. Mechanically galvanized carbon steel anchor body with stainless steel wedges.
 - b. Stainless steel Type 304.
 - c. Stainless steel Type 316.
2. Acceptable Product: Rod Hanger Lok-Bolt; torqued expansion type; pre-assembled sleeve style, with triple tined expansion sleeve; carbon steel plated in accordance with ASTM B 633, SC1, Type III.
3. Acceptable Product: Vertigo; hardened carbon steel plated in accordance with ASTM B 633, SC1, Type III.
 - a. For Wood: Thread forming wood screw; either vertical or side mounting of rod/bolt.
 - b. For Steel: Self-drilling, self-tapping screw; either vertical or side mounting of rod/bolt.
 - c. For Concrete: Double lead threaded bolt with integral washer, to be installed in hole pre-drilled using matched tolerance bit; vertical mounting of rod/bolt.
- F. Capsule Adhesive Anchors: Combination capsule adhesive and hardware; Chem-Stud; chisel pointed threaded rod, reinforcing bar (by Contractor), or internally threaded insert, installed into pre-drilled anchor hole using rotary hammer drill, crushing glass capsule containing two part epoxy acrylate resin (vinyl ester) with quartz aggregate and hardening agent, forming adhesive mortar.
 1. ASTM A307, carbon steel, chisel pointed threaded rod.
 2. ASTM A193, grade B7, chisel pointed threaded rod.
 3. Type 304 stainless steel, chisel pointed threaded rod.
 4. Carbon steel, internally threaded inserts.
- G. Capsule Adhesive Anchors: Combination capsule adhesive and hardware; Hammer-Capsule; threaded rod or reinforcing bar (by Contractor), driven into pre-drilled anchor hole, crushing glass capsule containing two part epoxy acrylate resin (vinyl ester) with quartz aggregate and hardening agent, forming adhesive mortar; not requiring spinning action or special tools to mix adhesive.
 1. Capsule shelf life of two years, minimum.
 2. Threaded Rod: ASTM A 307, carbon steel plated in accordance with ASTM B 633, SC1, with Type III clear chromate treatment.
 3. Threaded Rod: ASTM A 193 Grade B7, ASTM A 194 Grade 2H or ASTM A 563 Grade DH nuts, and ASTM F 436 washers; plated in accordance with ASTM B 633, SC1, with Type II yellow chromate treatment.
 4. Threaded Rod: Type 304 stainless steel, passivated.
- H. Injection Adhesive: Type recommended by manufacturer for application and use, rated for loadings and anchored items required.
 1. Acceptable Product: AC100 PLUS; two component, all weather, high performance, zero VOC, epoxy acrylate, complying with descriptive requirements of ASTM C 881, Type IV, Grade 3, Classes A, B, and C, except for gel time; mixed and dispensed through motionless, static mixing nozzle and dispensing tool; shelf life of 18 months, minimum.
 2. Acceptable Product: Power-Fast Plus; two component, structural grade, odorless amine based epoxy resin, complying with ASTM C 881, Types I, II, IV, and V, Grade 3, Classes B and C; mixed and dispensed through motionless static mixing nozzle; shelf life of two years, minimum, NSF 61 approved.
- I. Anchors and Inserts for Drilled Anchor Holes with Injection Adhesive:
 1. Threaded Rod: ASTM A 307, carbon steel plated in accordance with ASTM B 633, SC1, with Type III clear chromate treated.
 2. Threaded Rod: ASTM A 193 Grade B7, ASTM A 194 Grade 2H or ASTM A 563 Grade DH nuts, and ASTM F 436 washers; plated in accordance with ASTM B 633, SC1, with Type II yellow chromate treatment.
 3. Threaded Rod: Type 304 stainless steel, passivated.
 4. Reinforcing Bars: ASTM A 615/A 615M, Grade 60.
- J. General Purpose Anchors: Use one of the following:
 1. Acceptable Product: Wedge-Bolt; one piece screw anchor with finished hex head with integral washer, double lead thread, chamfered tip, ratchet teeth on underside of head to be installed in hole pre-drilled using matched tolerance bit; head stamped with diameter and length.

- a. Carbon Steel Wedge-Bolt installed with Wedge-Bit. Plated in accordance with ASTM B 633, SC1, Type III.
 - b. Carbon Steel Wedge-Bolt installed with ANSI Drill Bit. Plated in accordance with ASTM B 633, SC1, Type III.
 - c. Type 410 Stainless Steel Wedge-Bolt installed with Wedge-Bit.
2. Acceptable Product: Power-Bolt; torque-controlled, self-undercutting type; pre-assembled heavy duty sleeve style, with internal bolt, nylon compression ring, expansion cone with oversized annular ring that expands to undercut the base material.
 - a. Hex head, Grade 5 carbon steel, plated in accordance with ASTM B 633, SC1, Type III.
 - b. Flat head, Grade 5 carbon steel, plated in accordance with ASTM B 633, SC1, Type III.
 - c. Type 303 or 304 stainless steel, ASTM F 593 hex head.
3. Acceptable Product: Power-Stud; torque-controlled, wedge type; one piece body with expansion mechanism consisting of two interlocking independent wedges; head marked with length code; for installation by driving into same diameter hole and expanding by turning nut.
 - a. Carbon steel anchor body and wedges, plated in accordance with ASTM B 633, SC1, Type III.
 - b. Mechanically galvanized carbon steel anchor body with stainless steel wedges.
 - c. Type 304 stainless steel anchor body and wedges.
 - d. Type 316 stainless steel anchor body and wedges.
4. Acceptable Product: Lok-Bolt; torque-controlled, expansion type; pre-assembled sleeve style, with nylon compression ring and triple tined expansion sleeve.
 - a. Carbon steel plated in accordance with ASTM B 633, SC1, Type III.
 - b. Stainless steel.
 - c. Head: Hex nut.
 - d. Head: Acorn nut.
 - e. Head: Round head.
 - f. Head: Flat head.
5. Acceptable Product: Set-Bolt; driven deformation type, one piece stud style anchor with bottom-bearing external expansion plug; carbon steel plated in accordance with ASTM B 633, SC1, Type III; attached fixture secured with nut and washer on exposed screw threads.
6. Acceptable Product: SPIKE; driven deformation type, pre-expanded one-piece unit that develops compression forces at three different levels in bottom of anchor hole.
 - a. Carbon Steel, Mushroom Head.
 - b. Carbon Steel, Flat Head.
 - c. Type 316 Stainless Steel, Mushroom Head.
 - d. Carbon Steel Pipe Spike.
 - e. Carbon Steel Tie Wire.
7. Acceptable Product: Drive; driven deformation type, pre-expanded one-piece unit, heat treated carbon steel, plated in accordance with ASTM B 633, SC1, Type III.
 - a. Head: Round (tamperproof).
 - b. Head: Flat (tamperproof).
8. Acceptable Product: Zamac HAMMER-SCREW; driven deformation type, pre-assembled nail drive anchor with mushroom style head and Zamac alloy body; Phillips screw head for removal.
 - a. Carbon steel screw plated in accordance with ASTM B 633, SC1, Type III.
 - b. Type 304 stainless steel screw.
9. Acceptable Product: Zamac NAILIN; driven deformation type, pre-assembled nail drive anchor with Zamac alloy body.
 - a. Zinc alloy, mushroom head, carbon steel drive pin.
 - b. Zinc alloy, flat head, carbon steel drive pin.
 - c. Zinc alloy, mushroom head, stainless steel drive pin.
10. Acceptable Product: Nylon NAILIN; driven deformation type, pre-assembled nail drive anchor with nylon body.
 - a. Nylon, round head, carbon steel drive pin.
 - b. Nylon, flat head, carbon steel drive pin.
 - c. Nylon, mushroom head, carbon steel drive pin.
 - d. Nylon, mushroom head, stainless steel drive pin.
11. Acceptable Product: TAPPER; one-piece screw anchor.
 - a. Carbon steel with white Perma-Seal fluoropolymer coating.

- b. Carbon steel with blue Perma-Seal fluoropolymer coating.
 - c. Carbon steel with silver Perma-Seal fluoropolymer coating.
 - d. Carbon steel with bronze Perma-Seal fluoropolymer coating.
 - e. Type 304 stainless steel.
 - f. Type 410 stainless steel.
 - g. Carbon steel. Zinc plated
 - h. Head: Hex washer.
 - i. Head: Flat Phillips.
12. Acceptable Product: Hollow-Set Dropin; tool-set expansion type, pre-assembled tapered slotted expansion sleeve of Zamac alloy with threaded steel expansion cone, into which machine bolt is inserted and tightened.
- a. Expansion Cone: Plated in accordance with ASTM B 633, SC1, Type III.
 - b. Expansion Cone: Type 304 stainless steel.
13. Acceptable Product: Steel Dropin; tool-set expansion type, pre-assembled shell style with internal expansion plug, into which machine bolt is inserted and tightened.
- a. Carbon steel, smooth wall
 - b. Carbon steel, flange (lipped).
 - c. Carbon steel, coil thread.
 - d. Type 303 stainless steel, smooth wall.
 - e. Type 316 stainless steel, smooth wall.
14. Acceptable Product: Mini Dropin; tool-set expansion type, pre-assembled shell style with internal expansion plug, into which machine bolt is inserted and tightened; embedment of 3/4 inch (19 mm) maximum; carbon steel plated in accordance with ASTM B 633, SC1, Type III. Sizes as required for application.
- a. Size: 1/4 inch (6 mm).
 - b. Size: 3/8 inch (9.5 mm).
 - c. Size: 1/2 inch (12 mm).
 - d. As required.
15. Acceptable Product: Powder actuated drive pins and threaded studs, with guide washers or flutes; for standard low-velocity installation tools.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions and recommendations and as required by applicable code.
- B. Apply anchor items neatly, with anchor mounted plumb and level unless otherwise indicated.

3.4 FIELD QUALITY CONTROL

- A. The Architect/Engineer reserves the right to require the anchor manufacturer's representative to demonstrate proper installation procedures for post-installed anchors and to observe Contractor's installation procedures, at no extra cost to Owner.
- B. The Architect/Engineer reserves the right to require pullout or shear tests to determine adequacy of anchors, at no extra cost to Owner

END OF SECTION

SECTION 03200
CONCRETE REINFORCEMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Reinforcing steel bars, wire fabric and accessories for cast-in-place.

1.2 RELATED SECTIONS

- A. Section 03100 – Concrete Forms and Accessories.
- B. Section 03300 – Cast-In-Place Concrete.
- C. Section 04230 – Reinforced Concrete Unit Masonry.

1.3 REFERENCES

- A. ACI 301 - Structural Concrete for Buildings.
- B. ACI 318 - Building Code Requirements for Reinforced Concrete.
- C. ACI SP-66 - American Concrete Institute - Detailing Manual.
- D. ANSI/ASTM A82 - Cold Drawn Steel Wire for Concrete Reinforcement.
- E. ANSI/ASTM A184 - Fabricated Deformed Steel Bar Mats for Concrete Reinforcement.
- F. ANSI/ASTM A185 - Welded Steel Wire Fabric for Concrete Reinforcement.
- G. ANSI/AWS D1.4 - Structural Welding Code for Reinforcing Steel.
- H. ASTM A615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement.
- I. AWS D12.1 - Welding Reinforcement Steel, Metal Inserts and Connections in Reinforced Concrete Construction.
- J. CRSI - Concrete Reinforcing Steel Institute - Manual of Practice.
- K. CRSI 63 - Recommended Practice For Placing Reinforcing Bars.
- L. CRSI 65 - Recommended Practice For Placing Bar Supports, Specifications and Nomenclature.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01330
- B. Shop Drawings: Indicate bar sizes, spacings, and locations and quantities of reinforcing steel and wire fabric, bending and cutting schedules, and supporting and spacing devices.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with CRSI - Manual of Standard Practice ACI 301, ACI SP-66, ACI 318.
- B. Maintain one copy of each document on site.
- C. Submit certified copies of mill test report of reinforcement materials analysis.
- D. Provide Architect/Engineer with access to fabrication plant to facilitate inspection of reinforcement. Provide notification of commencement and duration of shop fabrication in sufficient time to allow inspection.

1.6 QUALIFICATIONS

- A. Welders' Certificates: Submit under provisions of Section 01400 Manufacturer's Certificates, certifying welders employed on the Work, verifying AWS qualification within the previous 12 months.

1.7 COORDINATION

- A. Coordinate work under provisions of Section 01300.
- B. Coordinate with placement of formwork, formed openings and other Work.

PART 2 PRODUCTS

2.1 REINFORCEMENT

- A. Reinforcing Steel: ASTM A615, 60 ksi yield grade; deformed billet steel bars, unfinished.
- B. Reinforcing Steel Plain Bar and Rod Mats: ASTM A704, ASTM A615, Grade 60; steel bars or rods, unfinished.
- C. Stirrup Steel: ANSI/ASTM A82, unfinished.
- D. Welded Steel Wire Fabric: ASTM A185 in flat sheets ; unfinished.

2.2 ACCESSORY MATERIALS

- A. Tie Wire: Minimum 16 gauge annealed type.
- B. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions including load bearing pad on bottom to prevent vapor barrier puncture. Brick batts may be used at slab on grade; 1/2 brick minimum.

2.3 FABRICATION

- A. Fabricate concrete reinforcing in accordance with CRSI Manual of Practice, ACI SP-66, ACI 318, and ANSI/ASTM A184.
- B. Locate reinforcing splices not indicated on drawings, at point of minimum stress. Review location of splices with Architect/Engineer.

PART 3 EXECUTION

3.1 PLACEMENT

- A. Place, support and secure reinforcement against displacement. Do not deviate from required position.

- B. Do not displace or damage vapor barrier.
- C. Accommodate placement of formed openings.
- D. Maintain concrete cover around reinforcing as indicated on structural drawings.
- E. Conform to applicable code and plans for concrete cover over reinforcement.
- F. Bond and ground all reinforcement to requirements of Division 16.

3.2 FIELD QUALITY CONTROL

- A. Field inspection will be performed under provisions of Section 01400.

3.3 SCHEDULES

- A. Reinforcement for Foundation Wall, Framing Members and Slab-on-Grad: Deformed bars.

END OF SECTION

SECTION 03300
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Extent of concrete work is shown on drawings.

1.3 SUBMITTALS

- A. Product Data: Submit data for non-proprietary materials and items, including admixtures, patching compounds, waterstops, joint systems, curing compounds, dry-shake finish materials, and others as requested by Architect.
- B. Shop Drawings; Reinforcement: Submit original shop drawings for fabrication, bending, and placement of concrete reinforcement. Comply with ACT 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures" showing bar schedules, stirrup spacing, diagrams of bent bars, arrangement of concrete reinforcement. Include special reinforcement required for openings through concrete structures.

1.4 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of the following codes, specifications, and standards, except where more stringent requirements are shown or specified:
 - 1. ACT 301 "Specifications for Structural Concrete for Buildings".
 - 2. ACT 318 "Building Code Requirements for Reinforced Concrete".
 - 3. Concrete Reinforcing Steel Institute (CRSI), "Manual of Standard Practice".
- B. Materials and installed work may require testing and retesting at anytime during progress of work. Retesting of rejected materials for installed work, shall be done at Contractor's expense.

1.5 PROJECT CONDITIONS

- A. Protect adjacent finish materials against spatter during concrete placement.

PART 2 PRODUCTS

2.1 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150, Type I, "Alamo Cement" or equal. Use one brand of cement throughout project, unless otherwise acceptable to Architect.
- B. Normal Weight Aggregates: ASTM C 33, and as herein specified. Provide aggregates from a single source for exposed concrete.
 - 1. For exterior exposed surfaces, do not use fine or coarse aggregates containing spalling-causing deleterious substances.
 - 2. Local aggregates not complying with ASTM C 33 but which have shown by special test or actual service to produce concrete of adequate strength and durability may be used when acceptable to Architect.
- C. Water: Drinkable.
- D. Water-reducing Admixture: ASTM C 194, Type A, and containing not more than 0.1 percent chloride ions.
 - 1. Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:
 - a) "WRDA Hycol"; W.R. Grace.
 - b) "PSI N"; Gifford-Hill/American Admixtures
 - c) "Eucon WR-75"; Euclid Chemical Co.
 - d) "Pozzoloth Normal"; Master Builders.
 - e) "Plastocrete 160"; Sika Chemical Corp.
 - f) "Chemtard"; Chem-Masters Corp.
 - g) "Pro-Kete-N"; Protex Industries, Inc.
- E. Water-Reducing, Non-Chloride Accelerator Admixture: ASTM C 494, Type E, and containing not more than 0.1 percent chloride ions.
 - 1. Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:
 - a) "Accelguard 80"; Euclid Chemical Co.
 - b) "Pozzoloth High Early"; Master Builders.
 - c) "Gilco Accelerator"; Gifford-Hill/America Admixtures
- F. Water-Reducing, Retarding Admixture: ASTM C 494, Type D, and containing not more than 0.1 percent chloride ions.
 - 1. Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:

- a) "Edoco 20006"; Edoco Technical Products.
 - b) "Pozzolith Retarder"; Master Builders.
 - c) "Eucon Retarder 75"; Euclid Chemical Co.
 - d) "Daratard"; W.R. Grace.
 - e) "PSI R"; Gifford-Hill/American Admixtures.
 - f) "Plastiment"; Sika Chemical Co.
 - g) "Protard"; Protex Industries, Inc.
- G. Prohibited Admixtures: Calcium chloride thycyanates or admixtures containing more than 0.1 percent chlorine ions are not permitted.

2.2 RELATED MATERIALS

- 1. None

2.3 PROPORTIONING AND DESIGN OF MIXES:

- A. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACT 301. If trial batch method used, use an independent testing facility acceptable to Architect for preparing and reporting proposed mix designs. The testing facility shall not be the same as used for field quality control testing.
- B. Submit written reports to Architect and Structural Engineer of each proposed mix for each class of concrete at least 15 days prior to start of work. Do not begin concrete production until mixes have been reviewed by Architect.
- C. Design mixes to provide normal weight concrete with the following properties, as indicated on drawings and schedules:
 - 1. 3000 psi 28-day compressive strength; W/C ratio, 0.58 maximum (non-air-entrained), 0.46 maximum (air-entrained). For structural slabs.
- D. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant; at no additional cost to Owner and as accepted by Architect. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Architect before using in work.
- E. Admixtures:
 - 1. Use water-reducing admixture in concrete as required for placement and workability.
 - 2. Use non-chloride accelerating admixture in concrete slabs placed at ambient temperatures below 50 deg F (10 deg C).
- F. Slump Limits: Proportion and design mixes to result in concrete slump at point of placement as follows:
 - 1. Ramps, slabs, and sloping surfaces: Not more than 5".
 - 2. Reinforced foundation systems: Not less than 3" and not more than 5".
 - 3. Other concrete: Not less than 3" nor more than 5".

2.4 CONCRETE MIXING

- A. Ready-Mix Concrete: Comply with requirements of ASTM C 94, and as herein specified.
- B. During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C 94 may be required.

PART 3 EXECUTION

3.1 GENERAL

- A. Coordinate the installation of joint materials and vapor retarders with placement of forms and reinforcing steel.

3.2 JOINTS:

- A. Construction Joints: Locate and install construction joints as indicated or, if not indicated, located so as not to impair strength and appearance of the structure, as acceptable to Architect.
- B. Place construction joints perpendicular to main reinforcement. Continue reinforcement across construction joints, except as otherwise indicated.

3.3 INSTALLATION OF EMBEDDED ITEMS

- A. General: Set and build into work anchorage devices and other embedded items required for other work that is attached to, or supported by, cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached thereto.
- B. Edge Forms and Screed Strips for Slabs: Set edge forms or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in finished slab surface. Provide and secure units sufficiently strong to support types of screed strips by use of strike-off templates or accepted compacting type screeds.

3.4 CONCRETE PLACEMENT

- A. Replacement Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or casting. Notify other crafts to permit installation of their work; cooperate with other trades in setting such work. Moisten wood forms immediately before placing concrete where form coatings are not used.
- B. Apply temporary protective covering to lower 2' of finished walls adjacent to poured floor slabs and similar conditions, and guard against spattering during placement.

- C. General: Comply with ACT 304 "Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete", and as herein specified.
- D. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as herein specified. Deposit concrete as nearly as practicable to its final location to avoid segregation.
- E. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers not deeper than 24" and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.
- F. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures for consolidation of concrete in accordance with ACT 309.
- G. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine. Place vibrators to rapidly penetrate placed layer and at least 6" into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of mix.
- H. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until the placing of a panel or section is completed.
- I. Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.
- J. Bring slab surfaces to correct level within straightedge and strike off. Use bull floats or darbies to smooth surface, free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.
- K. Maintain reinforcing in proper position during concrete placement operations.
- L. Cold Weather Placing: Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with ACT 306 and as herein specified.
- M. When air temperature has fallen to or is expected to fall below 40 deg F (4deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C), and not more than 80 deg F (27 deg C) at point of placement.
- N. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
- O. Do not use calcium chloride, salt, and other materials containing antifreeze agents or chemical accelerators, unless otherwise accepted in mix design.
- P. Hot Weather Placing: When hot weather conditions exist that would seriously impair quality and strength of concrete, place concrete in compliance with ACT 305 and as herein specified.
- Q. Cool ingredients before mixing to maintain concrete temperature at time of placement below 95° deg F (32 deg C). Mixing water may be chilled, or chopped ice may be used to control temperature provided water equivalent of ice is calculated to total amount of mixing water. Use of liquid nitrogen to cool concrete is Contractor's option.
- R. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedment in concrete.
- S. Fog spray forms, reinforcing steel, and subgrade just before concrete is placed.
- T. Use water-reducing retarding admixture (Type D) when required by high temperatures, low humidity, or other adverse placing conditions.

3.5 MISCELLANEOUS CONCRETE ITEMS

- A. Filling-In: Fill-in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place, and cure concrete as herein specified, to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete work.
- B. Equipment Bases and Foundations: Provide machine and equipment bases and foundations, as shown on drawings. Set anchor bolts for machines and equipment to template at correct elevations, complying with certified diagrams or templates of manufacturer furnishing machines and equipment.

3.6 CONCRETE SURFACE REPAIRS:

- A. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removal of forms, when acceptable to Architect.
- B. Cut out honeycomb, rock pockets, voids over 1/4" in any dimension, and holes left by tie rods and bolts, down to solid concrete but, in no case to a depth of less than 1". Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush-coat the area to be patched with specified bonding agent. Place patching mortar after bonding compound has dried.
- C. For exposed-to-view surfaces blend white portland cement and standard portland cement so that, when dry, patching mortar will match color surrounding. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.

- D. Repair of Formed Surfaces: Removed and replaced concrete having defective surfaces if defects cannot be repaired to satisfaction of Architect. Surface defects, as such, include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets; fins and other projections on surface; and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes, fill with dry pack mortar, or precast cement cone plugs secured in place with bonding agent.
- E. Repair concealed formed surfaces, where possible, that contain defects that affect the durability of concrete. If defects cannot be repaired, remove and replace concrete.
- F. Repair of Unformed Surfaces: Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface plane to tolerances specified for each surface and finish. Correct low and high areas as herein specified. Test unformed surfaces sloped to drain for trueness of slope, in addition to smoothness using a template having required slope.
- G. Correct high area in unformed surfaces by grinding, after concrete has cured at least 4 days.
- H. Correct low areas in unformed surfaces during or immediately after completion of surface finishing operations by cutting out low areas and replacing with fresh concrete. Finish repaired areas to blend into adjacent concrete. Proprietary patching compounds may be used when acceptable to Architect.
- I. Repair defective areas, except random cracks and single holes not exceeding 1" diameter, by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean, square cuts and expose reinforcing steel with at least 3/4" clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding compound. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
- J. Repair isolated random cracks and single holes not over 1" in diameter by dry-pack method. Groove top of cracks and cut-out holes to sound concrete and clean of dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding compound. Mix dry-pack, consisting of one part portland cement to 2-1/2" parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing. Place dry pack after bonding compound has dried. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched area continuously moist for not less than 72 hours.
- K. Perform structural repairs with prior approval of Architect or Structural Engineer for method and procedure, using specified epoxy adhesive and mortar.
- L. Repair methods not specified above may be used, subject to acceptance of Architect.

3.7 QUALITY CONTROL TESTING DURING CONSTRUCTION

- A. The Owner's Agent will employ a testing laboratory to perform test and to submit test reports.
- B. Sampling and testing for quality control during placement of concrete shall include the following, as directed by Architect.
- C. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.
- D. Slump: ASTM C 143; one test at point of discharge for each day's pour of each type of concrete; additional tests when concrete consistency seems to have changed.
- E. Air Content: ASTM C 173, volumetric method for lightweight or normal weight concrete; ASTM C 231 pressure method for normal weight concrete; one for each day's pour of each type of air-entrained concrete.
- F. Concrete Temperature: Test hourly when air temperature is 40 deg F (4 deg C) and below, and when 80 deg F (27 deg C) and above; and each time a set of compression test specimens are required.
- G. Compression Test Specimen: ASTM C 31, one set of 4 standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory cured test specimens except when field-cure test specimens are required.
- H. Compressive Strength Tests: ASTM C 39; one set for each day's pour exceeding 5 cu yds. plus additional sets for each 50 cu yds. over and above the first 25 cu. yds. of each concrete class placed in any one day; one specimen tested at 7 days, two specimens tested at 28 days, and one specimen retained in reserve for later testing if required. When frequency of testing will provide less than 5 strength test for a given class of concrete, conduct testing from at least 5 randomly selected batches or from each batch if fewer than 5 are used.
- I. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.
- J. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength, and no individual strength test result falls below specified compressive strength by more than 500 psi.
- K. Test results will be reported in writing to Architect, Structural Engineer, and Contractor within 24 hours after tests. Reports of compressive strength test shall contain the project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials; compressive breaking strength and type of break for both 7-day tests and 28-day tests.

- L. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.
- M. Additional Tests: The testing service will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by Architect. Testing service may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed. Contractor shall pay for such tests when unacceptable concrete is verified.
- N. See Structural Plans for additional requirements.

END OF SECTION

**SECTION 03350
CONCRETE FINISHING**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Finishing of exposed concrete.

1.2 RELATED SECTIONS

- A. Section 03100 - Concrete Forms and Accessories.
- B. Section 03300 - Cast-In-Place Concrete.

1.3 REFERENCES

- A. ACI 302 - Guide for Concrete Floor and Slab Construction.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01330.
- B. Product Data: Provide data on concrete colorer, sealer, and slip resistant treatment, compatibilities, and limitations.

1.5 MAINTENANCE DATA

- A. Submit under provisions of Section 01700.
- B. Maintenance Data: Provide data on maintenance renewal of applied coatings.

1.6 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 301 and ACI 302.
- B. Maintain one copy of each document on site.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle products to site under provisions of Section 01600.
- B. Deliver materials in manufacturer's packaging including application instructions.

1.8 COORDINATION

- A. Coordinate work under provisions of Section 01300.
- B. Coordinate the work with concrete placement and curing.

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify site conditions under provisions of Section 01300. Verify that surfaces are acceptable to receive the Work of this section.

3.2 MONOLITHIC SLAB FINISHES

- A. Scratch Finish: Apply scratch finish to monolithic slab surfaces that are to receive concrete floor topping or mortar setting beds for tile, portland cement terrazzo, and other bonded applied cementitious finish flooring material, and as otherwise indicated.
- B. Float Finish: Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as hereinafter specified, and slab surfaces which are to be covered with membrane or elastic waterproofing, membrane or elastic roofing, or sand-bed terrazzo, and as otherwise indicated.
- C. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating when surface water has disappeared or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats, or by hand-floating if area is small or inaccessible to power units. Check and level surface plane to tolerances of F 35 - F 25. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.
- D. Trowel Finish: Apply trowel finish to monolithic slab surfaces to be exposed-to-view, and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint, or other thin firm finish coating system.
- E. After floating, begin first trowel finish operation using a power-driven trowel. Begin final troweling when surface procedures a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and with surface leveled to tolerances of F 35 - F 25. Grind smooth surface defects which would telegraph through applied floor covering system.
- F. Trowel and Fine Broom Finish: Where ceramic or quarry tile is to be installed with thin-set mortar, apply trowel finish as specified, then immediately follow with slightly scarifying surface by fine brooming.
- G. Non-Slip Broom Finish: Apply non-slip broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.
- H. Immediately after float finishing, slightly roughen concrete surface by brooming with fiber bristly broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.
- I. See architectural for stained concrete locations.

3.3 TOLERANCES

- A. After placing slabs, plane surface to tolerances for floor flatness (F) of 35 and floor levelness (F1) of 25. Slope surfaces uniformly to drains where requires. After leveling, roughen surface before final set, with stiff brushes, brooms, or rakes.

END OF SECTION

**SECTION 03390
CONCRETE CURING**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Initial and final curing of horizontal concrete surfaces.

1.2 RELATED SECTIONS

- A. Section 03300 – Cast-In-Place Concrete.
- B. Section 03350 - Exposed Concrete Finishing.

1.3 REFERENCES

- A. ACI 301 - Structural Concrete for Buildings.
- B. ACI 302 - Recommended Practice for Concrete Floor and Slab Construction.
- C. ACI 308 - Standard Practice for Curing Concrete.
- D. ASTM C171 - Sheet Materials for Curing Concrete.
- E. ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete.
- F. ASTM D2103 - Polyethylene Film and Sheeting.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Provide data on curing compounds, product characteristics, compatibility and limitations.
- C. Manufacturer's Installation Instructions: Indicate criteria for preparation and application.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 301 and ACI 302.
- B. Maintain one copy of each document on site.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle products under provisions of Section 01600.
- B. Deliver curing materials in manufacturer's packaging including application instructions.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Membrane Curing Compound Type A: ASTM C309 Type 1.
- B. Polyethylene Film Type B: ASTM C171, 15 mil thick, clear.
- C. Water: Potable and not detrimental to concrete.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify substrate conditions under provisions of Section 01039.
- B. Verify that substrate surfaces are ready to be cured.

3.2 EXECUTION - HORIZONTAL SURFACES

- A. Cure floor surfaces in accordance with ACI 308.
- B. Ponding: Maintain 100 percent coverage of water over floor slab areas continuously for 4 days.
- C. Spraying: Spray water over floor slab areas and maintain wet for 7 days.
- D. Membrane Curing Compound: Apply curing compound in accordance with manufacturer's instructions in two coats with second coat applied at right angles to first.
- E. Polyethylene Film: Spread Polyethylene Film over floor slab areas, lapping edges and sides and sealing with pressure sensitive tape; cover with plywood; maintain in place for 7 days.

3.3 PROTECTION OF FINISHED WORK

- A. Protect finished Work under provisions of Section 01500.
- B. Do not permit traffic over unprotected floor surface.

END OF SECTION

SECTION 05120 STRUCTURAL STEEL

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Extent of structural steel work is shown on drawings, including schedules, notes and details to show size and location of members, typical connections, and type of steel required.
- B. Structural steel is that work defined in American Institute of Steel Construction (AISC) "Code of Standard Practice" and as otherwise shown on drawings.
- C. Miscellaneous Metal Fabrications are specified elsewhere in Division 5.
- D. Refer to Division 3 for anchor bolt installation in concrete; Division 4 for masonry.
- E. Source Quality Control: Materials and fabrication procedures are subject to inspection and tests in mill, shop, and field, conducted by a qualified inspection agency. Such inspections and tests will not relieve Contractor of responsibility for providing materials and fabrication procedures in compliance with specified requirements.
- F. Promptly remove and replace materials or fabricated components which do not comply.
- G. Design of Members and Connections: Details shown are typical; similar details apply to similar conditions, unless otherwise indicated. Verify dimensions at site whenever possible without causing delay in the work. Promptly notify Architect whenever design of members and connections for any portion of structure are not clearly indicated.

1.3 SUBMITTALS

- A. Shop Drawings: Submit shop drawings including complete details and schedules for fabrication and assembly of structural steel members, procedures and diagrams.
- B. Include details of cuts, connections, camber, holes, and other pertinent data. Indicate welds by standard AWS A2.1 and A2.4 symbols, and show size, length, and type of each weld.
- C. Provide setting drawings, templates, and directions for installation of anchor bolts and other anchorages to be installed as work of others sections.

1.4 QUALITY ASSURANCE

- A. Code and Standards: Comply with provisions of following, except as otherwise indicated:
- B. AISC "Code of Standard Practice for Steel Buildings and Bridges".
- C. Paragraph 4.2.1 of the above code is hereby modified by deletion of the following sentence: "This approval constitutes the owner's acceptance of all responsibility for the design adequacy of any connections designed by the fabricator as a part of his preparation of these shop drawings".
- D. AISC "Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings", including "Commentary" and Supplements thereto as issued.
- E. AISC "Specifications for Architecturally Exposed Structural Steel".
- F. AISC "Specifications for Structural Joints using ASTM A 325 or A 490 Bolts" approved by the Research Council on Riveted and Bolted Structural Joints of the Engineering Foundation.
- G. American Welding Society (AWS) D1. "Structural Welding Code - Steel".
- H. ASTM A 6 "General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use".
- I. Qualifications for Welding Work: Qualify welding processes and welding operators in accordance with AWS "Standard Qualification Procedure".
- J. Provide certification that welders to be employed in work have satisfactorily passed AWS qualification tests.
- K. If recertification of welders is required, retesting will be Contractor's responsibility.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to site at such intervals to insure uninterrupted progress of work.
- B. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete or masonry, in ample time to not to delay work.
- C. Store materials to permit easy access for inspection and identification. Keep steel members off ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from erosion and deterioration.
- D. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Metal Surfaces, General: For fabrication of work which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, rust and scale seam marks, roller marks, rolled trade names and roughness. Remove such blemishes by grinding, or by welding and grinding, prior to cleaning, treating, and application of surface finishes.
- B. Structural Steel Shapes, ASTM A572
- C. Plates and Bars: ASTM A36.
- D. Cold-Formed Steel Tubing: ASTM A 500, Grade B.
- E. Headed Stud-Type Shear Connectors: ASTM A 108, Grade 1015 or 1020, cold finished carbon steel; with dimensions complying with AISC Specifications.
- F. Anchor Bolts: ASTM A 307, nonheaded type unless otherwise indicated.
- G. Adhesive Anchors: Simpson "SET" Adhesive Anchor System
- H. High-Strength Threaded Fasteners: Heavy hexagon structural bolts, heavy hexagon nuts, and hardened washers, as follows:
 - I. Quenched and tempered medium-carbon steel bolts, nuts and washers, complying with ASTM A 325.
 - J. Direct tension indicator washers may be used at Contractor's option.
- K. Electrodes for Welding: Comply with AWS Code.
- L. Structural Steel Primer Paint: GPA - 313.
- M. Non-metallic Shrinkage-Resistant Grout: Pre-mixed, non-metallic, non-corrosive, non-staining product containing selected silica sands, portland cement, shrinkage compensating agents, plasticizing and water reducing agents, complying with CE-CRD-C621.
- N. Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:
 - 1. Euco N.S.; Euclid Chemical Co.
 - 2. Crystex; L & M Construction Chemicals
 - 3. Masterflow 713; Master Builders
 - 4. Five Star Grout; U.S. Grout Corp.
 - 5. Upcon; Upco Chem. Div., USM Corp.
 - 6. Propak; Protex Industries, Inc.
 - 7. Set Non-Shrink; Set Products, Inc.

2.2 FABRICATION

- A. Shop Fabrication and Assembly: Fabricate and assemble structural assemblies in shop to greatest extent possible. Fabricate items of structural steel in accordance with AISC Specifications and as indicated on final shop drawings. Provide camber in structural members where indicated.
- B. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence which will expedite erection and minimize field handling of materials.
- C. Where finishing is required, complete assembly, including welding of units, before start of finishing operations. Provide finish surfaces of members exposed in final structure free of markings, burrs, and other defects.
- D. Connections: Weld or bolt shop connections, as indicated.
- E. Bolt field connections, except where welded connections or other connections are indicated.
- F. Provide high-strength threaded fasteners for all bolted connections, except where unfinished bolts are indicated.
- G. Provide unfinished threaded fasteners for only bolted connections of secondary framing members to primary members (including purlins, girts, and other framing members taking only nominal stresses) and for temporary bracing to facilitate erection.
- H. High-Strength Bolted Construction: Install high-strength threaded fasteners in accordance with AISC "Specifications for Structural Joints using ASTM A325 or ASTM A325 or A490 bolts" (RCRBSJ).
- I. Welded Construction: Comply with AWS Code for procedures, appearance and quality of welds, and methods used in correcting welding work.
- J. Assemble and weld built-up sections by methods which will produce true alignment of axes without warp.
- K. Holes for Other Work: Provide holes required for securing other work to structural steel framing, and for passage of other work through steel framing members, as shown on final shop drawings. Provide threaded nuts welded to framing, and other specialty items as indicated to receive other work.
- L. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame cut holes or enlarge holes by burning. Drill holes in bearing plates.

2.3 SHOP PAINTING

- A. General: Shop paint structural steel, except those members or portions of members to be embedded in concrete or mortar. Paint embedded steel which is partially exposed on exposed portions and initial 2" of embedded areas only.
- B. Do not paint surfaces which are to be welded.

- C. Apply 2 coats of paint to surfaces which are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.
- D. Surface Preparation: After inspection and before shipping, clean steel work to be painted. Remove loose rust, loose mill scale, and spatter, slag or flux deposits. Clean steel in accordance with Steel Structures Painting Council (SSPC) as follows:
- E. Painting: Immediately after surface preparation, apply structural steel primer paint in accordance with manufacturer's instructions and at a rate to provide dry film thickness of not less than 1.5 mils. Use painting methods which result in full coverage of joints, corners, edges, and exposed surfaces.

PART 3 EXECUTION

3.1 ERECTION

- A. Surveys. Employ a land surveyor for accurate erection of structural steel. Check elevations of concrete and masonry bearing surfaces, and locations of anchor bolts and similar devices, before erection work proceeds, and report discrepancies to Architect. Do not proceed with erection until corrections have been made, or until compensating adjustments to structural steel work have been agreed upon with Architect.
- B. Temporary Shoring and Bracing: Provide temporary shoring and bracing members with connections of sufficient strength to bear imposed loads. Remove temporary members and connections when permanent members are in place and final connections are made. Provide temporary guy lines to achieve proper alignment of structures as erection proceeds.
- C. Temporary Planking: "OSHA approved" temporary planking and working platforms as necessary to effectively complete work.
- D. Setting Bases and Bearing Plates: Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean bottom surface of base and bearing plates.
- E. Set loose and attached base plates and bearing plates for structural members on wedges or other adjusting devices.
- F. Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims, but if protruding, cut off flush with edge of base or bearing plate prior to packing with grout.
- G. Pack grout solidly between bearing surfaces and bases or plates to ensure that no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure.
- H. Field Assembly: Set structural frames accurately to lines and elevation indicated. Align and adjust various members forming part of complete frame or structure before permanently fastening. Clean bearing surfaces and other surfaces which will be in permanent contact before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
- I. Level and plumb individual members of structure within specified AISC tolerances.
- J. Splice members only where indicated.
- K. Erection Bolts: On exposed welded construction, remove erection bolts, fill holes with plug welds and grind smooth at exposed surfaces.
- L. Comply with AISC Specifications for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.
- M. Do not enlarge unfair holes in members by burning or by use of drift pins, except in secondary bracing members. Ream holes that must be enlarged to admit bolts.
- N. Gas Cutting: Do not use gas cutting torches in field for correcting fabrication errors in primary structural framing. Cutting will be permitted only on secondary members which are not under stress, as acceptable to Architect. Finish gas-cut sections equal to a sheared appearance when permitted.
- O. Touch-Up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint. Apply paint to exposed areas using same material as used for shop painting.
- P. Apply by brush or spray to provide minimum dry film thickness of 1.5 mils.

3.2 QUALITY CONTROL

- A. Owner will engage an independent testing and inspection agency to inspect high-strength bolted connections and welded connections and to perform tests and prepare test reports. Contractor shall pay for such services from the testing allowance specified in Division 1.
- B. Testing agency shall conduct and interpret tests and state in each report whether test specimens comply with requirements, and specifically state any deviations therefrom.
- C. Provide access for testing agency to places where structural work is being fabricated or produced so that required inspection and testing can be accomplished.
- D. Testing agency may inspect structural steel at plant before shipment; however, Architect reserves the right, at any time before final acceptance, to reject material not complying with specified requirements.

- E. Correct deficiencies in structural steel work which inspections and laboratory test reports have indicated to be not compliance with requirements. Perform additional tests, at Contractor's expense, as may be necessary to reconfirm any non-compliance of original work, and as may be necessary to show compliance of corrected work.

END OF SECTION

SECTION 05 40 00
COLD-FORMED METAL FRAMING

The requirements of the "General Conditions", the "Supplementary Conditions", and "Division 1" sections of the Specifications, shall apply to this section of the Specifications.

PART 1 - GENERAL

1.01 SCOPE

- A. Work Included: Provide all labor, materials, equipment, and services necessary for Exterior Cold-Formed Metal Framing Work indicated on the Drawings and specified herein. Work includes, but is not limited to the following:
 - 1. Load Bearing, Structural Metal Stud Framing.
- B. Related Sections: The following items of related Work will be provided under other sections of the Specifications:
 - 1. Indoor Air Quality Requirements - Section 01 81 19. AIR BORNE PRODUCTS
 - 2. Unit Structural Masonry - Section 04 23 0.
 - 3. Structural Steel Framing - Section 05 120.
 - 4. Steel Deck - Section 05 31 00.
 - 5. Miscellaneous Metal Work - Section 05 50 00.
 - 6. Rough Carpentry - Section 06 10 00.
 - 7. Roof and Wall Specialties and Accessories - Section 07 70 00.
 - 8. Aluminum Framed Entrances and Storefronts - Section 08 41 13.
 - 9. Gypsum Wallboard - Section 09 29 00.
- A. Codes and Reference Specifications: Except as otherwise specified herein, materials and workmanship shall conform to the following current codes and specifications.
 - 1. American Institute of Steel Construction, Inc., AISC Steel Construction Manual.
 - 2. American Welding Society (AWS):
 - a. D1.1, Structural Welding Code - Steel.

- b. D1.3, Structural Welding Code - Sheet Steel.
- 3. American Iron and Steel Institute (AISI) - North American Cold-Formed Steel Specification 2001 Edition with 2004 Supplement.
- 4. ASTM International Standard Specifications:
 - a. ASTM A653 - Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process. (Formerly ASTM Standard A446.)
 - b. ASTM A780 - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
 - c. ASTM A1008 - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened and Bake Hardenable. (Formerly ASTM Standard A611.)
 - d. ASTM A1011 - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low Alloy, High-Strength Low Alloy with Improved Formability, and Ultra-High Strength. (Formerly ASTM Standard A570.)
 - e. ASTM C955 - Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases.
- 5. Connections tested per American Iron and Steel Institute (AISI) Standards.
- 6. All applicable governing Rules, Regulations, Building Codes and Ordinances.
- B. The following minimum factors of safety shall be applied to the ultimate values of fastenings:
 - 1. Welded Connections: Per AISI and AWS.
 - 2. Powder Driven Fasteners into Steel: 5.0.
 - 3. Powder Driven Fasteners into Concrete: 10.0.
 - 4. Drilled, Tapped-In, and/or Expansion Anchors: 5.0.
 - 5. Self-Tapping Screws: 4.0.

6. Pop Rivets: 4.0.

1.03 QUALITY ASSURANCE

- A. Environmental Requirements: Paint products shall comply with all applicable Federal and State Regulations on Volatile Organic Compounds (VOC).
- B. Environmental Requirements: Paint products such as touch-up field painting and isolation coatings shall comply with all applicable Federal and State Regulations on Volatile Organic Compounds (VOC). PAINT

1.04 CERTIFICATION OF WELDERS

- A. PRIOR to starting Work, furnish to the Architect, valid certification qualified by a recognized, independent laboratory, for all welders working on fabrication and erection. All welding shall be performed by welders who have qualified by tests in accordance with AWS "Standard Qualification Procedure", to perform the type of Work required.

1.05 SUBMITTALS

- A. General: Submit Shop Drawings and Product Data to the Architect for review in accordance with the requirements in Section 01 33 23 - Shop Drawings and Samples, and as specified herein.
- B. Reports: Submit test reports, procedure specifications and certifications as required to substantiate welded connections design and welding qualifications to the Owner's Representative and the General Contractor for review.
- C. General: Prior to fabrication of framing, the Contractor shall submit Shop Drawings and Product Data, including fabrication and erection drawings, to the Architect for review in accordance with the requirements in Section 01 33 23 - Shop Drawings and Samples, and as specified herein.
 - 1. Include placing drawings for framing members showing size and gauge designations, number, type, location and spacing. Indicate supplemental strapping, bracing, splices, accessories, and details required for proper installation. Design and detail all connections to structural steel, structural concrete, and/or masonry.
 - 2. Indicate all member gauges, spacings and sizes. Sizes and spacings shown on the Drawings are minimums, Contractor shall design all members. Contractor shall increase gauge or decrease spacings to comply with actual design load requirements.

- 3. All Shop Drawings and calculations shall be sealed by a Professional Structural Engineer licensed in the State of the proposed Project with a minimum of five (5) years experience in the design of light gauge framing.

- D. Structural Calculations: Submit full structural calculations indicating loads, stresses and deflections for members and connections.

1.06 QUALITY CONTROL

- A. Testing Agency Services: Contractor may engage at his expense, a separate testing agency for information and guidance, to ascertain that all new materials are furnished, fabricated, installed, or erected in accordance with all requirements of the Contract Documents.
- B. Inspection Reports: Testing agency shall send periodic reports of the findings of all inspections to the Architect, Owner, and General Contractor.
- C. Defective Materials: Promptly replace all defective materials and workmanship, to the satisfaction of the Architect, at no cost to the Owner.

1.07 DELIVERY AND STORAGE

- A. Packaging Waste Management: Separate packaging waste materials for reuse, recycling and/or landfill.
- B. Delivery: Deliver to the site, all materials in protective wrappings, clearly labeled with all pertinent information to facilitate checking. Unload in areas designated by the General Contractor.
- C. Storage: Store materials at the site off the ground and in properly protected dry storage facilities, until ready for use.

1.08 DAMAGE TO MATERIALS

- A. Use care in storing, handling and erecting all material, and support material properly at all times to insure that no piece is bent, twisted or otherwise damaged. Material damaged due to carelessness shall be corrected at Contractor's expense, to the approval of the General Contractor, before being erected.

1.09 SCAFFOLDING

- A. Furnish, erect, and maintain all scaffolding and ladders in accordance with the standards of all governing local, state, and national safety codes. Equipment shall be erected at times and locations so as not to delay any part of Work. When no longer required, promptly dismantle equipment and remove from the site.

1.10 WARRANTY

- A. Form of Warranty: Execute a warranty in the approved written form, warranting all materials and workmanship to remain in serviceable and satisfactory condition, and to make good at own expense any imperfections which may develop during the warranty period and any damage to other Work caused by imperfections or by repairing imperfections. The warranty period shall be not less than one (1) year from date of Owner's acceptance of the installation.

PART 2 - PRODUCTS

- 2.01 A. Substitutions: Manufacturers with comparable equivalent products may be acceptable, subject to conformance with these Specifications, the requirements of the Drawings, and the Architect's review. Refer to Specification 01 25 00 – Substitution Procedures.

2.02 DESIGN

- A. Cold-formed metal framing systems shall be designed by a Professional Structural Engineer registered in the State of the proposed Project. Drawings for the design of the cold-formed metal framing systems and metal truss framing systems shall also be sealed by the same Engineer.
- B. Design, analysis and computation of section properties shall be in accordance with the American Iron and Steel Institute (AISI) - North American Cold-Formed Steel Specification 2001 Edition with 2004 Supplement.
- C. Technical tabulations of section properties and load capacities shall indicate dimensions, steel characteristics and allowable stresses upon which computations are based.
- D. Framing systems shall be designed for applicable wind loads, with consideration for additional loading at eaves, corners, and overhangs.
- E. Design Parameters: Refer to the Structural Drawings.

2.03 MATERIALS

- A. Manufacturers:
 - 1. Clark Western Building Systems, 101 Clark Boulevard, Middletown, OH 45044, (800)543-7140 or (513)539-2900; www.clarkwestern.com.
 - 2. Dietrich Metal Framing, 500 Grant Street, Suite 2226, Pittsburgh, PA 15219, (412)281-2805; www.dietrichmetalframing.com.
 - 3. Marino/Ware, 400 Metuchen Road, South Plainfield, NJ 07080, (908)757-9000 or (800)627-4661; www.marinoware.com.

- B. Recycled Content of Steel Products: Provide products with an recycled content of steel so postconsumer recycled content plus one-half of pre-consumer recycled content is not less than 25 percent.
- C. Framing Systems: Framing system shall include, but not necessarily be limited to "CSE" type studs with minimum 2-1/2" flange width and 1/2" stiffening ribs, of sizes and lengths noted on Drawings, with mating runner track and required erection accessories such as strapping, and clip angles, of galvanized steel. Unless stud members of greater strength are noted on Drawings, stud members shall be of such design as to be capable of resisting wind loading designed per Building Code required in the State of the proposed Project, and in accordance with the current AISI recommendations, with a maximum allowable deflection of L/600 and a minimum of 12.5 mm (0.5 in.) deflection in either vertical direction up or down.
- D. Galvanized Studs:
 - 1. Form all 12, 14, and 16 gauge galvanized structural members from steel corresponding to the requirements of ASTM Standard A653, SQ Grade 50 (minimum yield strength 50 KSI).
 - 2. Form all I8 and 20 gauge galvanized structural members and accessories from steel corresponding to the requirements of ASTM Standard A653, SQ Grade 33 (minimum yield strength 33 KSI).
- E. Galvanizing: All studs and accessories shall be formed from steel with a G-60 Hot-Dipped galvanized coating conforming to ASTM Standards A653 and C955.
- F. Fastening Devices: Materials shall include electro-galvanized self drilling, self tapping, sheet metal screws of size required by calculations, plated expansion anchors to structural substrate, of size required by calculations. Use only drilled in anchors at connections to concrete and/or masonry.
- G. Physical and Structural Properties: The physical and structural properties listed by Dietrich Metal Framing, shall be considered the minimum permitted for all framing members.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Refer to Section 01 31 00 – Project Management & Coordination
- B. Refer to Section 01 73 00 - Execution

3.02 SHOP AND FIELD INSPECTION

- A. Testing Agency Services: The Owner will secure the services of an unbiased, qualified, and recognized commercial Testing Laboratory, to inspect all Cold-Formed Metal Framing Work at the shop and in the field, and will pay all costs involved, except inspection costs due to reinspection of items found defective on the initial Owner sponsored inspection. Reinspection costs shall be born by the Contractor.
- B. Shop Inspection shall include examination of the following Work:
 - 1. Verify that only new materials are provided.
 - 2. Conformance of Work with Specifications, including specified tolerances.
- C. Field Inspection shall include examination of the following Work:
 - 1. All members before erection to verify they have not been damaged in shipment, and are being properly stored on the site.
 - 2. All members after erection to verify proper position.
 - 3. All welds to verify proper execution, cleanliness, type, size, and strength.
- D. Reports of Inspection: The Testing Laboratory shall send periodic reports of the findings of all inspections to the Architect, Owner's Representative, and General Contractor within seven (7) days of inspection.
- E. Cooperation: Contractor shall cooperate fully with the Testing Laboratory in the execution of the Testing Work.

3.03 INSPECTION

- A. Examine conditions under which the Work is to be performed and notify the General Contractor in writing of unsatisfactory conditions. Do not proceed with the Work until unsatisfactory conditions have been corrected.

3.04 FABRICATION AND ERECTION

- A. Fabricate and erect cold-formed metal framing at exterior walls and where shown on Drawings. All Work shall be in accordance with Drawings, approved Shop Drawings, manufacturer's recommendations, and as specified herein.
- B. Cut all framing components squarely, or at angle as in bracing, to fit squarely against abutting members. Firmly hold members in position until properly fastened.
- C. Anchor track securely to bottom and to overhead steel framing structures as indicated on Drawings. Use butt welds or splices at all butt joints in the track.

- D. Install studs at spacings indicated on Drawings. Where stud spacings are not indicated, space in accordance with manufacturer's recommendations to sustain without axial load, the design wind load and maximum deflection as specified herein or shown on the Design Drawings.
 - 1. Seat studs squarely in the track, with the stud web and flanges abutting the track web, plumb and aligned, and securely attach to the flanges or web of both the upper and lower tracks, both sides.
 - 2. Splices in studs will NOT be permitted.
 - 3. Corners of stud walls shall be provided with three (3) studs minimum, located so as to provide surfaces for attachment of all interior and exterior facings.
- E. Bridging shall be furnished and installed in wall systems as indicated on Drawings, and to manufacturer's specifications or recommendations.
- F. Where non-structural sheathing is specified or indicated on Drawings, furnish and install lateral bracing in framing systems to manufacturer's specifications or recommendations. Where structural sheathing, such as plywood, is specified on Drawings, omit lateral bracing, except for erection purposes and stability before attachment of sheathing.
- G. All accessories shall be furnished and installed as required for a complete and proper installation, in strict accordance with manufacturer's recommendations.
- H. Fasten framing components with self-drilling, self-tapping screws, or by welding. Screws or welds shall be of sufficient size to insure the strength of the connection. Welds shall be fusion welds, including fillet welds, butt welds, plug welds and arc-spot welds (puddle welds), and shall be in accordance with the latest recommended procedures and practices of the American Welding Society (AWS).
- I. Touch-Up Field Painting: Touch-up all damaged areas of galvanized coating, including field abrasions and welds, with zinc-rich galvanized coating repair paint according to ASTM A780 - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings. Provide nylon/polyester or natural bristle brush application of paint product in accordance with the manufacturer's recommendations and instructions. Surfaces shall be dry, free from oil, dirt, dust, mill scale or other contaminants to ensure adequate adhesion.
 - 1. Galvanized Coating Repair Paint: Zinc Clad® VI Water Based Organic Zinc-Rich Epoxy (VOC content of less than 105 grams/liter), as manufactured by The Sherwin-Williams® Company, Cleveland, OH, (800)321-8194; www.sherwin-williams.com.
 - 2. Volatile Organic Compounds (VOC) Content: Touch-up primer product specified herein shall have a VOC content of 250 grams/liter or less when calculated according to 40 CFR 59, subpart D (EPA method 24).

- J. Isolation Coating: Wherever studs, or plates of cold-formed metal framing are to be secured to or be in contact with masonry or concrete, paint the metal contact surface with one (1) heavy coat of The Sherwin-Williams® Company "DTM Acrylic Primer/Finish, B66W1", or comparable equivalent product subject to review by the Architect. Allow all paint to dry thoroughly prior to installation of Metal Framing Work. Exposed to view surfaces shall be clean and free of isolation coating.

1. Volatile Organic Compounds (VOC) Content: Touch-up primer product specified herein shall have a VOC content of 250 grams/liter or less when calculated according to 40 CFR 59, subpart D (EPA method 24).

3.05 FIRE PREVENTION

- A. Precautions: When welding and/or cutting with burning torches is required, take all precautions to prevent damage to building(s) from fire, weld spatter, dripping molten metal, smoke and fumes, or other causes arising from the operations. Provide fireproof tarpaulins or enclosures around the areas of welding or burning.
- B. Equipment: Furnish adequate and sufficient fire-fighting equipment and extinguishers to prevent damage and fire at each location where welding or burning is to be done.

3.06 DAMAGE TO ADJACENT CONSTRUCTION

- A. Contractor shall be responsible for any damage to adjacent construction in place, caused by the Work of this section. Repair all damage at own expense, to the satisfaction of the Architect.

3.07 CLEAN-UP

- A. Work Required: Clean-up any Work soiled in the performance of the Work of this Trade.
- B. Debris and Waste Materials: During progress of Work, upon completion of Work, and before final acceptance of Work, keep the premises free of debris and waste materials resulting from Framing Work. Remove debris and rubbish to area designated by General Contractor, for general clean-up by General Contractor, or if directed by General Contractor to remove from the site and legally dispose.
- C. Unused Materials, Tools, and Equipment: Upon completion of Work and before final acceptance of the Work, remove unused materials, tools, and equipment from the site.
- D. Waste Management: Collect field generated construction waste created during construction or final cleaning.

END OF SECTION

**SECTION 05500
METAL FABRICATIONS**

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specifications Sections, apply to work of this section.

1.2 DESCRIPTION OF WORK

- A. Definition: Metal fabrications include items made from iron and steel shapes, plates, bars, strips, tubes, pipes and castings which are not a part of structural steel or other metal systems specified elsewhere.
- B. Extent of metal fabrications is indicated on drawings.
- C. Types of work in this section include metal fabrications for:
 - 1. Rough hardware.
 - 2. Loose steel lintels
 - 3. Miscellaneous framing and supports.
 - 4. Structural steel is specified in another section within Division 5.

1.3 SYSTEM PERFORMANCES

- A. Structural Performances: Engineer and provide assemblies which, when installed, comply with the following minimum requirements for structural performance, unless otherwise indicated:
 - 1. Handrails and Toprails: Capable of withstanding the following loads applied as indicated when tested per ASTM E 935.
 - 2. Concentrated loads of 250 lbs. applied at any point in any direction.
 - 3. Uniform load of 50 lbs. per linear ft. applied simultaneously in both vertical and horizontal directions.
 - 4. Concentrated and uniform loads above need not be assumed to act
 - 5. concurrently.
 - 6. Guards: Intermediate rails, capable of withstanding a uniform load of 25 lb. per sq. ft. of gross areas of guard, including any open areas, of which they are a part.
- B. Above load need not be assumed to be acting concurrently with uniform horizontal loads on top rails of railing assembly in determining stress on guard supporting members.

1.4 QUALITY ASSURANCE

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

1.5 SUBMITTALS

- A. Product Data: Submit manufacturer's specifications, anchor details, and installation instructions for products used in miscellaneous metal fabrications, including paint products and grout.
- B. Shop Drawings: Submit shop drawings for fabrication and erection of miscellaneous metal fabrications. Include plans, elevations, and details of sections and connections. Show anchorage and accessory items. Provide templates for anchor and bolt installation by others.
- C. Where materials or fabrications are indicated to comply with certain requirements for design loadings, include structural computations and letter certifying compliance.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Ferrous Metals:
 - 1. Metal Surfaces, General: For fabrication of miscellaneous metal work which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names and roughness.
 - 2. Steel Plates, Shapes, and Bars: ASTM A36.
 - 3. Steel Tubing: Cold-formed, ASTM A500; or hot-rolled, ASTM A50.
 - 4. Steel Pipe: ASTM A53; Type and grade (if applicable) as selected by fabricator and as required for design loading; galvanized; standard weight (schedule 40), unless otherwise indicated.
 - 5. Brackets, Flanges, and Anchors: Cast or formed metal of the same type material and finish as supported rails, unless otherwise indicated.
 - 6. Concrete Inserts; Threaded or wedge type; galvanized ferrous castings, either malleable iron, ASTM A 27. Provide bolts, washers, and shims as required, hot-dip galvanized, ASTM A 153.
- B. Grout:
 - 1. Non-Shrink Non-Metallic Grout: Pre-mixed, factory-packaged, non-staining, non-corrosive, non-gaseous grout complying with CE CRD-C621. Provide grout specifically recommended by manufacturer for interior and exterior applications of type specified in this section.

- C. Fasteners:
 - 1. As recommended by fabricator's engineer.
- D. Galvanizing Repair Paint: High zinc dust content paint for regalvanizing welds in galvanized steel, complying with the Military Specifications MIL-P-21035 (Ships) or SSPC-Paint-20.
- E. Concrete Fill:
 - 1. Concrete Materials and Properties: Comply with requirements of Division-3 section "Concrete Work" for normal weight, ready-mix concrete.
- F. Non-Slip Aggregate Finish: Factory-graded, packaged material containing fused aluminum oxide grits or crushed emery as abrasive aggregate; rust-proof and non-glazing; unaffected by freezing, moisture or cleaning materials.

2.2 FABRICATION, GENERAL

- A. Workmanship: Use materials of size and thickness indicated, or if not indicated, as required to produce strength and durability in finished product for use intended. Work to dimensions indicated or accepted on shop drawings, using proven details of fabrication and support. Use type of materials indicated or specified for various components of work.
- B. For Exposed Work true to line and level with accurate angles and surfaces and straight sharp edges. Ease exposed edges to a radius of approximately 1/8". Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- C. Weld corners and seams continuously, complying with AWS recommendations. At exposed connections, grid exposed welds smooth and flush to match and blend with adjoining surfaces.
- D. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts.
- E. Provide for anchorage of type indicated, coordinated with supporting structure. Fabricate and space anchoring devices to provide adequate support for intended use.
- F. Cut, reinforce, drill, and tap miscellaneous metal work as indicated to receive finish hardware and similar items.
- G. Galvanizing: Provide a zinc coating for those items indicated or specified to be galvanized, as follows:
 - 1. ASTM A 123 for galvanized rolled, pressed and forged steel shapes, plates, bars, and strip 1/8" thick and heavier.
 - 2. ASTM A 386 for galvanizing assembled steel products.
- H. Fabricate joints which will be exposed to weather in a manner to exclude water or provide weep holes where water may accumulated.

2.3 ROUGH HARDWARE

- A. Furnish bent or otherwise custom fabricated bolts, plates, anchors, hangers, dowels, and other miscellaneous steel and iron shapes as required for framing and supporting woodwork, and for anchoring or securing woodwork to concrete or other structures. Straight bolts and other stock rough hardware items as specified in Division-6 sections.
- B. Fabricate items to sizes, shapes, and dimensions required. Furnish malleable-iron washers for heads and nuts which bear on wood structural connections; elsewhere, furnish steel washers.

2.4 LOOSE STEEL LINTELS

- A. Provide loose structural steel lintels for openings and recesses in masonry walls and partitions as shown. Weld adjoining members together to form a single unit where indicated. Provide not less than 8" bearing at each side of openings, unless otherwise indicated.
- B. Galvanize loose steel lintels to be installed in exterior walls.

2.5 MISCELLANEOUS FRAMING AND SUPPORTS

- A. Provide miscellaneous steel framing and supports which are not a part of structural steel framework, as required to complete work.
- B. Fabricate miscellaneous units to sizes, shapes, and profiles indicated or, if not indicated, of required dimensions to receive adjacent other work to be retained by framing. Except as otherwise indicated, fabricated from structural steel shapes, plates, and steel bars of welded construction using mitered joints for field connection. Cut, drill, and tap units to receive hardware and similar items.
- C. Equip units with integrally welded anchors for casting into concrete or building into masonry. Furnish insets if units must be installed after concrete is placed.

PART 3 EXECUTION

3.1 PREPARATION

- A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication, where possible. Do not delay job progress; allow for trimming and fitting where taking field measurements before fabrication might delay work.
- B. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, such as concrete inserts, sleeves, anchor bolts, and miscellaneous items having integral anchors, which are to be embedded in concrete or masonry construction. Coordinate delivery of such items to project site.

3.2 INSTALLATION

A. General:

1. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrication to in-place construction; including, threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts wood screws, and other connectors as required.
2. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installation, of miscellaneous metal fabrications. Set work accurately in location, alignment and elevation, plus, level, true and free of rack, measured from established lines and levels. Provide temporary bracing or anchors in form work for items which are to be built into concrete masonry or similar construction.

B. Fit exposes connections accurately together to form tight hairline joints. Weld connections which are not to be left as exposes joint, but cannot be shop welded because of shipping size limitations. Grind exposes joints smooth and touch-up shop paint coat. Do not weld, cut, or abrade the surfaces of exterior units which have been hot-dip galvanized after fabrication.

C. Field Welding: Comply with AWS Code for procedures of manual shielded metal-arc welding, appearance and quality of welds made, and methods used in correcting welding work.

D. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.3 ADJUST AND CLEAN

- A. For galvanize surfaces: Clean field welds, bolted connections and abraded areas and apply of galvanizing repair paint to comply with ASTM A 780.

END OF SECTION

SECTION 05 50 00
MISCELLANEOUS METAL WORK

The requirements of the "General Conditions", the "Supplementary Conditions", and "Division 1" sections of the Specifications, shall apply to this section of the Specifications.

PART 1 - GENERAL

1.01 SCOPE

- A. Work Included: Furnish all labor, materials, equipment, apparatus, tools, transportation, protection, and services necessary for Miscellaneous Metal Work indicated on the Drawings and specified herein.
- B. Examination: Carefully examine the Drawings and Specifications and include all Miscellaneous Metal Work not distinctly specified in other sections, or noted on the Drawings as being provided by other Trades.
- C. Miscellaneous Metal Products: No attempt is made to enumerate or describe each item of the Work, but simply to describe major items, certain special items, and general construction requirements for all items. Work includes, but is not necessarily limited to the following:
 - 1. Anchors.
 - 2. Anchor Bolts and Pipe Sleeves.
 - 3. Lintels.
 - 4. Miscellaneous Steel Frames and Curbs.
 - 5. Steel Ladders - furnish and install.
- D. Related Sections: The following items of related Work will be provided under other sections of the Specifications:
 - 1. Concrete Reinforcing - Sections 03 200 and 03 30 00.
 - 2. Reinforced Unit Masonry Assemblies - Section 04820.
 - 3. Structural Steel (including Roof Opening Curb Steel) - Section 05120.
 - 4. Steel Roof Deck - Section 05312.
 - 5. Cold-Formed Metal Framing - Section 05 40 00.

6. Rough Carpentry - Section 06 10 00.
7. Roof and Wall Specialties and Accessories - Section 07 70 00.
8. Hollow Metal Doors and Frames - Section 08 11 13.
9. Door Hardware - Section 08 71 00.
10. Gypsum Wallboard - Section 09 29 00.
11. Acoustical Panel Ceilings - Section 09 51 13.
12. Paints and Coatings - Section 09 90 01.

E. Work Furnished but not installed:

1. Items anchored (not bolted) to Concrete and Masonry Work.
2. Items as specified herein for installation by others.

1.02 DESIGN REQUIREMENTS

- A. Structural Performance of Handrails and Railing Systems: Design, engineer, fabricate, and install handrails and railing systems to comply with requirements for ASTM Standard E985 for structural performance, based on testing performed in accordance with ASTM Standards E894 and E935.
- B. Accessibility Guidelines: Handrails required to be accessible to persons with disabilities shall comply with Title III of The Americans with Disabilities Act (ADA), Public Law 101-336.

1.03 QUALITY ASSURANCE

- A. Reference Specifications: Except as otherwise specified herein, materials and workmanship shall conform to the following current specifications as amended to date.
 1. All applicable Local Building Codes and Ordinances.
 2. "Specifications for Structural Steel Buildings", and "Commentary" thereon, as adopted by the American Institute of Steel Construction, Inc. (AISC), March 9, 2005.
 3. American Welding Society (AWS), D1.1, Structural Welding Code - Steel.

4. "Standard Specifications for Open Web Steel Joists" as adopted by the Steel Joist Institute (SJI) and the American Institute of Steel Construction, Inc., (AISC).

1.04 CERTIFICATION OF WELDERS

- A. Current and valid certification qualified by a recognized, Independent Laboratory shall be furnished to Architect for all welders working on fabrication and/or erection PRIOR to starting Work. All welding shall be performed by welders who have qualified by tests in accordance with AWS "Standard Qualification Procedure", to perform the type of Work required.

1.05 SUBMITTALS

- A. General: Submit Shop Drawings and Product Data to the Architect for review in accordance with the requirements in Section 01 33 23 - Shop Drawings and Samples, and as specified herein.
- B. Reports: Submit test reports, procedure specifications and certifications as required to substantiate welded connections design and welding qualifications to the Owner's Representative and the General Contractor for review.
- C. Shop Drawings:
 1. Prepare completely detailed Shop Drawings showing all items to be provided, and submit reproducibles to the Architect for review.
 2. Prepare completely detailed Shop Drawings showing details for cutting, fabricating, and connecting all pieces. Do not duplicate Design Drawings for use as Shop Drawings. Duplication of Design Drawings shall be grounds for rejection.
 3. Where connections are not shown on the Drawings, connections shall be designed and detailed on the Shop Drawings, and sealed by a Registered Professional Structural Engineer in the State of the proposed Project, retained and paid by the steel fabricator.
 4. Provide separate Shop Drawings for erection.
 5. Prepare Shop Drawings in accordance with "AISC - Detailing for Structural Steel", latest edition, using a marking system compatible with, and referenced to, the marking system used on the Design Drawings.
 6. Indicate welding by using AWS symbols, showing type, size and location of all welds. Provide auxiliary views of welds as required to clarify the welded connections.

7. Formally check all Shop Drawings before forwarding to Architect.

- C. Reports: Submit test reports, procedure specifications and certifications as required to substantiate welded connections design and welding qualifications to the Owner's Representative and the General Contractor for review.

1.06 QUALITY CONTROL

- A. Testing Agency Services: Contractor may engage at his expense, a separate testing agency for information and guidance, to ascertain that all new materials are furnished, fabricated and installed in accordance with all requirements of the Contract Documents. The testing agency shall send reports of all inspections to the Architect, Owner, and General Contractor.

1.07 WARRANTY

- A. Form of Warranty: Execute a warranty in the approved written form, warranting all materials and workmanship to remain in serviceable and satisfactory condition, and to make good at own expense any imperfections which may develop during the warranty period, and damage to other Work caused by imperfections or by repairing imperfections. The warranty period shall be not less than one (1) year from date of Owner's acceptance of the installation.

PART 2 - PRODUCTS

2.01 Substitution

- A. Manufacturers with comparable equivalent products may be acceptable, subject to conformance with these Specifications, the requirements of the Drawings, and the Architect's review. Refer to Specification 01 25 00 – Substitution Procedures.

2.02 MATERIALS

- A. Steel Rolled Plates and Shapes: Fabricated from new open hearth structural steel conforming to ASTM A36 - Standard Specification for Carbon Structural Steel.
- B. Steel Pipe: ASTM Standard A53, Type S, Grade A, Schedule 40, unless otherwise noted.
- C. Steel Tubing: Cold rolled, electric resistance welded, carbon steel, hollow, structural steel tubing, fabricated from steel having properties complying with ASTM A500 - Standard Specification for Cold- Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

- D. Hi-Tensile Bolts: Heavy hex type structural bolts conforming with ASTM Standard A325, with matching heavy hex type nuts, 3/4" minimum diameter, of lengths required for connections, with hardened steel washers.
- E. Standard Bolts and Anchor Bolts: Unfinished bolts conforming to ASTM Standard A307, Grade A, with hexagon heads and nuts where exposed in the finish Work.
- F. Expansion Bolts: Hilti® Kwik Bolt 3 Expansion Anchor as manufactured by Hilti, Inc., 5400 South 122nd. East Avenue, Tulsa, OK 74146, (866)445-8827, (800)879-8000 or (918)252-6000; www.us.hilti.com.
 - 1. Comparable Products: Expansion bolts by the following manufacturer with comparable products of equivalent capacity may be acceptable, subject to conformance with these Specifications, the requirements of the Drawings, and the Architect's review.
 - a. Power-Stud® as manufactured by Powers Fasteners, Inc., 2 Powers Lane, Brewster, NY 10509, (800)524-3244 or (914)235-6300; www.powers.com.
- G. Welding Electrodes: Series E-60 or E-70, AWS A5.1 or A5.5.
- H. Galvanizing: Provide zinc coating where indicated on the Drawings. Galvanizing shall be in accordance with ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products and/or ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware, not less than 1.25 oz./sq. ft.
- I. Priming Paints: Provide one (1) of the following manufacturers and products, "lead and zinc chromate free" rust inhibiting priming paint, subject to review by the Architect. Substitutions will not be permitted.
 - 1. Manufacturers:
 - a. ICI Paints, Devco® High Performance Coatings, Strongsville, OH, (800)654-2616; www.devcocoatings.com.
 - b. PPG Architectural Finishes, 400 S. 13th Street, Louisville, KY 40203, (800)441-9695; www.ppgahpc.com.
 - c. Tnemec, Inc., 6800 Corporate Drive, Kansas City, MO 64120, (800)863-6321; www.tnemec.com.

2. Ferrous Metal Paint Product:
 - a. ICI Paints, Devoe® High Performance Coatings, DEVSHIELD™ 4130 Rust Penetrating Metal Primer, Light Gray.
 - b. PPG Architectural Finishes, PPG High Performance Coatings™ (HPC), SPEEDHIDE® Int/Ext Rust Inhibitive Steel Primer 6-208 Red.
 - c. Tnemec, Inc., Tnemec Primer Series 10, 99 Red.
3. Galvanized Steel Paint Product:
 - a. ICI Paints, Devoe® High Performance Coatings, DEVGUARD™ 4160 Multi-Purpose Tank & Structural Primer, White.
 - b. PPG Architectural Finishes, PPG High Performance Coatings™ (HPC), SPEEDHIDE® Int/Ext Galvanized Steel Primer 6-209, White.
 - c. Tnemec, Inc., Hi-Build Epoxoline Series 66, White.

2.02 CONNECTIONS AND WORKMANSHIP

- A. General: Weld all shop connections, bolt or weld all field connections unless otherwise noted or specified. Provide all clips, lugs, brackets, straps, plates, bolts, nuts, washers, required for complete fabrication and erection. Use connections of type and design required by forces to be resisted, and to provide secure fastening. Shop welded steel bolts shall be welded to sides and bottom of steel members, not at top of member.
- B. Bolting: In bolting, draw-up bolts or nuts tight, and deform threads where possible. Use bolts of lengths required so that bolts do not project more than 1/4" beyond face of nut. Do not use washers unless specified.
- C. Welding:
 1. Perform all welding by the electric arc method, in accordance with the recommendations of the American Welding Society (AWS). Welds shall be solid and homogeneously a part of the metals joined, free from pits or incorporated slag or scale. Surfaces of weld shall be smooth and regular, and shall be of full area indicated or required to develop the required strength of the joint.
 2. Only welders and welding operators who have been tested and certified in accordance with Appendix A, AWS D1.0, and the applicable provisions of AWS D1.0 will be permitted. All operators shall pass all applicable qualification tests

while in the current and continuous employment of the fabricator or erector regardless of previous qualifications and certifications.

3. Perform all shop and field welding by the shielded metal-electric arc process. Use qualified welders. Provide all necessary jigs and holding devices for shop welding. Dog or clamp down all Work to prevent distortion during welding.
 4. Design weld details and procedures so as much shop Work as possible is performed in the flat and horizontal position. Avoid undercutting, insufficient throat or leg, lack of fusion and splattering. Prepare welding procedure specifications and diagrams for each weld joint, and use in the Work. Assign each joint a procedure designation number or code. Show the number or code in the tail of each welding symbol in the Shop Drawings. Qualify non-prequalified welds in accordance with Appendix A, AWS D1.0. Where a standard weld type is repeated throughout the Work, the procedure designation or code may be indicated by general note or reference on each Shop Drawing where that weld type appears.
 5. Make fillet welds larger than 5/16" in not less than two (2) passes. After each pass, remove the slag coating entirely before starting next pass. Do not use fillet welds smaller than 1/4" unless the thickness of the connected material requires the use of 3/16" weld. Add approximately 3/4" to the theoretical length of all intermittent welds as an allowance for craters. Fill all craters.
 6. Structural welds shall not be less than 3" in length unless otherwise approved on Shop Drawings.
 7. Welds of all metal fabrications exposed in the finish Work shall be ground smooth, flush with adjacent surfaces, filleted at angular connections, and suitably prepared for final finish painting, unless otherwise specified.
- D. Galvanized Steel Products: Field touch-up all damaged areas of galvanized coating, damaged during erection including field abrasions and welds, with zinc-rich galvanized coating repair paint according to ASTM A780 - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings. Provide nylon/polyester or natural bristle brush application of paint product in accordance with the manufacturer's recommendations and instructions. Surfaces shall be dry, free from oil, dirt, dust, mill scale or other contaminants to ensure adequate adhesion.
1. Galvanized Coating Repair Paint: Zinc Clad® VI Water Based Organic Zinc-Rich Epoxy (VOC content of less than 105 grams/liter), as manufactured by The Sherwin-Williams® Company, Cleveland, OH, (800)321-8194; www.sherwin-williams.com

- 2. Volatile Organic Compounds (VOC) Content: Galvanized coating repair paint product specified herein shall have a VOC content of 250 grams/liter or less when calculated according to 40 CFR 59, subpart D (EPA method 24).
- E. Holes for Connections of Work by Others: Provide all holes required for the connection of the Work of other Trades where noted on the Drawings, or determined prior to fabrication of the steel.
- F. Finished Work: Any Work not presenting a finished appearance will be rejected. Furnish all members true to length so assembling may be done without fillers, except where required as detailed. Trim projecting edges or corners flush where different members are assembled. All items shall be free from twists, bends, and joints. Cope, block, and miter joints carefully and neatly. Clip projecting corners. Trim all filler pieces flush.

2.03 PAINTING (SHOP AND FIELD)

- A. Miscellaneous (steel) metal shall be shop prime painted and field touched-up using paint specified herein.
- B. Before shop painting, thoroughly clean all surfaces of all dirt, grease, scale and rust. All surfaces not in contact but inaccessible after assembling shall have two (2) coats before assembling. Surfaces in contact after assembling need have no paint. All finished pieces shall have one (1) coat before leaving the shop.
- C. After erection, clean all foreign material off the steel, and if paint is removed, repaint to meet requirements of original prime coatings.
- D. After all miscellaneous (steel) metal Work has been installed and accepted, touch-up all abraded surfaces, including field bolts and welded areas.
 - 1. Volatile Organic Compounds (VOC) Content: Field touch-up paint product specified herein shall have a VOC content of 250 grams/liter or less when calculated according to 40 CFR 59, subpart D (EPA method 24).
- E. Furnish the General Contractor with copies of invoice for paint, and allow manufacturer's representatives and General Contractor full access to the paint shop to inspect the paint.

2.04 ANCHORS

- A. Provide anchors for miscellaneous iron members anchored into concrete or masonry. Fabricate anchors from strap iron, bent to shape, welded to backs of members, extended with bent end for building-in as conditions require, of sizes and spacing as noted. Where size and spacing are not noted, furnish 1-1/2" x 1/4" size anchors for concrete and 1-1/2" x 1/8" size anchors for masonry. Space masonry anchors properly to fit the pointing of the

adjacent masonry Work. Unless otherwise noted on the Drawings, space anchors 3'-0" or less on centers.

- B. Where anchors and plates or clips are to be built-in for attachment of later Work, provide bolts in the plates or clips, welded to back, with threaded ends extended as required.
- C. For attaching Work to masonry or concrete, where anchors or inserts cannot be built-in, provide approved type of cinch anchors and machine bolts or screws.

2.05 ANCHOR BOLTS AND PIPE SLEEVES

- A. Furnish to Masonry Contractor for installation, miscellaneous anchor bolts and pipe sleeves as indicated and required, including all markings, setting diagrams, templates. Steel Contractor shall drill all holes required for anchor bolts and through-bolts detailed not to be built-in.
- B. Furnish to Concrete Contractor for installation, pipe sleeves as indicated and required, including all markings, setting diagrams, and templates.

2.06 LINTELS

- A. Furnish to the Masonry Contractor for setting, all steel lintels for masonry veneers, including those required for items such as grilles, doors, ducts, wall recesses and other locations shown or required.
- B. Lintels shall be rolled structural shapes of sizes noted, selected for straightness and trueness of section. Camber shall not exceed 1/8" in 10'-0".
- C. Unless otherwise shown, lintels shall have a bearing of not less than 8" each side of opening.
- D. Galvanize all lintels in exterior walls.

2.07 MISCELLANEOUS STEEL FRAMES AND CURBS

- A. General: Furnish steel frames and curbs in accordance with the Drawings and as specified herein, to Masonry or Concrete Contractor for setting.
- B. Fabrication: Steel frames for door and other miscellaneous openings, and steel curbs throughout shall be built-up of rolled steel plate or structural sections as noted, with connections to adjoining Work, and anchors for building into masonry and/or concrete. All sections shall be selected for trueness of web and flange, straightened as required so that the finished frames are uniform, square and true throughout the length and depth of the assembled units and that curbs are straight and true.

- C. Assembly: Frames shall be assembled by riveting or welding, but rivets may not be used on exposed surfaces. Built-up members of frames shall be connected by means of plug welding or continuous welding. Exposed edges of member shall be welded continuously. Frames and lintel members shall be welded together where so noted and shown. All exposed welding shall be ground smooth.
- D. Door Frame Jambs in Concrete or Masonry: Provide 1-1/4" x 3/16" steel strap anchors on back, vertically adjusted, 2'-0" on centers maximum for building into concrete or masonry, and clip angle at bottom for bolting into concrete; and shall be fitted with temporary spreader bars at bottom to hold frame in shape during shipping and erection.
- E. Steel Frames and Curbs in Concrete Work: Provide 1-1/2" x 1/4" steel strap anchors on back, extended for building-in, spaced not over 3 ft. on centers, but not less than two (2) per side.

2.08 STEEL LADDERS

- A. General: Interior steel ladders shall be Occupational Safety and Health Administration (OSHA) approved ladders complete as detailed on Drawings. Fabricate steel ladders, as detailed with parallel side rails, of structural steel shapes indicated, and 3/4" diameter, solid, cold-rolled steel bar stock rungs spaced as shown on Drawings. Drill side rails for rungs, set rungs into rails, weld rungs solidly into rails, and grind rails smooth. Provide all steel plate brackets, washers, and fasteners, including steel angle braces, as required and detailed to install ladders in place securely.

2.09 MISCELLANEOUS

- A. Anchoring Cements: Products specified herein shall be as manufactured by CGM, Incorporated, 1445 Ford Road, Bensalem, PA 19020, (800)523-6570, (215)638-4400; www.cgmbuildingproducts.com, or comparable equivalent products subject to review by the Architect.
 - 1. Exterior Use - Anchoring Cement: Super Por-Rok® Exterior Anchoring Cement, quality controlled hydraulic cement, quick-setting, pourable, non-metallic, non-shrink grout, in accordance with the following ASTM International Standard Specifications.
 - a. ASTM C109 - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens).
 - b. ASTM C900 - Standard Test Method for Pullout Strength of Hardened Concrete.
 - 2. Interior Use - Anchoring Cement: Por-Rok® Anchoring Cement, non-shrink, hydraulic controlled expansion cement.

3. Material Shelf Life: Do not retain material at the jobsite which has exceeded the shelf life recommended by the manufacturer.
- B. Isolation Coatings: Paint products specified herein shall be as manufactured by The Sherwin Williams® Company, Cleveland, OH, (800)321-8194, (800)474-3794, or comparable manufacturer's equivalent products subject to review by the Architect.
1. Aluminum Contact with Steel: Wherever aluminum items are to be secured to, or in contact with steel supporting members, paint the contact surface of the steel with the following paint system for both the surfaces of the steel supporting members and the aluminum.
 - a. One (1) Prime Coat: Kem Kromik® Universal Metal Primer, B50WZ1 Off-White (VOC content of less than 420 grams/liter).
 - 1) Volatile Organic Compounds (VOC) Content: Galvanized coating repair paint product specified herein shall have a VOC content of 250 grams/liter or less when calculated according to 40 CFR 59, subpart D (EPA method 24).
 - b. One (1) Topcoat: TarGuard® Coal Tar Epoxy, B69B60 Black (VOC content of less than 250 grams/liter).
 - 1) Volatile Organic Compounds (VOC) Content: Galvanized coating repair paint product specified herein shall have a VOC content of 250 grams/liter or less when calculated according to 40 CFR 59, subpart D (EPA method 24).
 2. Aluminum Contact with Masonry or Concrete: Wherever aluminum items are to be secured to or in contact with masonry or concrete, shop paint the aluminum contact surface with the following paint product.
 - a. One (1) Topcoat: TarGuard® Coal Tar Epoxy, B69B60 Black (VOC content of less than 250 grams/liter).
 - 1) Volatile Organic Compounds (VOC) Content: Galvanized coating repair paint product specified herein shall have a VOC content of 250 grams/liter or less when calculated according to 40 CFR 59, subpart D (EPA method 24).
 3. Brass or Bronze Contact With Steel: Wherever brass or bronze items are to be in contact with steel members, paint the contact surfaces of the steel with one (1) coat of TarGuard® Coal Tar Epoxy, B69B60 Black, (VOC content of less than 250 grams/liter).

- a. Volatile Organic Compounds (VOC) Content: Galvanized coating repair paint product specified herein shall have a VOC content of 250 grams/liter or less when calculated according to 40 CFR 59, subpart D (EPA method 24).
- 4. Condition of Painted Products: Paint coats shall be thoroughly dry prior to installation of the steel, aluminum, brass and/or bronze products. Exposed to view surfaces shall be clean and free of isolation coatings.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Refer to Section 01 31 00 – Project Management & Coordination
- B. Refer to Section 01 73 00 - Execution

3.02 SETTING AND ERECTING MISCELLANEOUS METAL

- A. Fabricate all items as required to be built into concrete or masonry completely, and deliver to site for installation by others. Furnish all parts complete with bolts, anchors, and clips, ready to set. Deliver items to the general location of the Work. Where Work is composed of several parts, only those parts, upon which anchors occur, will be set and built-in by the other Trades, ready to receive further field assembly by this Trade.
 - 1. All Work required to be anchored entirely in concrete shall be set by the Concrete Contractor.
 - 2. All Work required to be anchored entirely to masonry shall be set by the Mason Contractor.
 - 3. All Work required to be anchored partially to masonry shall be set by the Mason Contractor.
- B. Where necessary to secure Work to the structure by means of expansion bolts, cinch anchors, and similar connections, lay-out and install connections, install the Work and bolt up. Drill holes in Concrete and Masonry Work with rotary twist drills only.
- C. Furnish, connect, and completely install all other items. Erect all items to proper lines and levels, plumb and true, and in correct relation to adjoining Work. Secure all parts in a rigid and substantial manner using concealed connections whenever practicable.

3.03 FIRE PREVENTION

- A. Precautions: When welding or cutting with burning torches is required, take all precautions to prevent damage to the building(s) from fire, weld spatter, dripping molten metal, smoke and fumes, or other causes arising from the operations. Provide fireproof tarpaulins or enclosures around the areas of welding or burning.
- B. Trained Personnel and Equipment: Furnish a worker trained and experienced in fire-fighting, whose sole duty shall be to prevent damage and fire at each location where welding or burning is to be done. Furnish adequate and sufficient fire-fighting equipment and extinguishers at each location.

3.04 FIELD FINISH PAINTING

- A. Finish field painting of miscellaneous metal items as indicated on the Drawings and specified herein shall be by the Painting Contractor.

3.05 CLEAN-UP

- A. Waste Management: Collect field generated construction waste created during construction or final cleaning.

END OF SECTION

SECTION 06 10 00
ROUGH CARPENTRY

The requirements of the "General Conditions", the "Supplementary Conditions", and "Division 1" sections of the Specifications, shall apply to this section of the Specifications.

PART 1 - GENERAL

1.01 SCOPE

- A. Work Included: Furnish all labor, materials, equipment, and services necessary for Rough Carpentry Work indicated on the Drawings and specified herein. Work includes, but is not necessarily limited to the following:
 - 1. Wood Nailers, Blocking, and Plywood - furnish and install.
 - 2. Rough Hardware - furnish and install.
- B. Related Sections: The following items of related Work will be performed under other sections of the Specifications:
 - 1. Indoor Air Quality Requirements - Section 01 81 19. AIR BORNE PRODUCTS
 - 2. Concrete Formwork and Cast-In-Place Concrete- Sections 03 10 0 and 03 30 00.
 - 3. Unit Structural Masonry - Section 04 23 00.
 - 4. Structural Steel - Section 05 12 00.
 - 5. Metal Roof Deck - Section 05 31 00.
 - 6. Cold-Formed Metal Framing - Section 05 40 00.
 - 7. Board Insulation - Section 07 21 20.
 - 8. Sheet Metal Work - Section 07 60 00.
 - 9. Aluminum Framed Entrances and Storefronts- Section 08 41 13.
 - 10. Gypsum Wallboard - Section 09 29 00.
 - 11. Thin-Set Tile Work - Section 09 31 00.
 - 12. Resilient Tile Flooring - Section 09 65 19

13. Paints and Coatings - Sections 09 90 00.

14. Toilet Compartments - Section 10 21 13.

15. Plumbing Fixtures - Division 22.

1.02 QUALITY ASSURANCE

- A. Wood Treatment Plants: The treatment plant shall be franchised or licensed by the specified preservative and/or retardant manufacturers as specified herein.
- B. Requirements of Regulatory Agencies:
 - 1. Grades of Lumber and Plywood: Lumber and plywood shall be as defined by the rules of the recognized association of manufacturers producing the kind or species of lumber and plywood specified herein. All lumber and plywood shall be grade stamped by the inspecting authorities.
- C. Environmental Requirements: Paint products shall comply with all applicable Federal and State Regulations on Volatile Organic Compounds (VOC).
- D. Environmental Requirements: Paint products such as touch-up field painting and isolation coatings shall comply with all applicable Federal and State Regulations on Volatile Organic Compounds (VOC). PAINT

1.03 MEASUREMENTS

- A. Field Measurements: Contractor shall obtain field measurements of adjoining Work as required to locate and fit the Work of this section. Contractor shall be responsible for the accurate fitting of materials together and to the building.

1.04 SUBMITTALS

- A. General: Submit Shop Drawings, Product Data, and Samples to the Architect for review in accordance with the requirements in Section 01 33 23 - Shop Drawings and Samples, and as specified herein.
- B. Reports: Submit test reports, procedure specifications and certifications as required to substantiate welded connections design and welding qualifications to the Owner's Representative and the General Contractor for review.
- C. Shop Drawings: Prepare complete Shop Drawings, showing dimensions, sections, details of materials, fabrication, and installation of materials and products. Special attention shall be given to, but not necessarily limited to the following:

D. Product Data: Include the following for review.

1. Wood Treatment Certificates for Lumber and Plywood.
2. Products specified herein under Article heading MISCELLANEOUS”.

1.05 PRODUCT DELIVERY, HANDLING AND STORAGE

A. Protection: Protect all materials from the weather during transit and during storage at the site. Store materials above the ground, in sheds if possible. If outdoor storage is required, house materials under waterproof coverings. Do not deliver materials to the job site until required for installation. Take all precautions to avoid absorption of moisture by wood and plywood.

1.06 WARRANTY

A. Form of Warranty: Execute a warranty in the approved written form, warranting all materials and workmanship to remain in serviceable and satisfactory condition, and to make good at own expense any imperfections which may develop during the warranty period and damage to other Work caused by imperfections or by repairing imperfections. The warranty period shall be not less than one (1) year from date of Owner’s acceptance of the installation.

PART 2 - PRODUCTS

2.01 WOOD FOR ROUGH CARPENTRY

- A. Substitutions: Manufacturers with comparable equivalent products may be acceptable, subject to conformance with these Specifications, the requirements of the Drawings, and the Architect’s review. Refer to Specification 01 25 00 – Substitution Procedures.
- B. Lumber: Wood shall conform to American Softwood Lumber Standard, current edition of “Voluntary Product Standard PS20”, as published by the National Institute for Standards and Technology (NIST). Grades shall conform with current grading rules of the Lumber Manufacturers Association, under whose rules the lumber is manufactured.
- C. Dimension and Board Lumber: Douglas Fir. All lumber shall be “seasoned dry” (S-DRY), 19% or less moisture content.
- D. Lumber Grades:
1. Boards: Douglas Fir, S4S, Standard Grade or better.

- E. Wood Treatments: All dimension lumber except wood blocking and nailers at roof, shall be fire retardant treated. Wood blocking and nailers at roof and in contact with masonry shall be preservative treated.

2.02 PLYWOOD

- A. Standards, Thicknesses and Grades: Plywood shall be in accordance with the National Institute of Standards and Technology (NIST) current DOC VPS Standard PS 1-95, and the quality standards of the APA-The Engineered Wood Association (formerly American Plywood Association). Thicknesses shall be as indicated on the Drawings. Grades of plywood shall be as follows for various uses, as indicated by the registered grade-trademarks of APA:
 - 1. Plywood Sheathing: C-D EXT-APA or APA Standard with exterior glue.
 - 2. A-C Plywood: A-C EXT-APA.
 - 3. A-D Plywood: A-D Exposure 1 (interior exposed, such as backboards for electrical and telephone panels).
 - 4. B-C Plywood: B-C EXT-APA (water heater platforms).
 - 5. C-D Plywood: C-D Plugged (interior concealed).
- B. Engineered Wood Products: Products shall contain no urea formaldehyde.
- C. Fire Retardant Treatment: All plywood and plywood sheathing shall receive "Fire Retardant Treatment" as specified herein.

2.03 WOOD TREATMENTS

- A. Manufacturer: Wood treatments required and as specified herein shall be products Equal to: Arch Wood Protection, Inc., Arch Treatment Technologies, Inc., 5660 New Northside Drive, Suite 1100, Atlanta, GA 30328, (678)627-2000; www.archchemicals.com. Manufacturers with equivalent products and treatments shall be subject to review by the Architect.
- B. Wood Preservative Treatment: All wood nailers at roof parapets, and/or in contact with masonry, and elsewhere as indicated on the Drawings, shall be pressure impregnated in accordance with the specifications for treatment by Arch Wood Protection, Inc., with Wolman® CCA (Chromated Copper Arsenate) wood preservative and shall bear the Wolmanized® trademark. Treated wood shall conform to AWPA Standard P5, and have a mark certifying conformance. The treating process shall meet requirements of Fed. Spec. TT-W-571 and AWPA Commodity Standards as applicable.

- C. Fire Retardant Treatment: Fire retardant treat all wood lumber, plywood and plywood sheathing by pressure treating with Dricon® fire retardant chemicals, by Arch Wood Protection, Inc. Kiln dry all pieces after treatment. Identify all treated pieces with an Underwriters Laboratories, Inc., label or marking, prior to shipment to site. Treatment shall be in accordance with the impregnating salt manufacturer's U.L. approved, specifications, and shall render the wood fire retardant to the extent that the flame spread does not exceed 25 per ASTM Standard E84 modified to require a 30 minute test period. The treating process shall conform to the requirements of the applicable AWPA Standard C1, C2, C3, C4, C9, C14, C15, C16, C22, C23, C24, C28, C31, C33 and M4, for the species, product, preservative and end use. Preservatives shall conform to AWPA P1/P13, P2, P5, P8 and P9. Include certification by treatment plant that the treatment will not bleed through finished surfaces.
- D. Certification: Submit certificates of wood treatments. Stamp or brand lumber before delivery, indicating treatment applied.
- E. Exposed Wood/Field-Cuts: Surfaces of treated wood exposed by cutting or drilling at the job site shall be treated with heavy brush coat of same preservative or fire-retardant treatment used in treatment.
 - 1. Volatile Organic Compounds (VOC) Content: Field applied preservative and fire-retardant product specified herein shall have a VOC content of 350 grams/liter or less when calculated according to 40 CFR 59, subpart D (EPA method 24).

2.04 ROUGH HARDWARE

- A. General: Furnish all items of rough hardware such as spikes, nails, screws, bolts, anchors, brackets, etc., necessary for the installation of this Work.
 - 1. Recycled Content of Steel Products: Provide products with a recycled content of steel so postconsumer recycled content plus one-half of pre-consumer recycled content is not less than 25 percent.
- B. Bolts, Nuts, and Expansion Shields: Use galvanized steel bolts for all bolting Work. Use carriage bolts and nuts, or welded stud bolts and nuts for securing wood members to steel framing. Use metallic expansion shields for securing bolts to concrete. Use similar shields or toggle bolts for securing to masonry. Select length of bolts to suit thickness of material being joined.
- C. Nails: Use nails conforming with Federal Spec. FF-N-105a, except as otherwise specified. Use galvanized steel nails for all Work. Zinc coating on galvanized nails shall conform with Article 3.2.1 of the Fed. Spec. Do not use aluminum nails. Except as otherwise specified, use common nails for securing of rough carpentry, use casing or finish nails, counter-set, for securing of finish carpentry.

- D. Corrosion Rates: Rough hardware in contact with fire retardant treated wood shall exhibit corrosion rates less than one mil per year when tested in accordance with Fed. Spec. MIL-L-19140E, Paragraph 4.6.5.2.

2.05 MISCELLANEOUS

- A. Isolation Coatings: Paint product specified herein shall be as manufactured by The Sherwin Williams® Company, McAllen, TX, or comparable manufacturer's products subject to review by the Architect.
1. Paint Product: TarGuard™ Coal Tar Epoxy, B69B60 Black.
 2. Condition of Painted Products: Paint coats shall be thoroughly dry prior to installation of the steel/metal products. Exposed to view surfaces shall be clean and free of isolation coatings.
 3. Volatile Organic Compounds (VOC) Content: Field applied preservative and fire-retardant product specified herein shall have a VOC content of 250 grams/liter or less when calculated according to 40 CFR 59, subpart D (EPA method 24).

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Refer to Section 01 31 00 - Project Management & Coordination
- B. Refer to Section 01 73 00 - Execution

3.02 ROUGH CARPENTRY

- A. Wood Nailers, and Blocking:
1. Neatly and accurately fit together with all necessary bolts and spikes, all wood where indicated on Drawings, such as blocking, nailers, as required to make secure.
 2. Where wood blocking is required in metal stud framed walls, e.g., for support of Tenant's or Owner's fixturing, securely fasten the wood blocking to the metal stud framing at positions required, as detailed and/or noted on the Drawings. Coordinate Work with Tenant's or Owner's Representative.
 3. Where wood members are to be secured to masonry, secure with 1/2" bolts with 3" hooked ends, not less than two (2) to each block, continuous nailers shall be spaced approximately 32" O.C. Bore lumber for bolts and countersink for heads. Provide washers under all bolt heads and nuts. All nailers and cants shall be

furnished in long lengths to minimize number of end joints. When joints are required, they shall be made without projecting edges.

4. Miscellaneous wood items which are built into concrete or masonry shall be delivered to the respective contractors for installation.
 5. Metal roof deck flutes shall be provided with wood blocking where and as indicated on the Drawings.
- B. Rough Hardware: Install all items of rough hardware as necessary for the execution of the Work.
- C. Preservative Treated Wood: Install wood treated with approved preservative for wood nailers at roof parapets, and in contact with masonry. Surfaces of treated wood exposed by cutting or drilling at the job site shall be treated with heavy brush coat of same preservative as applied at the treatment plant.
- D. Fire Retardant Treated Wood: Install wood that has been fire retardant treated, and in all wood blocking.
- E. Plywood: Install plywood, including plywood sheathing, of thickness noted and where indicated on Drawings. All Work and nailing shall be in accordance with the recommendations of APA-The Engineered Wood Association, and with the governing code requirements.

3.03 CLEAN-UP

- A. Work Required: Clean-up or repair adjacent finish Work which is soiled, marred, or damaged by the Work of this section, at Contractor's expense.
- B. Debris and Waste Materials: During progress of the Work, the premises shall be kept free of all debris and waste materials resulting from the Work of this section. During progress of the Work, upon completion of Work, and before final acceptance of the Work, remove all debris and rubbish from the site and dispose of legally. Upon completion and before final acceptance of the Work, all debris, rubbish, unused materials, tools, and equipment shall be removed from the site.

END OF SECTION

SECTION 06 11 40
WOOD BLOCKING AND CURBING

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes roof curbs, and perimeter nailers; blocking in roof openings; telephone and electrical panel back boards; and preservative treatment of wood.
- B. Related Sections:
 - 1. Section 05312: Metal roof decking to receive wood curbs.

1.2 REFERENCES

- A. ALSC (American Lumber Standards Committee) - Softwood Lumber Standards.
- B. APA/EWA (APA/Engineered Wood Association) - Certification.
- C. AWPA (American Wood Preservers Association) C1 - All Timber Products Preservative Treatment by Pressure Process.
- D. SPIB (Southern Pine Inspection Bureau) - Lumber Grading Rules.

1.3 SUBMITTALS

- A. Section 01330 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit technical data on wood preservative and fire retardant treatment materials and provide application instructions where required.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with the following agencies:
 - 1. Lumber Grading Agency: Certified by ALSC.
 - 2. Plywood Grading Agency: Certified by APA/EWA.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Lumber Grading Rules: SPIB.
- B. Miscellaneous Framing: Stress Group D, No. 2 or better grade 19 percent maximum moisture content after treatment, pressure preservative treat.
- C. Plywood: APA/EWA Rated Sheathing, Grade C-D; Exposure Durability 1; unsanded.

2.2 ACCESSORIES

- A. Fasteners and Anchors:
 - 1. Fasteners: Hot dipped galvanized steel for high humidity and treated wood locations, unfinished steel elsewhere.
 - 2. Anchors: Expansion shield and lag bolt type for anchorage to solid masonry or concrete.

2.3 FACTORY WOOD TREATMENT

- A. Wood Preservative (Pressure Treatment): AWPA Treatment C1 using water borne preservative with 0.25 percent retainage.

PART 3 EXECUTION

3.1 FRAMING

- A. Set members level and plumb, in correct position.
- B. Place horizontal members, crown side up.
- C. Construct curb members of solid wood sections.
- D. Space framing and furring 16 inches oc.
- E. Curb roof openings except where prefabricated curbs are provided. Form corners by alternating lapping side members.
- F. Coordinate curb installation with installation of decking and support of deck openings.

3.2 SHEATHING

- A. Install telephone and electrical panel back boards with plywood sheathing material where required. Size the back board by 12 inches beyond size of electrical and telephone panel.

3.3 SITE APPLIED WOOD TREATMENT

- A. Apply preservative treatment.
- B. Brush apply two coats of preservative treatment on wood in contact with cementitious materials and roofing and related metal flashings. Treat site-sawn cuts.
- C. Allow preservative to dry prior to erecting members.

3.4 SCHEDULES

- A. Roof Blocking: S/P/F species, 19 percent maximum moisture content, pressure preservative treatment.
- B. Telephone and Electrical Panel Boards: $\frac{3}{4}$ inch thick, square edges, site brush applied preservative treated.
- C. Storefront Blocking and shim: S/P/F species, 19 percent maximum moisture content, pressure preservative treatment.

END OF SECTION

SECTION 06 16 43.20
GYPSUM SHEATHING

The requirements of the "General Conditions", the "Supplementary Conditions", and "Division 1" sections of the Specifications, shall apply to this section of the Specifications

PART1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Fiberglass-mat faced, moisture and mold resistant gypsum sheathing.
- B. Related Sections: The following items of related Work will be provided under other sections of the Specifications:
 - 1. Section 05 40 00 Cold-Formed Metal Framing.
 - 2. Section 06 10 00 Rough Carpentry.
 - 3. Section 09 21 16 Gypsum Board Assemblies.

1.02 REFERENCES

- A. ASTM International (ASTM):
 - 1. ASTM C473 Standard Test Methods for Physical Testing of Gypsum Panel Products.
 - 2. ASTM C518 Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
 - 3. ASTM C1002 Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
 - 4. ASTM C1177 Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
 - 5. ASTM C1280 Standard Specification for Application of Gypsum Sheathing.
 - 6. ASTM D3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
 - 7. ASTM D6329 Standard Guide for Developing Methodology for Evaluating the Ability of Indoor Materials to Support Microbial Growth Using Static Environmental Chambers.

8. ASTM E72 Standard Test Methods of Conducting Strength Tests of Panels for Building Construction.

9. ASTM E96 Standard Test Methods for Water Vapor Transmission of Materials.

B. Gypsum Association (GA): GA-253 Application of Gypsum Sheathing.

1.03 QUALITY ASSURANCE

A. Environmental Requirements: Paint products shall comply with all applicable Federal and State Regulations on Volatile Organic Compounds (VOC).

B. Environmental Requirements: Paint products such as touch-up field painting and isolation coatings shall comply with all applicable Federal and State Regulations on Volatile Organic Compounds (VOC). PAINT

1.04 SUBMITTALS

A. Product Data: Manufacturer's specifications and installation instructions for each product specified.

1.05 WARRANTY

A. Provide products that offer twelve months of coverage against in-place exposure damage (delamination, deterioration and decay).

B. Manufacturer's Warranty:

1. Five years against manufacturing defects.

2. Ten years against manufacturing defects when used as a substrate in architecturally specified EIFS.

1.06 MATERIAL DELIVERY, STORAGE & HANDLING

A. Packaging Waste Management: Separate packaging waste materials for reuse, recycling and/or landfill.

PART2 PRODUCTS

2.01 MANUFACTURERS

A. Georgia-Pacific Gypsum LLC:

1. Fiberglass-Mat Faced Gypsum Sheathing, Type X for Fire Rated Designs: DensGlass Fireguard Sheathing.

B. Substitutions: Manufacturers with comparable equivalent products may be acceptable, subject to conformance with these Specifications, the requirements of the Drawings, and the Architect's review. Refer to Specification 01 25 00 – Substitution Procedures.

2.02 MATERIALS

A. Fire-Rated Fiberglass-Mat Faced Gypsum Sheathing: ASTM C1177, Type X:

1. Thickness: 5/8 inch.
2. Width: 4 feet.
3. Length: [8 feet] [9 feet] [10 feet].
4. Weight: 2.5 lb/sq. ft.
5. Edges: Square.
6. Surfacing: Fiberglass mat on face, back, and long edges.
7. Racking Strength (Ultimate, not design value) (ASTM E72): Not less than 654 pounds per square foot, dry.
8. Flexural Strength, Parallel (ASTM C1177): 100 lbf, parallel.
9. Humidified Deflection (ASTM C1177): Not more than 1/8 inch.
10. Permeance (ASTM E96): Not more than 17 perms.
11. R-Value (ASTM C518): 0.67.
12. Mold Resistance (ASTM D3273): 10, in a test as manufactured.
13. Microbial Resistance (ASTM D6329, GREENGUARD 3-week protocol): Will not support microbial growth.

14. Acceptable Products:

- a. 5/8 inch DensGlass Fireguard Sheathing, Georgia-Pacific Gypsum.

2.03 ACCESSORIES

- A. Screws: ASTM C1002, corrosion resistant treated.

PART3 EXECUTION

3.01 EXAMINATION

- A. Refer to Section 01 31 00 – Project Management & Coordination
- B. Refer to Section 01 73 00 - Execution
- C. Verification of Conditions:
 - 1. Inspection: Verify that project conditions and substrates are acceptable, to the installer, to begin installation of work of this section.

3.02 INSTALLATION

- A. General: In accordance with GA-253, ASTM C1280 and the manufacturer's recommendations.
 - 1. Manufacturer's Recommendations:
 - a. Current "Product Catalog", Georgia-Pacific Gypsum.

3.03 PROTECTION

- A. Protect gypsum board installations from damage and deterioration until date of Substantial Completion.

3.04 CLEAN-UP

- A. Waste Management: Collect field generated construction waste created during construction or final cleaning.

END OF SECTION

SECTION 07 19 10
VAPOR BARRIER

1.1 SCOPE

- A. The Conditions of The Contract (Division 0), and General Requirements (Division 1), are applicable to and a part of this Section.
- B. Related Work Specified Elsewhere:
 - 1. Termite Control: Section 02 28 20.

1.2 DESCRIPTION

- A. Vapor Barrier (Under Slab): Shall conform to ASTM E1745, Class C or better and shall have a minimum water vapor permeance of .044 perms when tested in accordance with ASTM E96. Vapor barrier shall be no less than 10 mils thick.

PART 2: PRODUCTS

2.1 APPROVED PRODUCTS

- A. Griffolyn T-65 by Reef Industries (800) 231-6074.

PART 3: EXECUTION

3.1 INSTALLATION

- A. Lay sheets smoothly, stretch and weight edges, lap joints twelve (12) inches and seal with tape as specified by vapor barrier manufacturer. Turn barrier up six (6) inches at walls and at all pipes, abutments, etc. Tape and seal at penetrations and at edges.
- B. At grade beams, extend vapor barrier down sides of beam trenches (and footing excavations) to within 4" of trench bottom and secure to sides of trench. Do not extend barrier across bottom of beam trench.

3.2 PATCHING:

- A. Patch all punctures with a minimum overlap of 6" in all directions and tape around entire perimeter of repair.

END OF SECTION

**SECTION 07191
VAPOR RETARDANT**

1.1 SCOPE

- A. The Conditions of The Contract (Division 0), and General Requirements (Division 1), are applicable to and a part of this Section.
- B. Related Work Specified Elsewhere:
 - 1. Termite Treatment: Section 02281.

1.2 DESCRIPTION

- A. Vapor Barrier (Under Slab): Shall conform to ASTM E1745, Class C or better and shall have a minimum water vapor permeance of .044 perms when tested in accordance with ASTM E96. Vapor barrier shall be no less than 15 mils thick.

PART 2: PRODUCTS

2.1 APPROVED PRODUCTS

- A. Stego Wrap (15 mil).by Stego Industries LLC. (887) 464-7834.
- B. Griffolyn T-65 by Reef Industries (800) 231-6074.
- C. Rufco D16WB by Raven Ind. At Texas Environmental Plastic:
(281) 821-7320.

PART 3: EXECUTION

3.1 INSTALLATION

- A. Lay sheets smoothly, stretch and weight edges, lap joints twelve (12) inches and seal with tape as specified by vapor barrier manufacturer. Turn barrier up six 6 inches at walls and at all pipes, abutments, etc. Tape and seal at penetrations and at edges.
- B. At grade beams, extend vapor barrier down sides of beam trenches (and footing excavations).

3.2 PATCHING:

- A. Patch all punctures with a minimum overlap of 6" in all directions and tape around entire perimeter of repair.

END OF SECTION

SECTION 07 21 00
THERMAL INSULATION

The requirements of the "General Conditions", the "Supplementary Conditions", and "Division 1" sections of the Specifications, shall apply to this section of the Specifications.

PART 1 - GENERAL

1.01 SCOPE

- A. Work Included: Provide all labor, materials, and services necessary for Insulation Work indicated on the Drawings and specified herein. Work includes, but is not necessarily limited to the following:
 - 1. Furnish and Install:
 - a. Blanket/Batt Insulation.
- B. Related Sections: The following items of related Work will be provided under other sections of the Specifications, as indicated:
 - 1. Concrete Work - Section 03 30 00.
 - 2. Masonry - Section 04 20 00.
 - 3. Steel Roof Decking - Section 05 31 23.
 - 4. Cold-Formed Metal Framing - Section 05 40 00.
 - 5. Rough Carpentry - Section 06 10 00.
 - 6. Sheet Metal Work - Section 07 60 00.
 - 7. Joint Protection - Section 07 90 00.
 - 8. Aluminum Window Framing - Section 08 41 00.
 - 9. Gypsum Sheathing Panels and Gypsum Wallboard - Section 09 29 00.

1.02 QUALITY ASSURANCE

- A. Environmental Requirements: Paint products such as touch-up field painting and isolation coatings shall comply with all applicable Federal and State Regulations on Volatile Organic Compounds (VOC). PAINT

1.03 SUBMITTALS

- A. Product Data: Submit three (3) sets of manufacturer's Product Data for each type of insulation specified herein.

1.04 MATERIAL DELIVERY AND STORAGE

- A. Delivery: Deliver only acceptable materials to the site in original boxes and wrappings, clearly labeled with all pertinent information to facilitate checking.
- B. Storage: Store materials at the site off the ground and in properly protected dry storage facilities, until ready for use. Provide a tarpaulin covering over the materials, securely tied down. Wet, damp, or damaged materials shall not be used.
- C. Waste Management: Collect field generated construction waste created during construction or final.

1.05 SCAFFOLDING

- A. Furnish, erect, and maintain all scaffolding and ladders in accordance with applicable code requirements. Erect at times and locations so as not to delay any part of the Work, and promptly remove when no longer required.

1.06 WARRANTY

- A. Form of Warranty: Execute a warranty in the approved written form warranting all materials and workmanship to remain in serviceable and satisfactory condition, and make good at own expense any imperfections which may develop during the warranty period, and damage to other Work caused by imperfections or by repairing imperfections. The warranty period shall be not less than one (1) year from date of Owner's acceptance.

PART 2 - PRODUCTS

2.01 BLANKET/BATT INSULATION

- A. Manufacturer: Insulation specified herein shall be as manufactured by Thermafiber, Inc., 3711 Mill Street, Wabash, IN 46992, (888)834-2371 or (260)563-2111; www.thermafiber.com.
 - 1. Insulation: Commercial quality, inorganic and noncombustible Thermafiber® Fire Safety Blankets, open-faced with vapor barrier (foil-faced vapor retarder), unless otherwise noted on the Drawings, flame-resistant, mineral wool fiber insulation.

- B. Substitutions: Manufacturers with comparable equivalent products may be acceptable, subject to conformance with these Specifications, the requirements of the Drawings, and the Architect's review. Refer to Specification 01 25 00 – Substitution Procedures.
- C. Blanket/Batt Widths: Provide as required by framing member spacings indicated on Drawings.
- D. Surface Burning Characteristics: Class A fire hazard classification in accordance with ASTM Standard E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 1. With Vapor Barrier: Thermafiber® FS-25 (with foil-faced vapor retarder attached), Type III, Flame Spread maximum 25, and Smoke Developed 0.
 - 2. Without Vapor Barrier: Thermafiber® FS-15 (unfaced), Type I, Flame Spread 0, and Smoke Developed 0.
- E. Vapor Retarder Facing: Foil-scrim (FSP) laminate vapor retarder shall be applied with a flameresistant adhesive. Class A flame-spread rating. Vapor retarder facing, shall have 0.02 perm rating, or better, when tested in accordance with ASTM Standard E96, Procedure A.
- F. Type and Quality: Rated non-combustible as defined by National Fire Protection Association NFPA Standard 220, when tested in accordance with ASTM Standard E136. Insulation shall be nonasbestos, moisture-resistant, noncorrosive, nondeteriorating, mildew-proof and vermin-proof.
- G. Thermal Resistance Values: Provide not less than R19 as unless otherwise indicated on Drawings. Thicknesses shall be as determined by manufacturer for "R" value specified. More than one layer of insulation may be used to achieve the specified "R" value.
- H. Vapor Retarder Tape: Compatible with specified facer and comparable perm rating. For taping insulation joints and repairing tears.
- I. Exposed Insulation: Where exposed, insulation shall meet the requirements of Factory Mutual (FM).

PART 3 - EXECUTION

3.01 BLANKET/BATT INSULATION INSTALLATION

- A. General: Install blanket/batt insulation at metal stud framed exterior building walls, and other locations as indicated on Drawings.

1. Install insulation between studs, from interior side of wall recessed slightly from stud faces. Secure to studs to prevent sagging, in accordance with manufacturer's recommendations.
 2. Fill voids in building construction with blanket insulation, at locations indicated on the Drawings, such as between top of concrete walls and underside of metal deck; between top of structural steel members and underside of deck, between exterior face of structural steel member and exterior construction.
 3. Foil-faced batt insulation shall be furnished to the Sheet Metal Contractor for utility enclosures.
- B. Vapor Retarder Installation: Seal all joints in exterior wall insulation with vapor retarder tape. Apply vapor retarder tape at intersection of insulation with framing, adjacent pieces and similar intersections to insure a vapor tight seal. Repair all tears in insulation foil facing with vapor retarder tape.

3.02 EXAMINATION

- A. Refer to Section 01 31 00 - Project Management & Coordination
- B. Refer to Section 01 73 00 - Execution

3.03 CLEAN-UP

- A. Work Required: Clean-up any Work soiled in the performance of the Work under this section.
- B. Debris and Waste Materials: During progress of the Work, upon completion of Work, and before final acceptance of the Work, keep the premises free of debris and waste materials resulting from Work of this section. Remove all debris and rubbish to central area designated by the General Contractor, for general clean-up by the General Contractor, or if directed by the General Contractor to remove from the site and legally dispose.
- C. Unused Materials, Tools, and Equipment: Upon completion of Work and before final acceptance of the Work, remove all unused materials, tools, and equipment from the site.
- D. Waste Management: Collect field generated construction waste created during construction or final cleaning.

END OF SECTION

SECTION 07 30 10
ROOFING UNDERLAYMENT

PART 1 GENERAL

1.1 SUMMARY

- A. This Section specifies a self-adhering sheet membrane used as underlayment for sloped roofs.
- B. Related Sections: Refer to the following specification sections for coordination:
 - 1. Section 061000 - Rough Carpentry.
 - 2. Section 073113 - Asphalt Shingles.
 - 3. Section 073116 - Metal Shingles.
 - 4. Section 073119 - Mineral-Fiber Cement Shingles.
 - 5. Section 073126 - Slate Shingles.
 - 6. Section 073129 - Wood Shingles and Shakes.
 - 7. Section 073200 - Roof Tiles.
 - 8. Section 076100 - Sheet Metal Roofing.
- C. Referenced Standards: Comply with the requirements of the following standards published by ASTM International to the extent referenced in this section.
 - 1. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension.
 - 2. ASTM D461 - Standard Test Methods for Felt.
 - 3. ASTM D 903 - Standard Test Method for Peel or Stripping Strength of Adhesive Bonds.
 - 4. ASTM D1970 - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.
 - 5. ASTM D3767 - Standard Practice for Rubber—Measurement of Dimensions.

- 6. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.
- 7. ASTM G90 – EMMAqua test.

1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's product data and installation instructions.

1.3 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with requirements of authorities having jurisdiction and applicable codes at the location of the project.
- B. Manufacturer: Minimum 10 years experience producing roofing underlayment.
- C. Installer: Minimum 2 years experience with installation of similar underlayment.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials and products in unopened factory labeled packages. Protect from damage.
- B. Cover materials and store in dry condition between temperatures of 40 and 90 degrees F (5 and 32 degrees C). Use within one year of date of manufacture. Do not store at elevated temperatures as that will reduce the shelf life of the product.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Self-Adhering Sheet Membrane Roof Underlayment: Performance Based
 - 1. Material: Cold applied, self adhering membrane composed of an innovative and proprietary rubberized asphalt adhesive and interwound with a disposable release sheet. An embossed, slip resistant surface is provided on the high performance film with UV barrier properties.
 - 2. Membrane Thickness: 40 mils (1.02 mm) per ASTM D3767 Method A.
 - 3. Membrane Tensile Strength: MD 33 lbf/in, CD 31 lbf/inch per ASTM D412 Die C Modified.
 - 4. Membrane Elongation: 250% per ASTM D412 Die C Modified.

5. Low Temperature Flexibility: Unaffected at -20 degrees F (-29 degrees C) per ASTM D1970.
6. Adhesion to Plywood: 5.0 lb/in. width (876 N/m) per ASTM D903.
7. Maximum Permeance: 0.05 perms (2.9 ng/sqms Pa) per ASTM E96.
8. Maximum Material Weight Installed: 0.22 pounds/sqft (1.1 kg/sqm) per ASTM D461.
9. Service Temperature: 240 degrees F (115.6 degrees C) per ASTM D1204
10. Compatibility: Suitable for use under all types of sloped roofing with the exception high altitude climates where zinc, copper or Cor-Ten roof coverings are used.
11. Adhesive: Rubberized asphalt adhesive containing post-consumer recycled content, contains no calcium carbonate, sand or fly ash.
12. Exposure: Can be left exposed for a maximum of 120 days from date of installation per ASTM G90 – EMMAqua test.
13. Primer: Water-based.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Prior to start of installation, inspect existing conditions to ensure surfaces are suitable for installation of roofing underlayment. Verify flashing has been installed. Starting work indicates installers' acceptance of existing conditions.

3.2 INSTALLATION

- A. Installation: Install roofing underlayment on sloped surfaces at locations indicated on the Drawings, but not less than at hips, ridges, eaves, valleys, sidewalls and chimneys, and surfaces over interior space within 36 inches (914 mm) from the inside face of the exterior wall. Strictly comply with manufacturer's installation instructions including but not limited to the following:
 1. Schedule installation such that underlayment is covered by roofing within the published exposure limit of the underlayment.
 2. Do not install underlayment on wet or frozen substrates.

3. Install when surface temperature of substrate is a minimum of 40 degrees F (5 degrees C) and rising.
4. Remove dust, dirt, loose materials and protrusions from deck surface.
5. Install membrane on clean, dry, continuous structural deck. Fill voids and damaged or unsupported areas prior to installation.
6. Prime concrete and masonry surfaces using specified primer at a rate of 500-600 square feet per gallon (12-15 sqm/L). Priming is not required for other suitable clean and dry surfaces.
7. Install membrane such that all laps shed water. Work from the low point to the high point of the roof at all times. Apply the membrane in valleys before the membrane is applied to the eaves. Following placement along the eaves, continue application of the membrane up the roof. Membrane may be installed either vertically or horizontally after the first horizontal course.
8. Side laps minimum 3-1/2 inches (89 mm) and end laps minimum 6 inches (152 mm) following lap lines marked on underlayment.
9. Patch penetrations and damage using manufacturer's recommended methods.

3.02 CLEANING AND PROTECTION

- A. Protection: Protect from damage during construction operations and installation of roofing materials. Promptly repair any damaged or deteriorated surfaces.
- B. Repair minor damage to eliminate all evidence of repair. Remove and replace work which cannot be satisfactorily repaired in the opinion of the Architect.
- C. Provide temporary protection to ensure work being without damage or deterioration at time of final acceptance. Remove protective film and re-clean as necessary immediately before final acceptance.

END OF SECTION

SECTION 07 60 00
SHEET METAL WORK

The requirements of the "General Conditions", the "Supplementary Conditions", and "Division 1" sections of the Specifications, shall apply to this section of the Specifications.

PART 1 - GENERAL

1.01 SCOPE

- A. Work Included: Furnish all labor, materials and equipment necessary for Sheet Metal Work indicated on Drawings and specified herein. All edge metal and perimeter metal flashings shall be in compliance with ES-1 (ANSI/SPRI), NRCA and INTERNATIONAL BUILDING CODE (IBC 2012/CURRENT) All materials for edge metal shall be supplied and warranted by the manufacturer of the Single Ply membrane, as ES-1 Compliant. The Work includes, but is not limited to the following:
 - 1. Base Flashing.
 - 2. Roofers Sheet Metal and Miscellaneous Sheet Metal Work.
 - 3. PVDF 70% (Kynar, Hylar, Trinar) coated Galvalume, 24 gauge, Grade 50 Steel.
 - 4. Flashing Collars and Hoods.
 - 5. Roof Vents.
 - 6. Two-Piece Metal Counter Flashing.
 - 7. Pressure Bars.
 - 8. Utility Enclosures.
 - 9. Scuppers, Receiver/Collectors, Downspouts and Perimeter Edge Metal
 - 10. All downspouts to be seamed using Pittsburgh seaming in lieu of galvanized pop riveting.
- B. Color Selections: Refer to Color Legend on the Drawings.
- C. Related Sections: The following Work will be provided under other sections of the Specifications, as indicated:
 - 1. Unit Structural Masonry - Section 04 23 00.
 - 2. Metal Roof Deck - Section 05 31 0.

3. Cold-Formed Metal Framing - Section 05 40 00.
4. Rough Carpentry. - Section 06 10 00.
5. Thermal Insulation - Section 07 21 00.
6. Plaster Veneer System - Section 07 24 00.
7. Sheet Metal Work - Section 07 60 00.
8. Roof and Wall Specialties and Accessories - Section 07 70 00.
9. Paints and Coatings - Section 09 90 00.
10. Flashing of Plumbing Vents and Ducts Passing Through Roof - Divisions 22 and 23.
12. Prefabricated Roof Curbs and Equipment Supports - Division 23.

1.02 APPLICABLE STANDARDS - SHEET METAL WORK

- A. General: All Work and materials shall conform to the requirements of the Architectural Sheet Metal Manual, Fifth Edition, (Current Edition), hereinafter referred to as "SMACNA Manual", as issued by the Sheet Metal and Air Conditioning Contractors□□National Association.

1.03 QUALIFICATIONS OF SHEET METAL CONTRACTOR

- A. Sheet Metal Contractor shall be a qualified Contracting Firm, with a minimum of five (5) years experience, capable of following the Specifications, and willing to accept instructions in the field.

1.04 QUALITY ASSURANCE

- A. ES-1 Edge Standard: As called out in IBC 2009/2012 section 1504.1 ... All flashings, perimeter metal, shall be in compliance with ES-1/ANSI SPRI. Manufacturer shall provide proof of compliance demonstrating as per manufacturer not by contractor shop fabrication. Manufacturer shall provide Grade 50 Galvalume AZ50 for Painted PVDF finish or AZ 55 for unpainted bare Galvalume finish.

1.05 WORKMANSHIP

- A. Work shall be performed by skilled tradesmen.
- B. Comply with the Contract Documents and the oral instructions of the Owner's Representative.

- C. Work not fully indicated by the Contract Documents shall be done in accordance with printed instructions of the system manufacturer, or as directed by the Owner's Representative.
- D. Consult the Specifications of the other Trades which connect to the Work specified herein, to become thoroughly familiar with the extent of the Work provided by others. Any items not specified under the other Trade headings, but required for completion of Work specified herein shall be provided as part of Work within this section.

1.06 SUBMITTALS

- A. Reports: Submit test reports, procedure specifications and certifications as required to substantiate welded connections design and welding qualifications to the Owner's Representative and the General Contractor for review.
- B. General: Submit Shop Drawings and Samples to the Architect for review in accordance with the requirements in Section 01 33 23 - Shop Drawings and Samples, and as specified herein.
- C. Shop Drawings: Prepare complete detailed Shop Drawings showing all fabricated items and the methods of assembling, jointing, seaming and securing of Sheet Metal Work.
- D. Samples: Submit two (2) 8" square Samples of factory finished sheet material, and two (2) 12" long samples of factory fabricated products.
- E. Installer's Certificate: Upon completion of Sheet Metal Work, submit a written certification to the Architect and Owner, signed by the manufacturer, stating all flashing were furnished and installed in accordance with ES-1 ANSI/SPRI, IBC (current edition) or exceeding the requirements of, specifications for ten (15) year type flashing. All flashing shall be designed and installed to obtain a watertight installation and shall be warranted as a "SYSTEM WARRANTY" from the roofing manufacturer.

1.07 MATERIAL DELIVERY, STORAGE AND HANDLING

- A. Delivery: Deliver only acceptable materials to the site in original boxes, crates, wrappings, properly packaged for protection against damage in transportation, clearly labeled with all pertinent information, to facilitate checking. Upon receipt of materials and components, installer shall examine the shipment for damage and completeness.
- B. Storage: Store and field protect materials at the site off the ground and in properly protected clean and dry storage facilities until ready for use. Stack all materials to prevent damage and to allow for adequate ventilation.
 - 1. Roofing Felt: Rolls shall always be stored upright on pallets.
- C. Handling: Exercise care in unloading, storing and installing all components to prevent bending, warping, twisting, and surface damage. Replace any damaged materials.

- D. Packaging Waste Management: Separate packaging waste materials for reuse, recycling and/or landfill.

1.08 MAINTENANCE CONTRACT

- A. Sheet Metal Contractor shall agree to maintain the Sheet Metal Work in a weathertight and watertight condition for a period of five (5) years from the date of Owner's acceptance.
- B. During the Maintenance Period, Contractor shall inspect and make immediate emergency repairs to defects or leaks in the Sheet Metal Work within twenty-four (24) hours of notice from the Owner's Representative. Within a reasonable time, restore the affected items to the standard of the original specifications. All emergency and permanent Work during the life of the contract to maintain Sheet Metal Work will be done without cost to the Owner, except in the event that leaks were caused by abuse, lightning, hurricane, tornado, hail storm or other unusual climatic phenomena of the elements, or failure of related Work (except related Roof Metal Work included under the Contract) installed by other parties.
- C. Contract agreement to maintain Sheet Metal Work shall be in a written form acceptable to the Owner.

PART 2 - PRODUCTS

- 2.01 Substitutions: Manufacturers with comparable equivalent products may be acceptable, subject to conformance with these Specifications, the requirements of the Drawings, and the Architect's review. Refer to Specification 01 25 00 – Substitution Procedures.

2.02 MATERIALS

- A. General: Furnish all Sheet Metal Work shown on Drawings and specified herein, except for items that are specifically noted on the Drawings or specified to be provided by others.
 - 1. Solar Reflectance Index: Not less than 78 when calculated according to ASTM E 1980 based on testing identical products by a qualified testing agency.
- B. Galvalume Sheet Metal: Commercial quality coated bearing sheet steel products of not less than the US standard gauges specified below, unless otherwise noted on the Drawings. Sheet metal shall have a uniform Coating Designation AZ 50 zinc/aluminum coating applied by the continuous Hot-Dip Process in compliance with ASTM Standard A924 to both sides of the base metal. Each sheet or formed product shall bear the manufacturer's stenciled registered trade name of the product, type of base metal, gauge, and heat number. Materials shall be in compliance with Aluminum Zinc Alloy Coated Steel Sheet: Galvalume ASTM A792/A 792M-05 for lock-forming quality sheet metal.
 - 1. Products and Manufacturer: Galvalume Steel shall be produced in accordance with ASTM A792/A 792M-05, made in America, formed and supplied by the

roofing manufacturer. All steel shall be submitted and provide the proper certificate of metal materials that clearly identify manufacturer of origin for the AZ 50 or AZ 55 Galvalume.

2. Sheet Metal Products:

- a. Fascia Flashing: 24 gauge (minimum) Grade 50 Galvalume, AZ 50 PVDF 70% (Kynar, Hylar or Trinar).
 - b. Metal Cleats: 16-20 gauge (minimum).
 - c. Gutters: 22 gauge (minimum) Grade 50 Galvalume, AZ 50 PVDF 70% (Kynar, Hylar or Trinar).
 - d. Braces and Brackets: Spacers and hangers shall be minimum 3/16" x 1".
 - e. Downspouts: 24 gauge (minimum) Grade 50 Galvalume, AZ 50 PVDF 70% (Kynar, Hylar or Trinar).
 - f. Metal Drip Edges: 24 gauge (minimum) Grade 50 Galvalume.
 - g. Flashing and Counter Flashing: 24 gauge Grade 50 Galvalume or heavier where required to meet service conditions, AZ 50 PVDF 70% (Kynar, Hylar or Trinar).
 - h. Break Formed Metal Trim: 24 gauge (minimum) Grade 50 Galvalume, AZ 50 PVDF 70% (Kynar, Hylar or Trinar).
 - i. Sheet Metal Angles: 16 gauge (minimum).
 - j. Conductor Heads: 16 gauge (minimum) Grade 50 Galvalume, AZ 50 PVDF 70% (Kynar, Hylar or Trinar).
- C. Strainers: Provide compatible wire mesh strainer at downspout locations.
- D. Sheet Lead: 2-1/2# Hard Lead Flashing and 4# Soft Lead Flashing, conforming to Federal Specification QQ-L-201, grade.
- E. Steel Plates and Bar Stock: Conform to ASTM Standard A36 with galvanized finish conforming to ASTM Standard A123.
- F. Pressure Bars: 1-1/2" x 1/8" thick galvanized metal with slotted holes, spaced 2" from each end and at 8" O.C., and length as required to suit conditions. Secure pressure bars with stainless steel anchor bolts and washers. Provide 1/4" wide gap between lengths of bars.

- G. Flashing Collars and Hoods: Sleeved flashing collars with banded "hoods" fabricated of 24 gauge galvanized steel as detailed.
- H. Roof Vents: Metal roof vents with insect screen as specified herein and caps as detailed on the Drawings. Construct vents of 6" dia., 18 gauge galvanized sheet metal with 4" flanges secured to metal roof deck and flashed into roofing.
- I. Two-Piece Metal Counter Flashing:
 - 1. Manufacturer: The Roofing Manufacturer shall provide the reglet as per architectural drawings as a 2 piece compression (spring locked) assembly, warranted, designed and engineered by the roofing manufacture and made part of the System Watertight Warranty.
 - 2. Product: Prefabricated, two-piece flashing system shall not be less than 24 gauge Grade 50 Galvalume standard zinc/aluminum AZ 50 finish and Kynar 70 PVDF coating to match architects selected colors. Provide type as required by Drawings, subject to review by the Architect. Provide ES 1 Compliance documentation in conjunction with IBC Code following ANSI/SPRI and International Building Code section 1504.1 of the IBC code for edge metal. (current IBC edition)
- J. Insect Screens: Epoxy coated wire mesh product, 18 x 14 mesh, 0.009 wire diameter, 0.09 lb./sq. ft., with 72% free open air area, as manufactured by McNichols Co., 2502 North Rocky Point Drive, Suite 990, Tampa, FL 33607-1447, (813)282-3828, (800)237-3820; www.mcnichols.com, or comparable equivalent product, subject to review by the Architect.
- K. Building Felt: Type II, No. 30, un-perforated asphalt-saturated roofing felt conforming to ASTM Standard D226.
- L. Fasteners: #10 x 1-1/4" min. hex head screws, heavy cadmium plated steel, or stainless steel, and neoprene sealing washers not less than 3/4" O.D.
- M. Sealants:
 - 1. Roofing Materials Sealant: Provide sealant compatible with roofing system, as recommended by the specified roofing manufacturer, subject to review by the Architect.
 - 2. Metal Joint Sealant:
 - a. Manufacturer: Roofing Manufacturers Sealants, made part of the watertight warranty or Tremco, Incorporated, Commercial Sealants & Waterproofing Division approved and warranted by roofing manufacturer.

- b. Product: Conforming to Manufacturers system warranty and/or matching the performance standards of Mono® 555, one-part Acrylic Terpolymer Sealant, meeting U.S. Federal Specification TT-S-230, or other equivalent product subject to review by the Architect. Color selection shall be by Architect.
- c. Volatile Organic Compounds (VOC) Content: paint and coatings product specified herein shall have a VOC content of 250 grams/liter or less when calculated according to 40 CFR 59, subpart D (EPA method 24).

2.03 FINISHES

- A. Field Painted Metal Products: Galvalume metal products AZ 50 aluminum zinc coated with 70 PVDF finish to match selection made by the architect. Touch up shall be in strict compliance of the manufacturer guidelines for 70% PVDF finishes.
- B. Prefinished Metal Products: Galvalume Grade 50 prefinished metal products shall have a factory-applied, primed, and oven-baked finish based of Kynar Polyvinylidene Fluoride (PVDF) resin by Akzo Nobel, Valspar, PPG or Arkema, Inc. Finish shall be a dispersion coating based on a minimum of 70% Kynar 500®/Hylar 5000®, Trinar® or Fluoropon® resins, in strict compliance with the standards for 70% PVDF finish and meeting Energy Star requirements. This finish shall be in strict accordance with the licensed formulator's specification and applied by an applicator approved by the licensed formulator. This finish, based on Kynar 500® resin, Trinar®, Hylar 5000® or Fluoropon® shall meet the performance criteria of AAMA 2605 specification and be certified by the formulator as containing PVDF 70% resin manufactured by Akzo Nobel, Arkema, Valspar, PPG. Primer shall have a dry film thickness of 0.2 to 0.4 mils. Topcoat dry film thickness shall be not less than .09 to 1.3 mil thickness on the exposed finished surface of the metal product. Dry film thickness shall be in accordance with ASTM D7091 - Standard Practice for Nondestructive Measurement of Dry Film Thickness of Nonmagnetic Coatings Applied to Ferrous Metals and Nonmagnetic, Nonconductive Coatings Applied to Non-Ferrous Metals (formerly ASTMStandard D1400).
 - 1. Application: 70% PVDF resin-based coating application method to substrates shall be in accordance with Authorized Licensee's recommended mil thickness, subject to review by the Architect.
 - 2. Colors: As indicated on the Drawings or selected by the Architect.
 - a. Solar Reflectance Index: Not less than 78 when calculated according to ASTM E 1980 based on testing identical products by a qualified testing agency.
 - b. PVDF Testing Standards as listed:

PAINT FINISH TESTING:

Abrasion	ASTM D 968
Accelerated Weathering	ASTM D 822, ASTM-G153
Acid Resistance	ASTM D 1308
Chalk	ASTM D 4214 Method A
Cleveland Condensing	ASTM D 4585
Color Change	ASTM D 2244
Cross Hatch Adhesion	ASTM D 3359
Cure Test	ASTM D 5402
Cyclic Salt Fog/UV	ASTM D 5894
Direct/Reverse Impact	ASTM D 2794
Fire Hazard	ASTM E 84
Florida Exterior	ASTM D 2244/ASTM D 4214 Method A
Gloss	ASTM D 523 60°
Humidity Resistance	ASTM D 2247
Mandrel Bend	ASTM D 522 1T, 2T, 3T
Pencil Hardness	ASTM D 3363
Salt Spray	ASTM B 117
Sulfur Dioxide	ASTM G 87 (aka Kesternich Test)
Water Immersion	ASTM D 870

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Refer to Section 01 31 00 – Project Management & Coordination
- B. Refer to Section 01 73 00 - Execution

3.02 WORKMANSHIP - SHEET METAL WORK

- A. Work shall be accurately formed to sizes, shapes and dimensions indicated and detailed, with all angles and lines in true alignment. All Work shall be straight, sharp, and erected plumb and level in proper plane without bulges or waves. Form sheets with a bending brake to the profiles detailed. Shaping and hand seaming shall be shop processed insofar as practical. AND ES1 COMPLIANT, supplied, manufactured, engineered by the roofing manufacturer, made part of the warranted roof system.
- B. Fabricate and erect all Sheet Metal Work to perform satisfactorily.
- C. Fabricate all items in maximum lengths and hold all joints to a minimum.
- D. Cooperate with all other subcontractors, and arrange for installation of sheet metal in connection with their Work.

3.03 INSTALLATION OF FLASHING AND SHEET METAL WORK

A. Flashing Collars and Hoods:

1. Where pipe or conduit extends through roof, and where other similar roof penetrations occur, furnish and install flashing collars for all locations as shown on Drawings. Furnish assemblies complete, including top "hood" portions, copper tension straps and non-corrosive bolts.
2. Flashing collars shall be fabricated with galvanized sheet iron, consisting of a 3" diameter seamed tube (larger diameter if required by size of item penetrating roof), min. 8" high with a 4" wide circular flange at the bottom. Flashing collars to be one piece, but, if joined in field shall be soldered completely tight including flange. Provide separate top "hood" portion, fabricated from galvanized sheet metal to shape indicated on Drawings. Provide each "hood" portion with a galvanized steel tension strap, for securing "hood", and brass or stainless steel bolt for securing strap.
3. Install the flashing assemblies by securing collar flanges to roofing, embedding in cement over top ply of roofing, and sealing with sealant as per detail.
4. At each flashing collar with sleeve, install top "hood" portion in approved elastic compound, place tension straps in position, and bolt same tightly in place. Seal top portion of "hood" by filling with flared out portion of "hood" with plastic sealant.

B. Prefinished Galvanized Metal Fascia Flashings:

1. Furnish and install prefinished galvanized metal fascia flashings, formed to shapes as shown on Drawings.
2. Fascia flashings shall be same as shown at FIGURE 2-1B, FORMED GRAVEL STOP FASCIA - DESIGN DATA, of SMACNA Manual, to fit into continuous sheet metal cleats of metal compatible with the galvanized metal secured to wood blocking at top of wall. All nailing shall be concealed.
 - a. Nail continuous cleats to the wood blocking at 10" O.C. and in compliance with ES -1(wood blocking by Rough Carpentry Trade). Form bottom edges of cleats out at a 45° angle, to fit drip shape of flashing. Install a continuous, single layer of waterproof building paper (conforming to ASTM Standard C171) over blocking and cleats, trimmed so that it will not be visible when coping is installed.
 - b. Form flashings in 10 ft. long sections, and joined to allow for longitudinal expansion. Stiffen free ends (bottom edges of vertical sides) of flashing by seaming back 1/2", and bending out 1/2" to form drip. Lock flashings into continuous cleats at face side of wall and fasten to wood blocking with screws at 2'-0" O.C. Overlap sections at joints a minimum of 4".

c. Corners of all flashings shall be mitered, seamed, and sealed.

C. Kynar 70% PVDF finish Gutters, Downspouts and Gravel Stops:

1. Fabricate and install prefinished gutters and downspouts as detailed on Drawings and specified herein.
2. Hanging gutter installation shall conform to similar detail at FIGURE 1-12 – HANGING GUTTER INSTALLATIONS - GENERAL of SMACNA Manual, and shall consist of continuous cleat, gutter, gutter spacer, and gutter brackets as shown on Drawings.
3. Fabricate gutter of Galvalume AZ50 Grade 50, PVDF 70% coating in Rectangular Type Gutter Style, per “Style I” shown on FIGURE 1-2 RECTANGULAR TYPE GUTTER STYLES OF SMACNA Manual, and as detailed on the Drawings.
4. Furnish and install strainers, inserted into downspout inlets. Furnish and install all outlet tubes, and gutter ends.
5. Furnish and install downspouts of plain round design as detailed on the Drawings, fabricated of galvanized sheet steel, in sizes and locations shown on the Drawings.
6. Fabricate downspout hanger according to FIG 1-35D, FIGURE 1-35, DOWNSPOUTS - HANGER DESIGN of SMACNA Manual. Secure downspouts with hangers to wall at 6 ft. centers, maximum.
7. All fasteners and accessories shall be of compatible material.
8. Gravel Stops: Fabricate perforated gravel stops of 12 gauge galvanized sheet, in lengths not exceeding 10 ft. Install stops, at gutters, over prepared nailer onto roof, and secured with neoprene-washed large-head stainless steel nails in 2 rows staggered with nails 6" apart each row, giving an actual 3" separation between fastenings. Lap each length 2", and drive 2 nails into each lap.
9. Conductors/Collectors/Receivers shall be custom fabricated to match the opening at the through wall scupper. The Scupper shall provide for a weld between the roof membrane, and the membrane through the wall at the scupper. The scupper shall provide a monolithic connection, manufactured and warranted by the membrane manufacturer.

D. Utility Enclosures:

1. Furnish and install curb mounted, two-piece, enclosure type, and 20 gauge galvalume sheet metal flashings to cover locations where pipes and conduit

penetrate the roof. Furnish complete enclosure assemblies, including sheet metal screws.

2. Fabricate two-piece enclosure assembly as detailed on Drawings. Bottom section shall be 12" high, square sleeve sized to fit on roof curb, with slots at one side of sleeve to fit over the utility lines, and closure piece at same side, similarly slotted to fit over utility lines, covering former slots. Fabricate removable top section as cover to fit over bottom section, with drip formed edges on all sides, and projecting hood portion at side with sheet metal slotted sleeve sheets fitted over utility line penetrations to form a weathertight seal around the pipes.
3. Fit and install bottom section on roof curb, securing with screws and neoprene/metal washers. Receive foil face batt insulation from Thermal Insulation Contractor. Install insulation as indicated on the Drawings with the foil face down. Fit top section down over bottom section, securing with sheet metal screws spaced 8" O.C.

E. Metal Drip Edges: Brake-form prefinished galvanized sheet metal to provide 3-inch roof deck flange and 1-1/2 fascia flange with 3/8-inch drip at lower edge. Furnish in lengths of 8 to 10 feet.

F. Miscellaneous Flashing and Sheet Metal Work: Complete all Miscellaneous Flashing and Sheet Metal Work indicated or required, whether or not specified herein.

G. Pitch Pockets: PITCH POCKETS ARE PROHIBITED.

3.04 ROOF VENT INSTALLATION

- A. Install vents through roof where shown on the Drawings. Coordinate with Roofing Contractor. Final flashing shall be by Roofing Contractor.

3.05 REPLACEMENT

- A. Promptly replace all defective materials and workmanship, at no cost to the Owner, to the satisfaction of the Architect.

3.06 PAINTING

- A. Field Painting: Finish painting of materials where required by Drawings and/or field conditions shall be by the Painting Contractor.

B. Prefinished Materials:

1. Touch-up prefinished items damaged during installation and in 100% compliance of PVDF provider.
2. Paint shall be 70% PVDF and color to match factory-applied shop finish.

2.02 Kynar/Hylar/Trinar/Fluoropon Polyvinylidene Fluoride (PVDF) finish surface imperfections or minor scratches shall be touched-up using a coating based upon 70%PVDF resin as supplied by Licensee.

B. Compatibility: Paint shall be compatible with roofing materials.

3.076 CLEAN-UP

A. Work Required: Clean-up any Work soiled in the performance of Work under this section.

B. Debris and Waste Materials: During progress of the Work the premises shall be kept free of all debris and waste materials resulting from the Work of this section. During progress of the Work, upon completion of Work, and before final acceptance of the Work, remove all debris and rubbish from the site, and dispose of legally.

C. Unused Materials, Tools, and Equipment: Upon completion and before final acceptance of the Work, remove all unused materials, tools, and equipment from the site.

D. Waste Management: Collect field generated construction waste created during construction or final cleaning.

END OF SECTION

SECTION 07 61 00
PREFORMED METAL ROOF

PART 1 GENERAL

1.1 DESCRIPTION OF WORK

- A. Work includes, but should not be limited to: roof material alternate preformed panels, related accessories, hips, ridges, eaves, corners, rakes, miscellaneous flashings and attaching devices.

1.2 RELATED WORK SPECIFIED ELSEWHERE:

- A. Section 5120 Structural Steel.

1.3 QUALITY ASSURANCE:

- A. Qualifications of Installers: Competent & skilled sheet metal applicators familiar with MBCI products or architect approved equal, standard details, and recommendations. Applicator shall have at least (5) years experience applying these types of materials with successful completion of projects of similar scope.

1.4 SUBMITTALS

- A. Submit the selected manufacturer's current specifications and installation recommendations.
- B. Provide samples in accordance with Section 01340.
- C. Submit shop drawings showing roof plans profiles, details of forming, joining trim-flashing and accessories. Show details of edges, terminations and penetrations of metal roofing work.
- D. Warranties:
 - a. A ten (10) year paint finish guarantee is required from panel applicator.

PART 2 PRODUCTS

2.1 MANUFACTURER:

- A. To match existing.

2.2 MATERIALS

- A. Roof panels
 - a. Roof panels to match existing.
- B. System Design
 - a. Roof shall be designed to meet uplift requirements of the IBC latest edition.
 - b. All components for the Batten-lock roof paneling systems shall be designed in accordance with sound engineering methods and practices.
 - c. Batten-lock roof panels shall be designed in accordance with AISI "Specifications for the Design of Light-Gage, old Formed Steel Structural Members, latest edition.
 - d. Paneling systems shall be designed to support design live loads.
 - e. All endwall trim and roof transition flashings shall allow the roof panel to move relative to the wall panels and/or the parapets as the roof expands and contracts with temperature changes.
 - f. The Batten-lock roof panel shall not be considered to be a safe work platform until completely secured to the structural system. Therefore, walk boards or other safety equipment as required by safety standards shall be provided by the erecting contractor to provide worker safety during panel installation.
- C. Accessories:
 - a. Provide all necessary accessories to complete installation.
 - b. Accessories and trim shall match prefinished color.
 - c. Provide manufacturer's recommended matching sealant.

2.3 DELIVERY

- A. Delivery of material shall be made only after suitable facilities for its storage and protection are available on site.
- B. Upon receipt of preformed metal panels, flat sheets, flashings, and panel accessories; installer shall examine each shipment for damage and for completeness of the consignment.

2.4 STORAGE

- A. Store materials out of the weather, in a clean, dry place. One end of each container should be slightly elevated to allow any moisture to run off.
- B. Panels and/or flashings with strippable film must not be stored in areas exposed to sunlight
- C. Care should be taken to prevent contact with any substance, which may cause a discoloration in the finish during storage.
- D. Store materials to provide ventilation and prevent bending, abrasion or twisting.

2.5 HANDLING

- A. Care should be taken to avoid gouging, scratching or denting.
- B. Do not allow traffic on completed roof. If required, provide cushioned walk boards.
- C. Protect installed products from damage caused by foreign objects and adjacent construction until completion of project.

PART 3 EXECUTION

3.1 CONNECTING WORK:

- A. The applicator shall examine surfaces on which his work is to be applied, and shall notify the Architect in writing if not suitable to receive his work. Work on any surface shall constitute acceptance of this surface by the installer.

3.2 FIELD MEASUREMENT

- A. Take field measurements to verify or supplement dimensions indicated prior to fabrication of metal panels.

3.3 SYSTEM INSTALLATION

- A. All Batten-lock panel clips shall be positioned by matching the hole in the clip with the field punched holes in the secondary structural members.
- B. All Batten-lock panels shall be positioned and properly aligned by matching the prepunched holes in the panel end with the field punched holes in the eave structural member and by aligning the panel with the panel clip.

- C. Batten-lock panel side-laps shall be field seamed by a self-propelled and portable electrical lock seaming machine. The machine field forms the final 180 degrees of a 360 degree double lock standing seam; all sidelaps sealant shall be factory applied.
- D. Batten-lock panel end laps, when required, shall be at least 6" sealed with Butler Paniastic sealant (weather sealing compound) containing hard nylon beads to prevent over compression of the sealant and fastened together by clamping plates. The panel laps shall be joined by means of a two-piece clamped connection consisting of a bottom reinforcing plate and a top panel strap. The panel end laps shall be located directly over, but not fastened to, a supporting secondary roof structural member and be staggered, so as to avoid a four panel lap splice condition.

3.4 FASTENERS

- A. All connections of double-lock panels to structural members, except at eave, shall be made with clips with movable tabs that are seamed into the standing seam sidelap.
- B. Panel clips shall be fastened to structural members with manufacturer's recommended fasteners as per manufacturer's erection drawings using factory prepunched holes in structural members. The fasteners shall contain a metal backed rubber washer, which serves as a torque indicator.
- C. Batten-lock panel-to-panel connections shall be made with a positive, field formed standing double-lock seam, formed by a special seaming machine. The machine field forms the final 180 degrees of a 360 degree Pittsburgh double-lock standing seam; all sidelap sealant shall be factory applied.
- D. Fasteners penetrating the meal membrane at the following locations must not exceed the frequency listed:
 - a. Basic Panel Systems 0 per sq. ft.
 - b. Exterior Eave Gutter 2 per lin ft.
 - c. Gable Trim (no parapet) 2 per lin ft.
 - d. Ridge 1 per lin ft.
 - e. High Eave (no parapet) 2 per lin ft.
 - f. Panel Splices 2 per lin ft.
 - g. High Side Transition 1 per lin. ft.

- E. In lieu of prepunched secondary and panels, pre-drilling of the structural members is a mandatory in order to maintain proper alignment of the roof system.
- F. Workmanship shall conform to standards set forth in the architectural sheet metal manual as published by SMACNA.
- G. Panels should be installed in a manner that, horizontal lines are true and level, and vertical lines are plumb.
- H. All starter and edge flashings should be installed prior to panel installation.
- I. Do not allow panels or trim to come into contact with dissimilar materials.

3.5 ACCESSORIES

- A. Accessories (i.e., gutters, downspouts and fascias) shall be as standard with Butler Manufacturing Company, unless otherwise noted and furnished as specified.
- B. The metal coating on all gutters, downspouts, gable trim and eave trim to be ButlerCote® 500 FP finish system, a full strength, 70% Kynar 500®/Hylar 5000® fluoropolymer coating.
- C. Location of standard accessories shall be as shown on erection drawings as furnished by Butler Manufacturing Company.
- D. Material used in flashing and transition parts and furnished as standard by Butler Manufacturing Company not visible may or may not match the roof panel material. All visible panels shall match. Parts shall be compatible and shall not cause a corrosive condition. Copper and lead materials shall not be used with GALVALUME® or optional aluminum coated panels.

3.6 PERFORMANCE TESTING

- A. Underwriters Laboratories –U.L. Class 90 Rating (U.L. Test 580).

The roof system shall carry a U.L. wind uplift classification Class 90 rating or as required by 2000IBC to ensure structural integrity and possible reduction of insurance rates.
- B. U.S. Army Corp of Engineering Guide Specification 07416.
- C. In addition, the Batten Lock® roof system must be tested and certified in accordance, with the Army Corps of Engineers Guide Specification 07416 (Test method for Structural Performance of Standing Seam Metal Roof Systems by Uniform Static Air Pressure Difference.)

- D. Factory Mutual –Class 1 Fire and 1-90 Windstorm Classification. Structural Integrity and the fire resistance of the roof system is produced by the complete system as defined by F.M. Installation modifications or substitutions can invalidate this test.

3.7 PROVISIONS FOR EXPANSION/CONTRACTION

- A. Provision for thermal expansion movement of the Batten Lock® panels shall be accomplished by the use of clips with a moveable tab. The stainless steel tabs shall be factory centered on the roof clip when installed to assure full movement in either direction. A force of no more than 8 pounds will be required to initiate tab movement. Each clip shall accommodate a minimum of 1.25" in either direction or 2.5" total movement.
- B. The roof shall provide for thermal expansion/contraction without detrimental effect of the roof panel when there is a +100 degree F. temperature difference between the inside structural framework of the building and the temperature of the roof panels.

3.8 TOUCH UP

- A. Only minor scratches and abrasions will be allowed to be touched up. Any other damaged material shall be replaced.

3.9 CLEAN UP

- A. Leave work areas clean, free from grease, finger marks and stains.
- B. Remove scrap and debris from surrounding areas and grounds.
- C. Remove excess sealant from seams or edges of materials.
- D. Remove and replace dented, scratched or damaged panels.

END OF SECTION

SECTION 07 62 00
SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes flashings and counter flashings, fabricated sheet metal items.
 - 1. Provide reglets and accessories.
- B. Related Sections:
 - 1. Section 03100 - Concrete Forms and Accessories: Placement of recessed flashing reglets and accessories.
 - 2. Section 06114 - Wood Blocking and Curbing.
 - 3. Section 07611 - Custom Sheet Metal Roofing.
 - 4. Section 07724 - Roof Hatches: Metal curbs.
 - 5. Section 07714 - Gutters and Downspouts
 - 6. Section 07900 - Joint Sealers.
 - 7. Section 08620 - Unit Skylights.
 - 8. Section 09900 - Paints and Coatings: Field painting.

1.2 REFERENCES

- A. AAMA 605.2 (American Architectural Manufacturers Association) - Specification for High Performance Organic Coatings on Architectural Extrusions and Panels.
- B. ASTM A924/A924M - Steel Sheet, Aluminum-Zinc Alloy Coated by the Hot-Dip Process, Structural (Physical) Quality.
- C. ASTM A653/A653M - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated by the Hot-Dip Process.
- D. ASTM B32 - Specification for Solder Metal.
- E. ASTM D4397 - Specification for Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications.
- F. FS TT-C-494 - Coating Compound, Bituminous, Solvent Type, Acid Resistant.
- G. SMACNA (Sheet Metal and Air Conditioning Contractors National Association) - Architectural Sheet Metal Manual.

1.3 DESIGN REQUIREMENTS

- A. Work of this Section is to physically protect base flashings, from damage that would permit water leakage to building interior.
- B. Sheet Metal Flashings: Conform to the criteria of SMACNA "Architectural Sheet Metal Manual."

1.4 SUBMITTALS

- A. Section 01330 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.
- C. Product Data: Submit data on manufactured components metal types, finishes, and characteristics.

1.5 QUALIFICATIONS

- A. Fabricator and Installer: Company specializing in sheet metal work with minimum three years documented experience.

1.6 PRE-INSTALLATION MEETING

- A. Section 01300 - Administrative Requirements: Preinstallation meeting.
- B. Convene minimum one week prior to commencing Work of this section.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Section 01600 - Product Requirements: Product storage and handling requirements.
- B. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- C. Prevent contact with materials, which may cause discoloration or staining.

1.8 COORDINATION

- A. Section 01300 - Administrative Requirements: Coordination and project conditions.

PART 2 PRODUCTS

2.1 SHEET METAL FLASHING AND TRIM

- A. Manufacturers:
 - 1. Surface mounted reglet and counterflashing:
Fry Reglet, Type SM, Springlor Flashing system.
 - 2. Substitutions: Section 01600 - Product Requirements.
- B. Sheet Materials:
 - 1. Galvanized Steel: ASTM A924/A924M, Grade A, or ASTM A653/A653M, G90 (Z275) zinc coating; 24 gauge thick steel.

2.2 ACCESSORIES

- A. Fasteners: Same material and finish as flashing metal, with soft neoprene washers.
- B. Slip Sheet: Rosin sized building paper.
- C. Primer: Zinc molybdate type.
- D. Protective Backing Paint: Zinc molybdate alkyd.
- E. Sealant: Type "B" sealant specified in Section 07900.
- F. Plastic Cement: ASTM D4586, Type I.
- G. Reglets: Surface mounted type, galvanized steel manufactured by Fry Reglet.
- H. Solder: ASTM B32; type suitable for application and material being soldered.

2.3 FABRICATION

- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- B. Fabricate cleats of same material as sheet metal, interlocking with sheet.
- C. Form pieces in longest possible lengths.
- D. Hem exposed edges on underside ½ inch; miter and seam corners.
- E. Form material with flat lock seams, except where otherwise indicated. At moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- F. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.
- G. Fabricate vertical faces with bottom edge formed outward ¼ inch and hemmed to form drip.
- H. Fabricate flashings to allow toe to extend 2 inches over roofing. Return and brake edges.

2.4 FACTORY FINISHING

- A. Modified silicone polyester coating: Baked enamel system conforming to AAMA 603.8.
- B. Primer Coat: Finish concealed side of metal sheets with primer compatible with finish system, as recommended by finish system manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01300 - Administrative Requirements: Coordination and project conditions.
- B. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.
- C. Verify roofing termination and base flashings are in place, sealed, and secure.

3.2 PREPARATION

- A. Install starter and edge strips, and cleats before starting installation.
- B. Install surface mounted reglets true to lines and levels. Seal top of reglets with sealant.
- C. Paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil.

3.3 INSTALLATION

- A. Secure flashings in place using concealed fasteners. Use exposed fasteners only where permitted.
- B. Apply plastic cement compound between metal flashings and felt flashings.
- C. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- D. Seal metal joints watertight.

3.4 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Testing and Inspection Services.
- B. Inspection will involve surveillance of Work during installation to ascertain compliance with specified requirements.

3.5 SCHEDULE

- A. Counterflashings at Roofing Terminations (over roofing base flashings):
- B. Roofing Penetration Flashings, for Pipes, Structural Steel, and Equipment Supports.

SECTION 07 70 00
ROOF AND WALL SPECIALTIES AND ACCESSORIES

The requirements of the "General Conditions", the "Supplementary Conditions", and "Division 1" sections of the Specifications, shall apply to this section of the Specifications.

PART 1 - GENERAL

1.01 SCOPE

- A. Work Included: Furnish and/or provide all material and equipment necessary for Roof and Wall Specialties and Accessories indicated on the Drawings and specified herein. Work includes, but is not necessarily limited to the following:
 - 1. Pipe Supports.
 - 2. Pipe Flashings.
- B. Color Selections: to match existing.
- C. Related Sections: The following items of related Work will be provided under other sections of the Specifications:
 - 1. Steel Roof Deck - Section 05312.
 - 2. Rough Carpentry - Section 06 10 00.
 - 3. Sheet Metal Work - Section 07 60 00.
 - 4. Paints and Coatings - Section 09 90 01.

1.02 SUBMITTALS

- A. General: Submit Shop Drawings and Product Data to the Architect for review in accordance with the requirements in Section 01 33 23 - Shop Drawings and Samples, and as specified herein.
- B. Shop Drawings: Prepare and submit complete Shop Drawings, indicating product construction, installation details, and control dimensions to allow for accurate preliminary framing and installation procedures.
- C. Reports: Submit test reports, procedure specifications and certifications as required to substantiate welded connections design and welding qualifications to the Owner's Representative and the General Contractor for review.

1.03 PRODUCT DELIVERY, HANDLING AND STORAGE

- A. Delivery: Deliver all products, materials, and accessories at location designated by the General Contractor.
- B. Storage: Store all products and materials at the site above the ground. Cover all materials with waterproof coverings to prevent water absorption from rain and condensation. Handle all materials to prevent damage. Materials shall not be dumped in piles or placed directly on ground.

1.04 WARRANTY

- A. General: Submit Shop Drawings and Product Data to the Architect for review in accordance with the requirements in Section 01 33 23 - Shop Drawings and Samples, and as specified herein.
- B. Form of Warranty: Execute a warranty in the approved written form warranting all materials and workmanship to remain in serviceable and satisfactory condition, and to make good at own expense any imperfections which may develop during the warranty period, and damage to other Work caused by imperfections or repairing imperfections. The warranty period shall be not less than five (5) years from date of Owner's acceptance of installation.

PART 2 - PRODUCTS

2.02 PIPE SUPPORTS

- A. Preformed Roller Bearing Pipe Supports:
 - 1. Manufacturer: Miro Industries, Inc., 2700 South 900 West, Salt Lake City, UT 84119, (800)768-6978, (801)975-9993; www.miroind.com.
 - 2. Product: To match existing.
- B. Pipe Support Product Verification: Contractor shall verify pipe support products as indicated on the Drawings and/or specified herein for coordinated size requirements in order to provide actual physical contact and support of pipes as required. Report to the Architect in writing, any discrepancies from Specifications and Drawings, and actual conditions at the site.
- C. Comparable Products: Manufacturers will comparable equivalent products may be acceptable, subject to conformance with these Specifications, the requirements of the Drawings, and the Architect's review.

2.03 PIPE FLASHINGS

- A.
To match existing.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Refer to Section 01 31 00 – Project Management & Coordination
- B. Refer to Section 01 73 00 - Execution

3.02 INSTALLATION

- A. General: Unless otherwise specified, furnish to the Roofing Contractors all roof specialties and accessories as indicated on the Drawings and specified herein, complete with all required sealants, anchoring devices, and miscellaneous accessories in accordance with manufacturer's recommendations. Unless otherwise noted on the Drawings, furnish all shimming accessories of materials compatible with roof construction.
- B. Finish Painting: Finish painting of metal surfaces indicated and/or noted to be field painted shall be by the Painting Contractor as specified in Section 09 90 01 - Paints and Coatings.

3.03 CLEAN-UP

- A. Waste Management: Collect field generated construction waste created during construction or final cleaning.

END OF SECTION

SECTION 07 84 00
FIRESTOPPING

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes firestopping and through-penetration protection system materials and accessories; firestopping tops of fire rated walls; and smoke sealing at joints between floor slabs and exterior walls.
- B. Related Sections:
 - 1. Section 03470 – Tilt-Up Precast Concrete.
 - 2. Section 09260 - Gypsum Board Assemblies: Gypsum board fireproofing.
 - 3. Division 15 - Mechanical: Mechanical work requiring firestopping.
 - 4. Division 16 - Electrical: Electrical work requiring firestopping.

1.2 REFERENCES

- A. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials.
- B. ASTM E119 - Method for Fire Tests of Building Construction and Materials.
- C. ASTM E814 - Test Method of Fire Tests of Through Penetration Firestops.
- D. FM (Factory Mutual Engineering Corporation) - Fire Hazard Classifications.
- E. UL (Underwriters Laboratories, Inc.) - Fire Resistance Directory.
- F. UL 263 (Underwriters Laboratories, Inc.) - Fire Tests of Building Construction and Materials.
- G. UL 723 (Underwriters Laboratories, Inc.) - Test for Surface Burning Characteristics of Building Materials.
- H. UL 1479 (Underwriters Laboratories, Inc.) - Fire Tests of Through-Penetration Firestops.
- I. WH (Warnock Hersey) - Directory of Listed Products.

1.3 DEFINITIONS

- A. Firestopping (Through-Penetration Protection System): Sealing or stuffing material or assembly placed in spaces between and penetrations through building materials to arrest movement of fire, smoke, heat, and hot gases through fire rated construction.

1.4 SYSTEM DESCRIPTION

- A. Firestopping Materials: ASTM E119, ASTM E814/UL 1479 to achieve fire ratings as noted on Drawings for adjacent construction, but not less than 2-hour fire rating.
 - 1. Ratings may be 3-hours for firestopping in through-penetrations of 4-hour fire rated assemblies unless otherwise required by applicable codes.
- B. Surface Burning: ASTM E84/UL 723 with maximum flame spread / smoke developed rating of 25/450.
- C. Firestop interruptions to fire rated assemblies, materials, and components.

1.5 PERFORMANCE REQUIREMENTS

- A. Conform to FM, UL, WH for fire resistance ratings and surface burning characteristics.
- B. Provide certificate of compliance from authority having jurisdiction indicating approval of materials used.

1.6 SUBMITTALS

- A. Section 01330 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit data on product characteristics, performance and limitation criteria.
- C. Schedule: Submit schedule of opening locations and sizes, penetrating items, and required listed design numbers to seal openings to maintain fire resistance rating of adjacent assembly.
- D. Manufacturer's Installation Instructions: Submit preparation and installation instructions.
- E. Manufacturer's Certificate: Certify products meet or exceed specified requirements and applicable code requirements.
- F. Engineering Judgements: For conditions not covered by UL or WH listed designs, submit judgements by licensed professional engineer suitable for presentation to authority having jurisdiction for acceptance as meeting code fire protection requirements.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Applicator: Company specializing in performing Work of this section with minimum three years documented experience , and approved by manufacturer.

1.8 MOCKUP

- A. Section 01400 - Quality Requirements: Requirements for mockup.
- B. Apply 1 linear ft of each type of linear firestopping material to representative substrate surface.
- C. Apply one of each unit type of firestopping material, such as penetrations through fire rated partition, to representative application.
- D. Locate where directed by Architect.
- E. Incorporate accepted mockup as part of Work.

1.9 ENVIRONMENTAL REQUIREMENTS

- A. Section 01600 - Product Requirements.
- B. Do not apply materials when temperature of substrate material and ambient air is below 60 degrees F.
- C. Maintain this minimum temperature before, during, and for minimum 3 days after installation of materials.
- D. Provide ventilation in areas to receive solvent cured materials.

PART 2 PRODUCTS

2.1 FIRESTOPPING

- A. Manufacturers:
 - 1. Tremco. Model Fyre-Sil S/L.
 - 2. Substitutions: Section 01600 - Product Requirements.
- B. Product Description: Different types of products by multiple manufacturers are acceptable as required to meet specified system description and performance requirements; provide only one type for each similar application.
 - 1. Silicone Firestopping Elastomeric Firestopping: Single component silicone elastomeric compound and compatible silicone sealant.
- C. Color: Tremco Green.

2.2 ACCESSORIES

- A. Primer: Type recommended by firestopping manufacturer for specific substrate surfaces and suitable for required fire ratings.
- B. Dam Material: As required by manufacturer.

- C. Installation Accessories: Provide clips, collars, fasteners, temporary stops or dams, and other devices required to position and retain materials in place.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01300 - Administrative Requirements: Coordination and project conditions.
- B. Verify openings are ready to receive firestopping.

3.2 PREPARATION

- A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter-affecting bond of firestopping material.
- B. Remove incompatible materials affecting bond.
- C. Install damming materials to arrest liquid material leakage.

3.3 APPLICATION

- A. Install material at fire rated construction perimeters and openings containing penetrating sleeves, piping, ductwork, conduit and other items, requiring firestopping.
- B. Apply primer where recommended by manufacturer for type of firestopping material and substrate involved, and as required for compliance with required fire ratings.
- C. Apply firestopping material in sufficient thickness to achieve required fire and smoke rating, to uniform density and texture.
- D. Remove dam material after firestopping material has cured.

3.4 FIELD QUALITY CONTROL

- A. Section 01400 - Quality Requirements: Testing and Inspection Services.
- B. Inspect installed firestopping for compliance with specifications and submitted schedule.

3.5 CLEANING

- A. Section 01700 - Execution Requirements: Final cleaning.
- B. Clean adjacent surfaces of firestopping materials.

3.6 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 70 00 - Execution Requirements: Protecting installed construction.
- B. Protect adjacent surfaces from damage by material installation.

END OF SECTION

SECTION 07 90 00
JOINT PROTECTION

The requirements of the "General Conditions", the "Supplementary Conditions", and "Division 1" sections of the Specifications, shall apply to this section of the Specifications.

PART 1 - GENERAL

1.01 SCOPE

- A. Work Included: Provide all labor, materials, equipment, and services necessary for Caulking Work indicated on the Drawings and specified herein. Work includes, but is not limited to the following:
1. Preparation of surfaces.
 2. Exterior and interior caulking of the following joint types. Exterior caulking shall be done with sealants, and interior caulking shall be with caulking compounds, however, selected interior locations noted on Drawings or specified herein will require sealant in lieu of caulking compound.
 - a. Between dissimilar materials, including concrete or masonry to metal (aluminum, steel, stainless steel), and steel to aluminum (at non-metallic shims).
 - b. Between similar materials as detailed, unless specifically excluded.
 3. Expansion and control joints.
 4. Between thresholds and adjoining materials.
 5. Exterior joints where Mechanical and Electrical Work penetrates concrete or masonry.
 6. Wherever indicated by the words, "Seal", "Sealer", "Sealant", "Caulk", or "Caulking" on the Drawings.
 7. Acoustical Sealant.
 8. Compressible Back-up Material as required.
 9. Firestopping Systems.
 10. Cleaning and removing excess materials.

- B. Related Sections: The following items of related Work will be provided under other sections of the Specifications:
1. Cast in Place Concrete - Section 03 30 00.
 2. Unit Structural Masonry - Section 04 23 0.
 3. Rough Carpentry - Section 06 10 00.
 4. Thermal Insulation - Section 07 21 00.
 5. Plaster Veneer System - Section 07 24 00.
 6. Sheet Metal Work - Section 07 60 00.
 7. Fire Safing - Section 07 84 56.
 8. Hollow Metal Doors and Frames - Section 08 11 13.
 9. Aluminum Framed Entrances and Storefronts - Sections 08 41 13.
 10. Gypsum Wallboard - Section 09 29 00.
 11. Paints and Coatings - Section 09 90 00.
 12. Caulking and Mastic Operations at Roof and Sealing Sheet Metal Flashings - By Roofing Contractor.

1.02 QUALITY ASSURANCE

- A. Environmental Requirements: Paint products such as touch-up field painting and isolation coatings shall comply with all applicable Federal and State Regulations on Volatile Organic Compounds (VOC). PAINT

1.03 SUBMITTALS

- A. General: Submit Product Data and Samples to the Architect for review in accordance with the requirements in Section 01 33 23 - Shop Drawings and Samples, and as specified herein.
- B. Reports: Submit test reports, procedure specifications and certifications as required to substantiate welded connections design and welding qualifications to the Owner's Representative and the General Contractor for review.

- C. Product Data: Submit manufacturer's specification and recommendations for each type of sealant, caulking compound, expansion joint cover, and miscellaneous material required.
- D. Sealant Compatibility and Test Reports: Provide reports from sealant manufacturer certifying that materials forming joint substrates of system have been tested for compatibility and adhesion with joint sealants; include sealant manufacturer's interpretation of results relative to sealant performance and recommendations for primers and substrate preparation needed to obtain adhesion.
- E. Samples: Submit Samples of sealants and caulking for review and approval by the Architect. Do not commence Work until the Architect's written approval of the Samples has been received.
 - 1. General: Submit two (2) 12" long Samples of each color and type of exposed-to-view sealant and caulk. Install Sample in 1/2" wide joints between two (2) strips of material representative of exposed surfaces adjacent to joint sealants. Manufacturer's color charts and/or color swatches will not be accepted as Samples.
 - 2. Expansion Joint Covers: Provide samples of sealant system in colors as required to match with adjacent finished surfaces.

1.04 PRODUCT DELIVERY AND STORAGE

- A. Delivery: Ship material to job site in plainly marked, original containers, with seals unbroken. Do not ship opened or partially full containers to the site. Materials will be subject to inspection, and rejection at any time. Unload materials at locations designated by the General Contractor.
- B. Storage: All materials shall be stored in sheltered enclosures with ambient temperature range of 60 to 80 degree F° at the site until ready for use.
- C. Material Shelf Life: Do not retain material at the jobsite which has exceeded the shelf life recommended by the manufacturer.
- D. Packaging Waste Management: Separate packaging waste materials for reuse, recycling and/or landfill.

1.05 PROJECT CONDITIONS

- A. Temperature and Temporary Enclosures: Do not install compounds when ambient air temperature is less than 40°F. or when recesses are wet or damp. Temporary enclosures and temporary heat may be provided to maintain temperature requirements.

- B. Protection: Adjacent finished surfaces shall be protected from damage, by masking or other approved methods, prior to sealing. Remove protection when no longer needed, clean adjacent surfaces smeared by compounds.

1.06 SCAFFOLDING

- A. Furnish, erect, and maintain all scaffolding and tarpaulin enclosures, complying with governing code requirements. Erect apparatus at times and locations so as not to delay any part of Work. When Work has been completed, promptly dismantle all scaffoldings and remove from site.

1.07 WARRANTY

- A. General Requirements: The warranty shall state that the Contractor will make good at his expense, all imperfections which may develop in Caulking and Sealing Work during the warranty period, as well as damage to other Work caused by imperfections or by repairing imperfections.
- B. Sealant Work: Execute a warranty in the approved written form, warranting all Sealant Work to remain in a serviceable, watertight, elastic, adhesive and perfect condition for a period of not less than three (3) years from date of Owner's acceptance of the installation.
- C. Caulking Work: Execute a warranty in the approved written form, warranting all Caulking Work to remain in a serviceable, watertight, elastic, adhesive and perfect condition for a period of not less than two (2) years from date of Owner's acceptance of the installation.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. General:
 - 1. Colors: Sealants and caulking compounds shall be of colors as selected and/or reviewed by the Architect to match adjacent finish surfaces.
 - 2. Grade and Consistency: Sealants and caulking compounds shall be of correct grade and consistency for application, to flow easily from application gun, and to tool without excessive tackiness.
 - 3. Material Properties: Set sealants and caulking compounds shall be waterproof, elastic, non-staining and non-corrosive; firm but not brittle hard; remain plastic without cracking at low temperatures; non-sagging at temperatures up to 120°F for 24 hours.

4. Substitutions: Manufacturers with comparable equivalent products may be acceptable, subject to conformance with these Specifications, the requirements of the Drawings, and the Architect's review. Refer to Specification 01 25 00 – Substitution Procedures.
5. VOC Content of Interior Sealants: Provide sealants and sealant primers for use inside the weatherproofing system that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - a. Architectural Sealants: Not more than 250 g/L.
 - b. Sealant Primers for Nonporous Substrates: Not more than 250 g/L.
 - c. Sealant Primers for Porous Substrates: Not more than 775 g/L.

B. Sealants:

1. Sealants - General: Multiple-component polyurethane sealant, non-sag type, conforming to ASTM C920 - Standard Specification for Elastomeric Joint Sealants, Type M, Grade NS, and Federal Specification TT-S-00227E, Type II, Class A, by one of the following manufacturers:
 - a. Manufacturer: BASF Construction Chemicals, LLC - Building Systems, 889 Valley Park Drive, Shakopee, MN 55379, (800)243-6739 or (800)433-9517; www.BuildingSystems.BASF.com.
 - 1) Product: Sonneborn® "Sonolastic® NP 2Ö.
 - b. Manufacturer: Pecora Corporation, 165 Wambold Road, Harleysville, PA 19438, (800)523-6688 or (215)723-6051; www.pecora.com.
 - 1) Product: Dynatrol® II.
 - c. Manufacturer: Tremco, Incorporated, Commercial Sealants & Waterproofing Division, 3735 Green Road, Beachwood, OH 44122, (800)321-7906 or (216)292-5000; www.tremcosealants.com.
 - 1) Products: Dymeric 240 or Dymeric® 240FC.
2. Sealant for Exterior Plaster Veneer System: Product shall be acceptable to Plaster Veneer System Manufacturer. Sealant shall conform to ASTM Standard C920, Grade NS, Class 50, by one of the following manufacturers:
 - b. Manufacturer: Dow Corning Corporation, South Saginaw Road, Midland, MI 48686, (800)662-0661 or (989)496-6000; www.dowcorning.com.

- 1) Product: Dow Corning® 790 Silicone Building Sealant, one-component silicone sealant.
- c. Manufacturer: Tremco, Incorporated, Commercial Sealants & Waterproofing Division, 3735 Green Road, Beachwood, OH 44122, (800)321-7906 or (216)292-5000; www.tremcosealants.com.
 - 1) Products: Spectrem® 1 or Spectrem® 3 one-component silicone sealant, "Spectrem® 4-TS" multiple-component silicone sealant or "Dymeric® 240FC" multiple-component polyurethane sealant.
3. Sealant for Traffic Areas: One-component polyurethane sealant, non-sag type, for use in traffic areas, per ASTM Standard C920, by one of the following manufacturers:
 - a. Manufacturer: BASF Construction Chemicals, LLC - Building Systems, 889 Valley Park Drive, Shakopee, MN 55379, (800)243-6739 or (800)433-9517; www.BuildingSystems.BASF.com.
 - 1) Product: Sonneborn® Sonolastic® NP 1Ô.
 - b. Manufacturer: Tremco, Incorporated, Commercial Sealants & Waterproofing Division, 3735 Green Road, Beachwood, OH 44122, (800)321-7906 or (216)292-5000; www.tremcosealants.com.
 - 1) Products: Dymonic® FC or Vulkem® 45 SSL.
 - c. Manufacturer: LymTal International, Inc., 4150 S. Lapeer Road, Lake Orion, MI 48359, (248)373-8100; www.lymtal.com.
 - 1) Product: Iso-Flex® 830, Joint Sealant.
4. Acoustical Sealant: Equivalent to SHEETROCK® Brand Acoustical Sealant as manufactured by United States Gypsum Company, A Subsidiary of USG Corporation, 550 West Adams Street, Chicago, IL 60661, (800)874-4968; www.usg.com.
 - a. Product Requirements: Acoustical sealant shall be an acrylic, latex-based caulk for use as a joint sealant for sealing sound-rated systems. Sealant shall be non-staining and paintable. Sealant shall meet ASTM Standard C834 and tested in accordance with ASTM Standard E90.
 - b. Surface Burning Characteristics: Classified by UL, and tested in accordance with ASTM Standard E84:

- 1) Flame Spread: 0.
- 2) Smoke Developed: 0.
- c. VOC Content: Less than 15 grams/liter.
- C. Caulking Compounds:
 - 1. Caulking Compounds - General: One-part, acrylic latex sealant, non-sag type, conforming to ASTM C834 - Standard Specification for Latex Sealants, by one of the following manufacturers:
 - a. Manufacturer: Pecora Corporation, 165 Wambold Road, Harleysville, PA 19438, (800)523-6688 or (215)723-6051; www.pecora.com.
 - 1) Product: AC-20® + Silicone.
 - b. Manufacturer: Tremco, Incorporated, Commercial Sealants & Waterproofing Division, 3735 Green Road, Beachwood, OH 44122, (800)321-7906 or (216)292-5000; www.tremcosealants.com.
 - 1) Product: Tremflex® 834.
- D. Primers: Provide primer products recommended by the sealant or caulking compound manufacturer, to provide adhesion of the sealant and caulking compounds to, and to prevent staining of adjacent surfaces.
- E. Back-up Material:
 - 1. Manufacturer: Construction Foam Products, a Division of Nomaco, Inc., 501 NMC Drive, Zebulon, NC 27597, (800)345-7279 or (919)380-6640; www.cfoamproducts.com.
 - 2. Product: Round, Foam Rod, cylindrical, flexible, extruded, compressible closed cell, polyethylene foam backer rod, Type C - per ASTM Standard C1330, such as Closed-Cell Backer Rod "HBR®". Provide backer rods in diameters 1/2 larger than width of joints in which rods are installed.

2.02 FIRESTOPPING SYSTEMS:

- A. Construction Penetrations: UL Listed firestopping system for through-penetrations shall meet the requirements of ASTM Standard E814 (UL 1479) and provide a fire rating equal to that of construction being penetrated. Backing material and sealant shall not contain asbestos, halogens, and volatile solvents, and shall be flexible to allow for normal

movement of building and penetrating items without adversely affecting the integrity of the system.

- B. VOC Content of Interior Sealants: Provide sealants and sealant primers for use inside the weatherproofing system that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
1. Architectural Sealants: Not more than 250 g/L.
 2. Sealant Primers for Nonporous Substrates: Not more than 250 g/L.
 3. Sealant Primers for Porous Substrates: Not more than 775 g/L.
- C. Firestopping Systems: Provide system/products by one of the following manufacturers:
1. Manufacturer: Hilti, Inc., 5400 South 122nd. East Avenue, Tulsa, OK 74146, (800)879-8000 or (918)252-6000; www.us.hilti.com.
 - a. System/Products: Hilti Firestop Systems.
 2. Manufacturer: Pecora Corporation, 165 Wambold Road, Harleysville, PA 19438, (800)523-6688 or (215)723-6051; www.pecora.com.
 - a. System/Products: Firestop Systems-UL® Classified.
 3. Manufacturer: RectorSeal® Corporation, 2601 Spenwick Drive, Houston, TX 77055, (800)231-3345 or (713)263-8001; www.rectorseal.com.
 - a. System/Products: Metacaulk® Firestop Materials.
 4. Manufacturer: Tremco, Incorporated, Commercial Sealants & Waterproofing Division, 3735 Green Road, Beachwood, OH 44122, (800)321-7906 or (216)292-5000; www.tremcosealants.com.
 - a. System/Products: TREMstop® Fire Protection Products and related products.
- D. Comparable Systems/Products: Comparable equivalent products of other manufacturers may be acceptable, subject to conformance with these Specifications and the Architect's review.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Refer to Section 01 31 00 – Project Management & Coordination
- B. Refer to Section 01 73 00 - Execution

3.02 INSPECTION

- A. Inspect all joints to be caulked. Notify the General Contractor in writing (copy to the Architect), of any condition that will prevent the required performances of the compounds, for correction. Installation of the compounds will be considered Contractor's acceptance of the joints. Promptly repair or replace all Caulking and Sealing Work that becomes damaged or defective because of defects in the joint surfaces, to the satisfaction of the Architect, and at no cost to the Owner.

3.03 PREPARATION

- A. Joints to be caulked will be raked out or left open 3/8" to 1/2" deep, maximum by others. Joint width to be 1/2" maximum, 3/8" width for control joints.
- B. Clean recesses to receive compound so as be free of dirt, dust, loose material, oil, grease, and all other substances detrimental to the material's performance. Remove lacquer or other protective coatings from metal surfaces, without damage to the surface, prior to sealing. Recesses shall be dry when compounds are installed.
- C. If sealing or caulking compounds cause stains on, or do not adhere to, adjacent materials, or if recommended by compound manufacturer, prime all surfaces with specified primer in accordance with compound manufacturer's recommendations.
- D. Width or depth of the joint shall be not less than 1/4". In joints up to 1/2" wide, the depth of the sealant shall be equal to the width. In joints wider than 1/2", but not exceeding 1", the depth shall be maintained at 1/2". Joints wider than 1" shall maintain a width to depth ratio of 2 to 1. Fill recesses with backer rod, held back the specified depth from the surface, where joint depths exceed the specified maximums.
- E. If joints to receive sealant are filled with other than backer rod specified material, adhere a strip of polyethylene film over the exposed edge of the material, to break the bond of the sealant.
- F. Use materials as manufactured, without additives or adulterations. Mix two (or three) component materials until thoroughly and uniformly blended, and then install such materials prior to start of hardening or curing of the materials.

3.04 INSTALLATION OF SEALANTS AND CAULKING COMPOUNDS - GENERAL

- A. Sealants and caulking compounds for use in any one area shall be of one brand throughout, mixing of brands on a single wall or in a single room or area is prohibited.
- B. All Work shall be done by experienced workmen, in accordance with manufacturer's recommendations, and as specified herein.
- C. Install all sealing and caulking compounds immediately after the adjoining Work of other trades is in proper condition to receive same, but before Work has been given applied finishes such as painting or staining, and in a manner to prevent damage occurring by reason of any delay in providing the Work specified herein. No sealing or caulking shall be done until the General Contractor has inspected and approved the preparatory Work and the condition of the adjoining Work.
- D. Fill joints completely with sealant and/or caulking compound, without extra cost to the Owner, regardless of variance in joint widths.
- E. Install sealants and caulking compounds under pressure, without smearing adjacent surfaces. Compounds shall have full and uniform contact and adhesion with sides of joint recesses.
- F. Finish sealants and caulking compounds in recesses, in angular surfaces, with a smooth surface, flush with face of material at each side. Finish sealants and caulking compounds, in recesses, between masonry and jambs, with a smooth surface, flush with the face of the metal frame on one side and with face of masonry on the other side. Finish sealants and caulking compounds in recesses, in flush surfaces (including masonry walls), with a smooth concave surface, flush with face of material at each side.
- G. Surfaces of sealants and caulking compounds in joints shall be smooth and even, free from dirt, stain or other defacements, and be uniform in color throughout.
- H. Tooling of joints will be allowed, provided that such operations do not damage the seal or tear the compounds.

3.05 INSTALLATION OF SEALING COMPOUNDS

- A. Building Exterior: Fill with sealant, as required to provide a weathertight condition, all exposed joints that are not subject to movement but require finishing, and all joints that are not subject to excessive movement. Principal locations shall include, but not be limited to, the following:
 - 1. Joints between Dissimilar Materials: All exposed joints in the exterior walls, between dissimilar materials, including masonry or concrete construction to metal

- (aluminum, steel, stainless steel) such as door frames, frames for glass and other miscellaneous openings; and steel to aluminum (at non-metallic shims).
2. Joints between Similar Materials: All joints between similar materials such as masonry control joints, etc., unless specifically excluded.
 3. Noted Locations: Wherever indicated by the words "seal" or "sealant" on the Drawings.
 4. Exterior Plaster Veneer: Joint filler, primer, and bond breaker shall be in accordance with the sealant manufacturer's specifications and instructions. Application of the sealant shall be as recommended by the plaster veneer system manufacturer, subject to review by the Architect.
 - a. Back-up Material: Sealant backer rods, as required by field conditions shall be of closed cell.
 - b. Textured Finishes or Base Coat Surfaces: Sealant shall not be applied directly to textured finishes or base coat surfaces. Plaster veneer system base coat surfaces subject to be in contact with sealant shall be coated with acrylic coating or pigmented acrylic primer. Coordinate Work with Plaster Veneer System Contractor.
- B. Building Interior: Fill with sealant, as required to provide a closed condition, all exposed joints that are subject to movement, but not excessive movement, or where specifically noted on Drawings. Principal locations shall include, but not be limited to the following:
1. Joints Between Dissimilar Materials: All exposed joints in exterior and interior walls, between dissimilar materials generally, including masonry or concrete to metal (aluminum, steel, stainless steel), such as door frames, frames for glass and other openings, and steel to aluminum (at non-metallic shims).
 2. Joints Between Similar Materials: All exposed joints between similar materials such as masonry control joints, unless specifically excluded.
- C. Acoustical Sealant: Comply with sealant manufacturer's written directions and instructions for preparation and application of sealant.
1. Coordinate with Gypsum Wallboard Contractor for installation of acoustical sealant at sound-rated partitions where indicated on the Drawings; applied in accordance with ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications, using conventional caulking equipment.

2. At partition walls, provide continuous beads of acoustic sealant at juncture of both faces of runners with floor and ceiling construction, and wherever gypsum board abuts dissimilar materials, prior to installation of gypsum board.
3. At ceilings, provide continuous beads of sealant wherever gypsum board abuts dissimilar materials.
4. Provide continuous bead of sealant behind faces of control joints prior to installation of control joint accessories.
5. After installation of gypsum board base layer(s), fill open space between gypsum board and floor, ceiling and dissimilar vertical construction with continuous sealant beads after installation of face layer.
6. At openings and cutouts, fill open spaces between gypsum board and fixtures, cabinets, ducts and other flush or penetrating items, with continuous bead of sealant.
7. Seal sides and backs of electrical boxes to completely close off openings and joints.
8. Sound Flanking Paths:
 - a. Where sound-rated partition walls intersect non-rated gypsum board partition walls, provide acoustical sealant at extended sound-rated construction to completely close sound flanking paths through non-rated construction.
 - b. Seal joints between face layers at vertical interior angles of intersecting partitions.

3.06 INSTALLATION OF CAULKING COMPOUNDS

- A. Building Interior: At interior of building, fill with caulking compound, all exposed joints not subject to movement that require a finished appearance. Principal locations shall include, but not be limited to the following:
 1. Joints in interior walls, between masonry and metal frames.
 2. Joints in interior walls, between masonry and adjacent construction.
 3. Wherever indicated by the words "caulk" or "caulking" on the Drawings, except if the locations are specified to be sealed.

3.07 INSTALLATION OF FIRESTOPPING SYSTEM

- A. Prepare substrate surfaces to insure proper support for firestop system. Clean surfaces of all foreign material including loose debris, dirt, oil, grease, and wax. Install firestop material in accordance with manufacturer's printed instructions and UL requirements.

3.08 CLEANING

- A. Excess Sealing and Caulking Materials: Remove excess sealing and caulking materials from adjacent surfaces before materials have set up. Follow manufacturer's instructions for removal of sealing and caulking materials from finished surfaces. Repair surfaces damaged by sealing and caulking operations. Obtain written approval, from the Architect, of the entire installation after completion.
- B. Debris and Waste Materials: During progress of the Work, keep the premises free of debris and waste materials resulting from Sealing and Caulking Work. During progress of the Work, upon completion of Work, and before final acceptance of the Work, remove all debris and rubbish from the site, and dispose of legally. Upon completion and before final acceptance of the Work, remove unused materials, tools, and equipment from the site.
- C. Waste Management: Collect field generated construction waste created during construction or final.

END OF SECTION

SECTION 07 92 00
JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Silicone joint sealants.
2. Urethane joint sealants.
3. Polysulfide joint sealants.
4. Latex joint sealants.
5. Solvent-release-curing joint sealants.
6. Preformed joint sealants.
7. Acoustical joint sealants.

B. Related Sections:

1. Section 042000 "Unit Masonry" for masonry control and expansion joint fillers and gaskets.
2. Section 079500 "Expansion Control" for building expansion joints.
3. Section 078446 "Fire-Resistive Joint Systems" for sealing joints in fire-resistance-rated construction.
4. Section 084423 "Structural-Sealant-Glazed Curtain Walls" for structural and other glazing sealants.
5. Section 088000 "Glazing" for glazing sealants.
6. Section 088400 "Plastic Glazing" for plastic glazing sealants.
7. Section 092613 "Gypsum Veneer Plastering" for sealing perimeter joints and penetrations.
8. Section 092900 "Gypsum Board" for sealing perimeter joints.
9. Section 093000 "Tiling" for sealing tile joints.
10. Section 095113 "Acoustical Panel Ceilings" for sealing edge moldings at perimeters with acoustical sealant.
11. Section 096313.35 "Chemical-Resistant Brick Flooring" for sealing flooring joints.
12. Section 321373 "Concrete Paving Joint Sealants" for sealing joints in pavements, walkways, and curbing.

1.3 PRECONSTRUCTION TESTING

- A. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.

1. Use manufacturer's standard test method to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
2. Submit not fewer than 5 pieces of each kind of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
4. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.
5. Testing will not be required if joint-sealant manufacturers submit joint preparation data that are based on previous testing, not older than 24 months, of sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.

B. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates as follows:

1. Locate test joints where indicated on Project or, if not indicated, as directed by Architect.
2. Conduct field tests for each application indicated below:
 - a. Each kind of sealant and joint substrate indicated.
3. Notify Architect seven days in advance of dates and times when test joints will be erected.
4. Arrange for tests to take place with joint-sealant manufacturer's technical representative present.
 - a. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
 - 1) For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
5. Report whether sealant failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
6. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

1.4 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- C. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in ~~1/2-inch-~~ wide joints formed between two ~~6-inch-~~long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

D. Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.
- C. Sealant, Waterproofing, and Restoration Institute (SWRI) Validation Certificate: For each sealant specified to be validated by SWRI's Sealant Validation Program.
- D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.
- E. Preconstruction Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
 2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
- F. Preconstruction Field-Adhesion Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on testing specified in "Preconstruction Testing" Article.
- G. Field-Adhesion Test Reports: For each sealant application tested.
- H. Warranties: Sample of special warranties.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.
- C. Product Testing: Test joint sealants using a qualified testing agency.
1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.
 2. Test according to SWRI's Sealant Validation Program for compliance with requirements specified by reference to ASTM C 920 for adhesion and cohesion under cyclic movement, adhesion-in-peel, and indentation hardness.

- D. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.
- E. Preinstallation Conference: Conduct conference at Project site.

1.7 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
 - 2. When joint substrates are wet.
 - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 - 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.8 WARRANTY

- A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer's standard form in which joint-sealant manufacturer agrees to furnish joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: 5 years from date of Substantial Completion.
- C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
 - 1. Movement of the structure caused by structural settlement or errors attributable to design or construction resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
 - 2. Disintegration of joint substrates from natural causes exceeding design specifications.
 - 3. Mechanical damage caused by individuals, tools, or other outside agents.
 - 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. VOC Content of Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - 1. Architectural Sealants: 250 g/L.
 - 2. Sealant Primers for Nonporous Substrates: 250 g/L.
 - 3. Sealant Primers for Porous Substrates: 775 g/L.
- C. Low-Emitting Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- D. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
 - 1. Suitability for Immersion in Liquids. Where sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C 1247. Liquid used for testing sealants is deionized water, unless otherwise indicated.
- E. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
- F. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.
- G. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

- A. Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use NT.
 - 1. Products: Subject to compliance with requirements, provide the following:
 - a. Dow Corning Corporation; 790.
 - b. GE Advanced Materials - Silicones; SilPruf
 - c. Tremco Incorporated; Spectrem 1.

- B. Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 50, for Use NT.
1. Products: Subject to compliance with requirements, provide the following:
- a. Dow Corning Corporation; 795.
 - b. GE Advanced Materials - Silicones; SilPruf SCS2000.
 - c. Tremco Incorporated; Spectrem 2.
- C. Mildew Resistant, Single-Component, Nonsag, Acid-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.
1. Products: Subject to compliance with requirements, provide the following:
- a. Dow Corning Corporation; 999-A.
 - b. GE Advanced Materials - Silicones; Contractors SCS1000 .
 - c. Tremco Incorporated; Tremsil 200.
- D. Single-Component, Nonsag, Traffic-Grade, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use T.
1. Products: Subject to compliance with requirements, provide the following:
- a. Dow Corning Corporation; NS Parking Structure Sealant.
 - b. Pecora Corporation; 301 NS.
 - c. Tremco Incorporated; Spectrem 800.
- E. Multicomponent, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type M, Grade NS, Class 50, for Use NT.
1. Products: Subject to compliance with requirements, provide the following:
- a. Tremco Incorporated; Spectrem 4TS.

2.3 URETHANE JOINT SEALANTS

- A. Single-Component, Nonsag, Urethane Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use NT.
1. Products: Subject to compliance with requirements, provide the following:
- a. Sika Corporation, Construction Products Division; Sikaflex - 15LM.
 - b. Tremco Incorporated; Dymonic 100
- B. Single-Component, Nonsag, Traffic-Grade, Urethane Joint Sealant: ASTM C 920. Type S, Grade NS, Class 25, for Use T.
1. Products: Subject to compliance with requirements, provide the following:
- a. BASF Building Systems; Sonolastic NP1.
 - b. Sika Corporation, Construction Products Division

- c. Tremco Incorporated; Vulkem 45SSL.
- C. Multicomponent, Nonsag, Urethane Joint Sealant: ASTM C 920, Type M, Grade NS, Class 50, for Use NT.
- 1. Products: Subject to compliance with requirements, provide the following:
 - a. Pecora Corporation; Dynatrol II.
 - b. Polymeric Systems, Inc.; PSI-270.
 - c. Tremco Incorporated; Dymeric 240 FC.
- D. Multicomponent, Nonsag, Traffic-Grade, Urethane Joint Sealant: ASTM C 920, Type M, Grade NS, Class 50, for Use T.
- 1. Products: Subject to compliance with requirements, provide the following:
 - a. Polymeric Systems, Inc.; PSI-270.
 - b. Tremco Incorporated; Dymeric 240 FC.
- E. Immersible, Single-Component, Nonsag, Traffic-Grade, Urethane Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Uses T and I.
- 1. Products: Subject to compliance with requirements, provide the following:
 - a. BASF Building Systems; Sonolastic NP1.
 - b. Sika Corporation, Construction Products Division; Sikaflex - 1a.
 - c. Tremco Incorporated; Vulkem 45SSI.
- F. Immersible, Single-Component, Pourable, Traffic-Grade, Urethane Joint Sealant: ASTM C 920, Type S, Grade P, Class 25, for Uses T and I.
- 1. Products: Subject to compliance with requirements, provide the following:
 - a. Sika Corporation, Construction Products Division; Sikaflex - 1CSL.
 - b. Tremco Incorporated; Vulkem 45.
- G. Immersible Multicomponent, Nonsag, Traffic-Grade, Urethane Joint Sealant: ASTM C 920, Type M, Grade NS, Class 25, for Uses T and I.
- 1. Products: Subject to compliance with requirements, provide the following:
 - a. BASF Building Systems; Sonolastic NP 2.
 - b. Pecora Corporation; Dynatred.
 - c. Tremco Incorporated; Vulkem 45SSL.

2.4 LATEX JOINT SEALANTS

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

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

- a. BASF Building Systems; Sonolac.
- b. Bostik, Inc.; Chem-Calk 600.
- c. Tremco Incorporated; Tremflex 834.

2.5 PREFORMED JOINT SEALANTS

- A. Preformed Silicone Joint Sealants: Manufacturer's standard sealant consisting of precured low-modulus silicone extrusion, in sizes to fit joint widths indicated, combined with a neutral-curing silicone sealant for bonding extrusions to substrates.

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

- a. Dow Corning Corporation; 123 Silicone Seal.
- b. GE Advanced Materials - Silicones; UltraSpan US1100.
- c. Tremco Inc, Simple Seal

- B. Preformed Foam Joint Sealant: Manufacturer's standard preformed, precompressed, open-cell foam sealant manufactured from urethane foam with minimum density of 10 lb/cu. ft. and impregnated with a nondrying, water-repellent agent. Factory produce in precompressed sizes in roll or stick form to fit joint widths indicated; coated on one side with a pressure-sensitive adhesive and covered with protective wrapping.

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

- a. Dayton Superior Specialty Chemicals; Polytite Standard.
- b. EMSEAL Joint Systems, Ltd.; Emseal 25V.
- a. Tremco Inc; illmod 600.

2.6 ACOUSTICAL JOINT SEALANTS

- A. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

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

- a. Pecora Corporation; AC-20 FTR.
- b. USG Corporation; SHEETROCK Acoustical Sealant.
- c. TREMCO INC, TREMflex 834>.

2.7 JOINT SEALANT BACKING

- A. General: Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, Type B (bicellular material with a surface skin) or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.8 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.

2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Concrete.
 - b. Masonry.
 - c. Unglazed surfaces of ceramic tile.
 - d. Exterior insulation and finish systems.
3. Remove laitance and form-release agents from concrete.
4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
 - a. Metal.
 - b. Glass.
 - c. Porcelain enamel.
 - d. Glazed surfaces of ceramic tile.

- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 1. Do not leave gaps between ends of sealant backings.
 2. Do not stretch, twist, puncture, or tear sealant backings.
 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
1. Place sealants so they directly contact and fully wet joint substrates.
 2. Completely fill recesses in each joint configuration.
 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
1. Remove excess sealant from surfaces adjacent to joints.
 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.
 4. Provide flush joint profile where indicated per Figure 8B in ASTM C 1193.
 5. Provide recessed joint configuration of recess depth and at locations indicated per Figure 8C in ASTM C 1193.
- a. Use masking tape to protect surfaces adjacent to recessed tooled joints.
- G. Installation of Preformed Silicone-Sealant System: Comply with the following requirements:
1. Apply masking tape to each side of joint, outside of area to be covered by sealant system.
 2. Apply silicone sealant to each side of joint to produce a bead of size complying with preformed silicone-sealant system manufacturer's written instructions and covering a bonding area of not less than 3/8 inch. Hold edge of sealant bead 1/4 inch inside masking tape.
 3. Within 10 minutes of sealant application, press silicone extrusion into sealant to wet extrusion and substrate. Use a roller to apply consistent pressure and ensure uniform contact between sealant and both extrusion and substrate.
 4. Complete installation of sealant system in horizontal joints before installing in vertical joints. Lap vertical joints over horizontal joints. At ends of joints, cut silicone extrusion with a razor knife.
- H. Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping. Do not pull or stretch material. Produce seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures, apply heat to sealant in compliance with sealant manufacturer's written instructions.
- I. Acoustical Sealant Installation: At sound-rated assemblies and elsewhere as indicated, seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations.

3.4 FIELD QUALITY CONTROL

- A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
1. Extent of Testing: Test completed and cured sealant joints as follows:
 - a. Perform 10 tests for the first 1000 feet of joint length for each kind of sealant and joint substrate.
 - b. Perform 1 test for each 1000 feet of joint length thereafter or 1 test per each floor per elevation.
 2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
 - a. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
 3. Inspect tested joints and report on the following:
 - a. Whether sealants filled joint cavities and are free of voids.
 - b. Whether sealant dimensions and configurations comply with specified requirements.
 - c. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer's field-adhesion hand-pull test criteria.
 4. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.
 5. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.
- B. Evaluation of Field-Adhesion Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.5 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.6 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.7 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces JS-#.
 - 1. Joint Locations:
 - a. Control and expansion joints in brick pavers.
 - b. Isolation and contraction joints in cast-in-place concrete slabs.
 - c. Joints between plant-precast architectural concrete paving units.
 - d. Joints in stone paving units, including steps.
 - e. Tile control and expansion joints.
 - f. Joints between different materials listed above.
 - g. Other joints as indicated.
 - 2. Silicone Joint Sealant: Single component, nonsag, traffic grade, neutral curing.
 - 3. Urethane Joint Sealant: Single component, nonsag, traffic grade.
 - 4. Polysulfide Joint Sealant: Multicomponent, nonsag, traffic grade.
 - 5. Preformed Joint Sealant: Preformed foam sealant.
 - 6. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- B. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces subject to water immersion JS-#.
 - 1. Joint Locations:
 - a. Joints in pedestrian plazas.
 - b. Joints in swimming pool decks.
 - c. Other joints as indicated.
 - 2. Urethane Joint Sealant: Immersible, single component, nonsag, traffic grade.
 - 3. Polysulfide Joint Sealant: Immersible, multicomponent, nonsag, traffic grade.
 - 4. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- C. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces JS-#.
 - 1. Joint Locations:
 - a. Construction joints in cast-in-place concrete.
 - b. Joints between plant-precast architectural concrete units.
 - c. Control and expansion joints in unit masonry.
 - d. Joints in dimension stone cladding.
 - e. Joints in glass unit masonry assemblies.
 - f. Joints in exterior insulation and finish systems.

- g. Joints between metal panels.
 - h. Joints between different materials listed above.
 - i. Perimeter joints between materials listed above and frames of doors and windows.
 - j. Control and expansion joints in ceilings and other overhead surfaces.
 - k. Other joints as indicated.
 - 2. Silicone Joint Sealant: Single component, nonsag, neutral curing, Class 100/50, Class 25.
 - 3. Urethane Joint Sealant: Single component, nonsag, Class 100/50] [Single component, nonsag, Class 50.
 - 4. Polysulfide Joint Sealant: Single component, nonsag.
 - 5. Preformed Joint Sealant: Preformed silicone.
 - 6. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- D. Joint-Sealant Application: Interior joints in horizontal traffic surfaces JS-#.
- 1. Joint Locations:
 - a. Isolation joints in cast-in-place concrete slabs.
 - b. Control and expansion joints in stone flooring.
 - c. Control and expansion joints in brick flooring.
 - d. Control and expansion joints in tile flooring.
 - e. Other joints as indicated.
 - 2. Silicone Joint Sealant: Single component, nonsag, traffic grade, neutral curing.
 - 3. Urethane Joint Sealant: Single component, nonsag, traffic grade.
 - 4. Polysulfide Joint Sealant: Multicomponent, nonsag, traffic grade.
 - 5. Preformed Joint Sealant: Preformed foam.
 - 6. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- E. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces.
- 1. Joint Locations:
 - a. Control and expansion joints on exposed interior surfaces of exterior walls.
 - b. Perimeter joints of exterior openings where indicated.
 - c. Tile control and expansion joints.
 - d. Vertical joints on exposed surfaces of interior unit masonry, concrete walls and partitions.
 - e. Perimeter joints between interior wall surfaces and frames of [interior doors and windows].
 - f. Other joints as indicated.
 - 2. Joint Sealant: Latex.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- F. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces JS-#.
- 1. Joint Sealant Location:
 - a. Joints between plumbing fixtures and adjoining walls, floors, and counters.

- b. Tile control and expansion joints where indicated.
 - c. Other joints as indicated.
 - 2. Joint Sealant: Mildew resistant, single component, nonsag, neutral curing, Silicone.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- G. Joint-Sealant Application: Interior acoustical joints in vertical surfaces and horizontal nontraffic surfaces JS-#.
- 1. Joint Location:
 - a. Acoustical joints where indicated.
 - b. Other joints as indicated.
 - 2. Joint Sealant: Acoustical.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

END OF SECTION

SECTION 08 11 13
HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Standard and custom hollow metal doors and frames.
2. Steel sidelight, borrowed lite and transom frames.
3. Louvers installed in hollow metal doors.
4. Light frames and glazing installed in hollow metal doors.

B. Related Sections:

1. Division 04 Section "Unit Masonry" for embedding anchors for hollow metal work into masonry construction.
2. Division 08 Section "Flush Wood Doors".
3. Division 08 Section "Glazing" for glass view panels in hollow metal doors.
4. Division 08 Section "Door Hardware".
5. Division 09 Sections "Exterior Painting" and "Interior Painting" for field painting hollow metal doors and frames.
6. Division 28 Section "Access Control" for access control devices installed at door openings and provided as part of a security access control system.

C. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI/SDI A250.8 - Recommended Specifications for Standard Steel Doors and Frames.
2. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames, Frames Anchors and Hardware Reinforcing.
3. ANSI/SDI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames.
4. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
5. ANSI/SDI A250.11 - Recommended Erection Instructions for Steel Frames.
6. ASTM A1008 - Standard Specification for Steel Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
7. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
8. ASTM A924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.

9. ASTM C 1363 - Standard Test Method for Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus.
10. ANSI/BHMA A156.115 - Hardware Preparation in Steel Doors and Frames.
11. ANSI/SDI 122 - Installation and Troubleshooting Guide for Standard Steel Doors and Frames.
12. ANSI/NFPA 80 - Standard for Fire Doors and Fire Windows; National Fire Protection Association.
13. ANSI/NFPA 105: Standard for the Installation of Smoke Door Assemblies.
14. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; National Fire Protection Association.
15. UL 10C - Positive Pressure Fire Tests of Door Assemblies.
16. UL 1784 - Standard for Air Leakage Tests of Door Assemblies.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, hardware reinforcements, profiles, anchors, fire-resistance rating, and finishes.
- B. Door hardware supplier is to furnish templates, template reference number and/or physical hardware to the steel door and frame supplier in order to prepare the doors and frames to receive the finish hardware items.
- C. Shop Drawings: Include the following:
 1. Elevations of each door design.
 2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
 3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
 4. Locations of reinforcement and preparations for hardware.
 5. Details of anchorages, joints, field splices, and connections.
 6. Details of accessories.
 7. Details of moldings, removable stops, and glazing.
 8. Details of conduit and preparations for power, signal, and control systems.
- D. Samples for Verification:
 1. Samples are only required by request of the architect and for manufacturers that are not current members of the Steel Door Institute.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain hollow metal doors and frames through one source from a single manufacturer wherever possible.
- B. Quality Standard: In addition to requirements specified, furnish SDI-Certified manufacturer products that comply with ANSI/SDI A250.8, latest edition, "Recommended Specifications for Standard Steel Doors and Frames".

- C. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to UL10C (neutral pressure at 40" above sill) or UL 10C.
 - 1. Oversize Fire-Rated Door Assemblies Construction: For units exceeding sizes of tested assemblies, attach construction label certifying doors are built to standard construction requirements for tested and labeled fire rated door assemblies except for size.
 - 2. Temperature-Rise Limit: Where indicated and at vertical exit enclosures (stairwell openings) and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.
 - 3. Smoke Control Door Assemblies: Comply with NFPA 105.
 - a. Smoke "S" Label: Doors to bear "S" label, and include smoke and draft control gasketing applied to frame and on meeting stiles of pair doors.
- D. Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled, by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257. Provide labeled glazing material.
- E. Energy Efficient Exterior Openings: Comply with minimum thermal ratings, based on ASTM C1363. Openings to be fabricated and tested as fully operable, thermal insulating door and frame assemblies.
 - 1. Thermal Performance (Exterior Openings): Independent testing laboratory certification for exterior door assemblies being tested in accordance with ASTM C1363 and meet or exceed the following requirements:
 - a. Door Assembly Operable U-Factor and R-Value Ratings: U-Factor 0.29, R-Value 3.4, including insulated door, thermal-break frame and threshold.
 - 2. Air Infiltration (Exterior Openings): Independent testing laboratory certification for exterior door assemblies being tested in accordance with ASTM E283 to meet or exceed the following requirements:
 - a. Rate of leakage of the door assembly shall not exceed 0.25 cfm per square foot of static differential air pressure of 1.567 psf (equivalent to 25 mph wind velocity).
- F. Pre-Submittal Conference: Conduct conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier, Installer, and Contractor to review proper methods and procedures for installing hollow metal doors and frames and to verify installation of electrical knockout boxes and conduit at frames with electrified or access control hardware.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project site storage. Do not use non-vented plastic.

- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch high wood blocking. Do not store in a manner that traps excess humidity.
 - 1. Provide minimum 1/4-inch space between each stacked door to permit air circulation. Door and frames to be stacked in a vertical upright position.

1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.7 COORDINATION

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

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
- B. Warranty includes installation and finishing that may be required due to repair or replacement of defective doors.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide steel doors and frames from a SDI Certified manufacturer:
 - 1. CECO Door Products (C).
 - 2. Curries Company (CU).
 - 3. Steelcraft (S).

2.2 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

- C. Frame Anchors: ASTM A 653/A 653M, Commercial Steel (CS), Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.
- D. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.

2.3 HOLLOW METAL DOORS

- A. General: Provide 1-3/4 inch doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8 and ANSI/NAAMM HMMA 867.
- B. Exterior Doors (Energy Efficient): Face sheets fabricated of commercial quality hot-dipped zinc coated steel that complies with ASTM A924 A60. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model, ANSI/SDI A250.4 for physical performance level, and HMMA 867 for door construction.
 - 1. Design: Flush panel.
 - 2. Core Construction: Foamed in place polyurethane and steel stiffened laminated core with no stiffener face welds, in compliance with HMMA 867 "Laminated Core".
 - a. Provide 22 gauge steel stiffeners at 6 inches on-center internally welded at 5" on-center to integral core assembly, foamed in place polyurethane core chemically bonded to all interior surfaces. No stiffener face welding is permitted.
 - b. Thermal properties to rate at a fully operable minimum U-Factor 0.29 and R-Value 3.4, including insulated door, thermal-break frame and threshold.
 - c. Kerf Type Frames: Thermal properties to rate at a fully operable minimum U-Factor 0.36 and R-Value 2.7, including insulated door, kerf type frame, and threshold.
 - 3. Level/Model: Level 3 and Physical Performance Level A (Extra Heavy Duty), Minimum 16 gauge (0.053 inch - 1.3-mm) thick steel, Model 2.(Seamless face and edges)
 - 4. Vertical Edges: Vertical edges to be mechanically interlocked with hairline seam. Beveled Lock Edge, 1/8 inch in 2 inches (3 mm in 50 mm).
 - 5. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel channel not less than 16 gauge, extending the full width of the door and welded to the face sheet. Doors with an inverted top channel to include a steel closure channel, screw attached, with the web of the channel flush with the face sheets of the door. Plastic or composite channel fillers are not acceptable.
 - 6. Hinge Reinforcement: Minimum 7 gauge (3/16") plate 1-1/4" x 9".
 - 7. Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.
- C. Interior Doors: Face sheets fabricated of commercial quality cold rolled steel that complies with ASTM A 1008/A 1008M. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
 - 1. Design: Flush panel.

- a. Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.
 2. Level/Model: Level 2 and Physical Performance Level B (Heavy Duty), Minimum 18 gauge (0.042-inch - 1.0-mm) thick steel, Model 2.
 3. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel channel not less than 16 gauge, extending the full width of the door and welded to the face sheet.
 4. Hinge Reinforcement: Minimum 7 gauge (3/16") plate 1-1/4" x 9" or minimum 14 gauge continuous channel with pierced holes, drilled and tapped.
 5. Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.
- D. Manufacturers Basis of Design:
1. Curries Company (CU) - Polystyrene Core - 707 Series.
 2. Curries Company (CU) - Energy Efficient - 777 Trio-E Series.

2.4 HOLLOW METAL FRAMES

- A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.
- B. Thermal Break Frames: Subject to the same compliance standards and requirements as standard hollow metal frames. Tested for thermal performance in accordance with NFRC 102, and resistance to air infiltration in accordance with NFRC 400. Where indicated provide thermally broken frame profiles available for use in both masonry and drywall construction. Fabricate with 1/16" positive thermal break and integral vinyl weatherstripping.
- C. Exterior Frames: Fabricated of hot-dipped zinc coated steel that complies with ASTM A 653/A 653M, Coating Designation A60.
1. Fabricate frames with mitered or coped corners. Profile as indicated on drawings.
 2. Frames: Minimum 14 gauge (0.067-inch -1.7-mm) thick steel sheet.
 3. Manufacturers Basis of Design:
 - a. Curries Company (CU) – M Series.
 - b. Curries Company (CU) – Thermal Break TQ Series.
- D. Interior Frames: Fabricated from cold-rolled steel sheet that complies with ASTM A 1008/A 1008M.
1. Fabricate frames with mitered or coped corners. Profile as indicated on drawings.
 2. Frames: Minimum 16 gauge (0.053-inch -1.3-mm) thick steel sheet.
 3. Manufacturers Basis of Design:
 - a. Curries Company (CU) - CM Series.
 - b. Curries Company (CU) - M Series.
- E. Fire rated frames: Fabricate frames in accordance with NFPA 80, listed and labeled by a qualified testing agency, for fire-protection ratings indicated.

- F. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 Table 4 with reinforcement plates from same material as frames.

2.5 FRAME ANCHORS

- A. Jamb Anchors:
1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, formed from A60 metallic coated material, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
 2. Stud Wall Type: Designed to engage stud, welded to back of frames; and not less than 0.042 inch thick.
 3. Compression Type for Drywall Slip-on (Knock-Down) Frames: Adjustable compression anchors.
- B. Floor Anchors: Floor anchors formed from same material as frames, to be provided at each jamb, formed from A60 metallic coated material, not less than 0.042 inches thick.
1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
 2. Separate Topping Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
- C. Mortar Guards: Formed from same material as frames, not less than 0.016 inches thick.

2.6 LOUVERS

- A. Metal Louvers: Door manufacturer's standard metal louvers unless otherwise indicated.
1. Blade Type: Vision proof inverted V or inverted Y.
 2. Metal and Finish: Galvanized steel, 0.040 inch thick, factory primed for paint finish with baked enamel or powder coated finish. Match pre-finished door paint color where applicable.
- B. Louvers for Fire Rated Doors: Metal louvers with fusible link and closing device, listed and labeled for use in doors with fire protection rating of 1-1/2 hours and less.
1. Manufacturers: Subject to compliance with requirements, provide door manufacturers standard louver to meet rating indicated.
 2. Metal and Finish: Galvanized steel, 0.040 inch thick, factory primed for paint finish with baked enamel or powder coated finish. Match pre-finished door paint color where applicable.

2.7 LIGHT OPENINGS AND GLAZING

- A. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints at fabricator's shop. Fixed and removable stops to allow multiple glazed lites each to be removed independently.

Coordinate frame rabbet widths between fixed and removable stops with the type of glazing and installation indicated.

- B. Moldings for Glazed Lites in Doors and Loose Stops for Glazed Lites in Frames: Fabricated from same material as door face sheet in which they are installed. Minimum 20 gauge thick, fabricated from same material as door face sheet in which they are installed.
- C. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch (16 mm) high unless otherwise indicated. Provide fixed frame moldings and stops on outside of exterior and on secure side of interior doors and frames.
- D. Preformed Metal Frames for Light Openings: Manufacturer's standard frame formed of 0.048-inch-thick, cold rolled steel sheet; with baked enamel or powder coated finish; and approved for use in doors of fire protection rating indicated. Match pre-finished door paint color where applicable.

2.8 ACCESSORIES

- A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.
- B. Grout Guards: Formed from same material as frames, not less than 0.016 inches thick.

2.9 FABRICATION

- A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. When shipping limitations so dictate, frames for large openings are to be fabricated in sections for splicing or splining in the field by others.
- B. Tolerances: Fabricate hollow metal work to tolerances indicated in ANSI/SDI A250.8.
- C. Hollow Metal Doors:
 - 1. Exterior Doors: Provide weep-hole openings in bottom of exterior doors to permit moisture to escape where specified. Top of door to be flush and completely sealed joints in top edges of doors against water penetration.
 - 2. Glazed Lites: Factory cut openings in doors with applied flush trim or kits to fit. Factory install glazing where indicated.
 - 3. Astragals: Provide overlapping astragals as noted in door hardware sets in Division 08 Section "Door Hardware" on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted.
 - 4. Continuous Hinge Reinforcement: Provide welded continuous 12 gauge strap for continuous hinges specified in hardware sets in Division 08 Section "Door Hardware".
 - 5. Electrical Raceways: Provide raceways for standardized plug connectors to accommodate up to twelve (12) wires as required for electrified door hardware specified in hardware sets in Division 8 Door Hardware. Provide sufficient number of concealed wires to accommodate electric function of specified hardware. Wire nut connections are not acceptable.

6. Seamless Edge: Provide seamless edge on hollow metal doors by intermittently tack welding seam, grinding smooth and finishing edge free from defects and blemishes.

D. Hollow Metal Frames:

1. Shipping Limitations: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
2. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible. Continuously backweld joints as exterior frames.
 - a. Welded frames are to be provided with two steel spreaders temporarily attached to the bottom of both jambs to serve as a brace during shipping and handling. Spreader bars are for bracing only and are not to be used to size the frame opening.
3. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
4. Equal Rabbet Frames: Provide frames with equal rabbet dimensions unless glazing and removable stops required wider dimension on glass side of frame.
5. High Frequency Hinge Reinforcement: Provide high frequency hinge reinforcements at door openings 48-inches and wider with mortise butt type hinges at top hinge locations to deter against hinge reinforcement sage.
6. **Continuous Hinge Reinforcement: Provide welded continuous 12 gauge straps for continuous hinges specified in hardware sets in Division 08 Section "Door Hardware".**
7. **Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated for removable stops, provide security screws at exterior locations.**
8. Mortar Guards: Provide and weld guard boxes to frame at back of hardware mortises in frames at all hinges and strike preps regardless of grouting requirements.
9. Electrical Knock Out Boxes: Factory weld 18 gauge electrical knock out boxes to frame for electrical hardware preps; included but not limited to electric thru wire hinges, electrical raceways, door position switches, electric strikes, jamb mount card readers, and magnetic locks as noted in door hardware sets in Division 8 Door Hardware.
 - a. Electrical knock out boxes are required at door position switches, electric strikes, card readers, and middle hinge locations for all exterior locations regardless of electrical hardware specified in Division 8 Door Hardware.
 - b. Provide electrical knock out boxes with 3/4-inch knockouts.
 - c. Conduit to be coordinated and installed in field from middle hinge box and strike box to door position box.
 - d. Electrical knock out boxes to comply with NFPA requirements and fit electrical door hardware as specified in hardware sets in Division 8 Door Hardware.
 - e. Electrical knock out boxes for continuous hinges should be located in the center of the vertical dimension on the hinge jamb.
 - f. Provide field installed conduit per Division 28 section for standardized plug connectors to accommodate up to twelve (12) wires as required for electrified door hardware specified in hardware sets in Division 8 Door Hardware. Provide

sufficient number of concealed wires to accommodate electric function of specified hardware. Wire nut connections are not acceptable.

10. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
 11. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - 1) Two anchors per jamb up to 60 inches high.
 - 2) Three anchors per jamb from 60 to 90 inches high.
 - 3) Four anchors per jamb from 90 to 120 inches high.
 - 4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.
 - b. Stud Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - 1) Three anchors per jamb up to 60 inches high.
 - 2) Four anchors per jamb from 60 to 90 inches high.
 - 3) Five anchors per jamb from 90 to 96 inches high.
 - 4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
 - 5) Two anchors per head for frames above 42 inches wide and mounted in metal stud partitions.
 12. Door Silencers: Except on weatherstripped or gasketed doors, drill stops to receive door silencers. Silencers to be supplied by frame manufacturer regardless if specified in Division 08 Section "Door Hardware".
 - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
 - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
 13. Bituminous Coating: Where frames are fully grouted with an approved Portland Cement based grout or mortar, coat inside of frame throat with a water based bituminous or asphaltic emulsion coating to a minimum thickness of 3 mils DFT, tested in accordance with UL 10C and applied to the frame under a 3rd party independent follow-up service procedure.
- E. Fabricate concealed stiffeners, edge channels, and hardware reinforcement from either cold- or hot-rolled steel sheet.
- F. Hardware Preparation: Factory prepare hollow metal work to receive template mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware".
1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
 2. Reinforce doors and frames to receive non-template, mortised and surface mounted door hardware.
 3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.

4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Sections.

G. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints at fabricators shop

1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow metal work.
2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that glazed lites are capable of being removed independently.
3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
4. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.
5. Gap for butted or mitered joints in glass stop should not exceed .0625-inch.

2.10 STEEL FINISHES

A. Prime Finishes: Doors and frames to be cleaned, and chemically treated to insure maximum finish paint adhesion. Surfaces of the door and frame exposed to view to receive a factory applied coat of rust inhibiting shop primer.

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

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. General Contractor to verify the accuracy of dimensions given to the steel door and frame manufacturer for existing openings or existing frames (strike height, hinge spacing, hinge back set, etc.) before frame installation.
- C. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove welded in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

- B. Prior to installation, adjust and securely brace welded hollow metal frames for square, level, twist, and plumb to the following tolerances and conditions:
 - 1. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - 2. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
 - 3. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - 4. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a perpendicular line from head to floor.
- C. Tolerances shall comply with SDI-117 "Manufacturing Tolerances Standard Steel Doors and Frames."
- D. Drill and tap doors and frames to receive non-template, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

- A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.
- B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11 and NFPA 80 at fire rated openings.
 - 1. Set frames accurately in position, plumbed, leveled, aligned, and braced securely until permanent anchors are set. After wall construction is complete and frames properly set and secured, remove temporary braces, leaving surfaces smooth and undamaged. Shim as necessary to comply with installation tolerances.
 - a. At fire-protection-rated openings, install frames according to NFPA 80.
 - b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
 - c. Install frames with removable glazing stops located on secure side of opening.
 - d. Install door silencers in frames before grouting.
 - e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - f. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
 - g. Field apply bituminous coating to backs of frames that are filled with grout containing antifreezing agents.
 - 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors.
 - a. Floor anchors may be set with powder-actuated fasteners instead of post installed expansion anchors if so indicated and approved on Shop Drawings.

3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
 4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with mortar.
 5. Concrete Walls: Solidly fill space between frames and concrete with grout. Take precautions, including bracing frames, to ensure that frames are not deformed or damaged by grout forces.
 6. Field Supplied Ceiling Struts: Extend struts vertically from top of frame at each jamb to overhead structural supports or substrates above frame unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction. Provide adjustable wedged or bolted anchorage to frame jamb members.
 7. Grout Requirements: Do not grout head of frames unless reinforcing has been installed in head of frame. Do not grout vertical or horizontal closed mullion members.
 8. Installation Tolerances: Adjust hollow metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs at floor.
- C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.
1. Non-Fire-Rated Standard Steel Doors:
 - a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
 - b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
 - c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
 - d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.
 2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
 3. Smoke-Control Doors: Install doors according to NFPA 105.
- D. Field Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow metal manufacturer's written instructions.
1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches (230 mm) o.c. and not more than 2 inches (50 mm) o.c. from each corner.
 - a. Secure exterior removable stops with security head screws.

3.4 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.
- B. Remove grout and other bonding material from hollow metal work immediately after installation.
- C. Prime-Coat and Painted Finish Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat, or painted finishes, and apply touchup of compatible air drying, rust-inhibitive primer, zinc rich primer (exterior and galvanized openings) or finish paint.
- D. Metallic-Coated Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION

SECTION 08 14 16
FLUSH WOOD DOORS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Solid-core doors with wood-veneer faces.
 - 2. Shop priming flush wood doors.
 - 3. Factory fitting flush wood doors to frames and factory machining for hardware.
- B. Related Requirements:
 - 1. Section 062000 "Finish Carpentry".
 - 2. Section 088000 "Glazing" for glass view panels in flush wood doors.
 - 3. Section 099000 "Paints and Coatings."

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of door. Include details of core and edge construction, and trim for openings.
- B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; and the following:
 - 1. Dimensions and locations of blocking.
 - 2. Dimensions and locations of mortises and holes for hardware.
 - 3. Dimensions and locations of cutouts.

- 4. Undercuts.
- 5. Requirements for veneer matching.
- 6. Doors to be factory finished and finish requirements.
- 7. Fire-protection ratings for fire-rated doors.
- C. Samples for Initial Selection: For factory-finished doors.
- D. Samples for Verification:
 - 1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches, for each material and finish. For each wood species and transparent finish, provide set of three Samples showing typical range of color and grain to be expected in finished Work.
 - 2. Frames for light openings, 6 inches long, for each material, type, and finish required.

1.5 INFORMATIONAL SUBMITTALS

- A. Sample Warranty: For special warranty.
- B. Quality Standard Compliance Certificates: AWI Quality Certification WI, Certified Compliance Program certificates.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body and is a certified participant in AWI's Quality Certification Program.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of referenced standard and manufacturer's written instructions.
- B. Package doors individually in plastic bags or cardboard cartons
- C. Mark each door on top and bottom rail with opening number used on Shop Drawings.

1.9 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and

maintaining ambient temperature and humidity conditions at occupancy levels during remainder of construction period.

- B Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 43 and 70 percent during remainder of construction period.

1.9 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
 - a. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
 - b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.
 2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
 3. Warranty Period for Solid-Core Exterior Doors: Five years from date of Substantial Completion.
 4. Warranty Period for Solid-Core Interior Doors: Life of installation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Ampco.
 2. Eggers Industries.
 3. Graham Wood Doors; an Assa Abloy Group Company.
 4. Haley Brothers, Inc
 5. Marlite.

- B. Source Limitations: Obtain flush wood doors indicated to be blueprint matched with paneling and wood paneling from single manufacturer.

2.2 FLUSH WOOD DOORS, GENERAL

- A. Quality Standard: In addition to requirements specified, comply with AWI's, AWMAC's, and WI's "Architectural Woodwork Standards">
 - 1. Provide AWI Quality Certification Labels indicating that doors comply with requirements of grades specified.
 - 2. Contract Documents contain selections chosen from options in quality standard and additional requirements beyond those of quality standard. Comply with those selections and requirements in addition to quality standard.
- B. Low-Emitting Materials: Fabricate doors with adhesives and composite wood products that do not contain urea formaldehyde.
- C. WDMA I.S.1-A Performance Grade: Heavy Duty.
- D. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
 - 1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
 - 2. Temperature-Rise Limit: Where indicated and at vertical exit enclosures and exit passageways provide doors that have a maximum transmitted temperature end point of not more than 450 deg F above ambient after 30 minutes of standard fire-test exposure.
 - 3. Cores: Provide core specified or mineral core as needed to provide fire-protection rating indicated.
 - 4. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.
 - 5. Pairs: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.
 - 6. Pairs: Provide formed-steel edges and astragals with intumescent seals.

- a. Finish steel edges and astragals with baked enamel same color as doors.
 - b. Finish steel edges and astragals to match door hardware (locksets or exit devices).
- E. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control, based on testing according to UL 1784.
- F. Mineral-Core Doors:
 - 1. Core: Noncombustible mineral product complying with requirements of referenced quality standard and testing and inspecting agency for fire-protection rating indicated.
 - 2. Blocking: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated as needed to eliminate through-bolting hardware. follows:
 - a. 5-inch top-rail blocking.
 - b. 5-inch bottom-rail blocking, in doors indicated to have protection plates.
 - c. 5-inch midrail blocking, in doors indicated to have armor plates.
 - d. 4-1/2-by-10-inch lock blocks 5-inch midrail blocking], in doors indicated to have exit devices.
 - 3. Edge Construction: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.
 - a. Screw-Holding Capability: 475 lbf 2110 N per WDMA T.M.-10.

2.3 VENEER-FACED DOORS FOR TRANSPARENT FINISH

- A. Exterior Solid-Core Doors:
 - 1. Grade: Premium, with Grade AA faces
 - 2. Species: Select white birch
 - 3. Cut: Plain sliced flat sliced.
 - 4. Match between Veneer Leaves: Book match.

5. Assembly of Veneer Leaves on Door Faces: Center-balance match.
 6. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.
 7. Exposed Vertical and Top Edges: Applied wood-veneer edges of same species as faces and covering edges of faces - edge Type B
 8. Core: Particleboard
 9. Construction: Five or seven plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before veneering. Faces are bonded to core using a hot press.
 10. Adhesives: Type I per WDMA T.M.-6.
 11. WDMA I.S.1-A Performance Grade: Heavy duty.
- B. Interior Solid-Core Doors:
1. Grade: Premium, with Grade A faces.
 2. Species: Select white birch.
 3. Cut: Plain sliced flat sliced.
 4. Match between Veneer Leaves: Book match.
 5. Assembly of Veneer Leaves on Door Faces: Center-balance match.
 6. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.
 7. Room Match: Provide door faces of compatible color and grain within each separate room or area of building.
 8. Transom Match: Continuous match.
 9. Blueprint Match: Where indicated, provide doors with faces produced from same flitches as adjacent wood paneling and arranged to provide blueprint match with wood paneling. Comply with requirements in Section 064216 "Flush Wood Paneling."
 10. Exposed Vertical and Top Edges: Same species as faces or a compatible species - edge Type A

11. Core: Particleboard.
12. Construction: Seven plies, either bonded or nonbonded construction.
13. WDMA I.S.1-A Performance Grade: Heavy Duty.

2.4 FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
 1. Comply with NFPA 80 requirements for fire-rated doors.
- B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, BHMA-156.115-W, and hardware templates.
 1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.
 2. Metal Astragals: Factory machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.
- C. Transom and Side Panels: Fabricate matching panels with same construction, exposed surfaces, and finish as specified for associated doors. Finish bottom edges of transoms and top edges of rabbeted doors same as door stiles.
 1. Fabricate door and transom panels with full-width, solid-lumber, rabbeted, meeting rails. Provide factory-installed spring bolts for concealed attachment into jambs of metal door frames.
- D. Openings: Factory cut and trim openings through doors.
 1. Light Openings: Trim openings with moldings of material and profile indicated.
 2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Section 088000 "Glazing."
 3. Louvers: Factory install louvers in prepared openings.
- E. Exterior Doors: Factory treat exterior doors with water repellent after fabrication has been completed but before shop priming, factory finishing.

2.5 SHOP PRIMING

- A. Doors for Opaque Finish: Shop prime faces, all four edges, edges of cutouts, and mortises with one coat of wood primer specified in Section 09 90 01" Paints and Coatings."
- B. Doors for Transparent Finish: Shop prime faces and all four edges with stain (if required), other required pretreatments, and first coat of finish." Seal edges of cutouts and mortises with first coat of finish.

1.6 FACTORY FINISHING

- A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
 - 1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.
- B. Factory finish doors.
- C. Factory finish doors that are indicated to receive transparent finish.
- D. Factory finish doors where indicated in schedules or on Drawings as factory finished.
- E. Use only paints and coatings that comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- F. Transparent Finish:
 - 1. Grade: Premium.
 - 2. Finish: AWI's, AWMAC's, and WI's "Architectural Woodwork Standards" System 5, conversion varnish
 - 3. Finish: WDMA TR-4 conversion varnish.
 - 4. Staining: As selected by Architect from manufacturer's full range.
 - 5. Effect: Open-grain finish, Filled finish, Semifilled finish, produced by applying an additional finish coat to partially fill the wood pores.
 - 6. Sheen: Semigloss.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine doors and installed door frames, with Installer present, before hanging doors.
 - 1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
 - 2. Reject doors with defects.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Hardware: For installation, see Section 08 71 00 "Door Hardware."
- B. Installation Instructions: Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.
 - 1. Install fire-rated doors according to NFPA 80.
 - 2. Install smoke- and draft-control doors according to NFPA 105.
- C. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
 - 1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold unless otherwise indicated.
 - a. Comply with NFPA 80 for fire-rated doors.
 - 2. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.
 - 3. Bevel fire-rated doors 1/8 inch in 2 inches at lock edge; trim stiles and rails only to extent permitted by labeling agency.
- D. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

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

3.3 ADJUSTING

- A. Operation: Rehang or replace doors that do not swing or operate freely.
- B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION

SECTION 08 71 00
DOOR HARDWARE

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. Any door shown on the drawings and not specifically referenced in the hardware sets shall be provided with identical hardware as specified on other similar openings and shall be included in the finish hardware suppliers bid.
- B. All doors that are fire rated shall be provided with fire rated hardware to comply with the local code requirements whether specified that way or not as a part of the hardware supplier's base bid.
- C. Hardware supplier shall notify the Architect in writing of any discrepancies no less than five (5) working days prior to the bid date that could result in hardware being supplied that is non-functional, that will not meet local codes, or any door that is not covered in this specification.
- D. Aluminum storefront hardware shall be provided under this specification section and shall be included in the finish hardware supplier's base bid.

1.2 RELATED DOCUMENTS

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

1.3 SUMMARY

- A. This Section includes the following:
 - 1. Commercial door hardware for the following:
 - a. Swinging doors.
 - b. Other doors to the extent indicated.
 - 2. Cylinders for doors specified in other Sections.
- B. Related Sections:
 - 1. Division 08 Section "Hollow Metal Doors and Frames" for astragals furnished as part of fire-rated labeled assemblies.

2. Division 08 Section "Flush Wood Doors" for astragals as part of fire-rated labeled assemblies.
3. Division 08 Section "Aluminum-Framed Entrances and Storefronts" for integral weatherstripping and astragals.

1.4 SUBMITTALS

- A. Product Data: Include installation details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
 1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
 2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening.
 - a. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
 3. Content: Include the following information:
 - a. Type, style, function, size, label, hand, and finish of each door hardware item.
 - b. Manufacturer of each item.
 - c. Fastenings and other pertinent information.
 - d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
 - e. Explanation of abbreviations, symbols, and codes contained in schedule.
 - f. Mounting locations for door hardware.
 - g. Door and frame sizes and materials.

4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.
- C. Keying Schedule: Prepared under the supervision of the Owner, separate schedule detailing final keying instructions for locksets and cylinders in writing. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner to approve submitted keying schedule prior to the ordering of permanent cylinders.
- D. Maintenance Data: For each type of door hardware to include in maintenance manuals specified in Division 1. Upon completion of construction and building turnover, furnish two (2) complete maintenance manuals to the owner. Manuals to include the following items:
 1. Approved hardware schedule, catalog cuts and keying schedule.
 2. Furnish keying bitting list in paper and electronic format by registered mail directly to facility manager owner.
 3. Hardware installation and adjustment instructions.
 4. Manufacturer's written warranty information.

1.5 QUALITY ASSURANCE

- A. Door Hardware Installer Qualifications: An experienced and factory trained Installer who has completed both standard and electrified builders hardware and integrated access control installations similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- B. Door Hardware Supplier Qualifications: Door hardware supplier with warehousing facilities in Project's vicinity which is not more than a half day of travel from the jobsite and who employs a qualified Architectural Hardware Consultant or equivalent experience available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying. Supplier recognized by manufacturers to be a direct factory-authorized distributor of the specified hardware products. Supplier is required to be available for onsite meetings with one days notice regarding issues that arise with opening functions, installation, keying, on-site warehousing, trouble shooting of products, and final punch out related issues.
 1. Scheduling Responsibility: Preparation of door hardware and keying schedules.

- C. Architectural Hardware Consultant Qualifications: A person who is currently certified by the Door and Hardware Institute as an Architectural Hardware Consultant (AHC) and who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project.
- D. Source Limitations: Obtain each type and variety of aluminum, steel and wood door hardware from the same single source manufacturer and supplier, unless otherwise indicated.
- E. Regulatory Requirements: Comply with provisions of the following:
 - 1. Where indicated to comply with accessibility requirements, comply with "Americans with Disabilities Act" (ADA), "Accessibility Guidelines for Buildings and Facilities (ADAAG)," ANSI A117.1, and "Texas Accessibility Standards" (TAS) as follows:
 - a. Handles, Pulls, Latches, Locks, and other Operating Devices: Shape that is easy to grasp with one hand and does not require tight grasping, tight pinching, or twisting of the wrist.
 - b. Door Closers: Comply with the following maximum opening-force requirements indicated:
 - 1) Interior Hinged Doors: 5 lbf applied perpendicular to door.
 - 2) Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
 - c. Thresholds: Not more than 1/2 inch high. Bevel raised thresholds with a slope of not more than 1:2.
 - 2. NFPA 101: Comply with the following for means of egress doors:
 - a. Latches, Locks, and Exit Devices: Not more than 15 lbf to release the latch. Locks shall not require the use of a key, tool, or special knowledge for operation.
 - b. Thresholds: Not more than 1/2 inch high.
 - 3. International Building Code (2006).
- F. Fire-Rated Door Assemblies: Furnish door hardware for assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252 (neutral pressure at 40" above sill) or UL-10C.

1. Test Pressure: Positive pressure labeling.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. One complete shipment of door hardware as detailed in approved Door Hardware Schedule Shop Drawings to be inventoried on site and upon receipt of material is secure in lock-up room furnished with shelving for door hardware.
- B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.
- C. Deliver permanent keys and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference". Hardware Supplier must be a regional supplier to address owner questions and concerns relating to keying issues that arise as project close-out.

1.7 COORDINATION

- A. Templates: Door Hardware Supplier to furnish and distribute to the parties involved for templating for doors, frames, and other work specified to be factory prepared for installing standard, electrified and access control door hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.
- B. Keying Conference: Door Hardware Supplier to conduct keying conference to comply with requirements in Division 1 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document prior to any material being ordered:
 1. Function of building, purpose of each area and degree of security required.
 2. Plans for existing and future key system expansion.
 3. Review all lock and exit device functions when reviewing keying requirements.
 4. Requirements for key control system.
 5. Installation of permanent keys and cylinder cores.
 6. Address the requirements for delivery of keys.
 7. Address keying and cylinder stamping (identification) as required by owner or owner representative.
 8. Establish method of submitting electronic format of keying systems and diagram and to be produced and furnished by Hardware Supplier.

- C. Pre-Installation Conference: Hardware Supplier to conduct conference at Project site attended by representatives of Door Hardware Manufacturers, Hardware Installers, Owner Representative and General Contractor to review proper hardware installation methods and the procedures for receiving and handling hardware. Onsite training should not be less than four hours of on-site training by qualified Hardware Supplier and Manufactures. At completion of installation and final walk through, furnish written certification that hardware items were applied according to conference recommendations and to finish hardware specifications.

1.8 WARRANTY

- A. General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Special Warranty: Written warranty, executed by manufacturer agreeing to repair or replace components of standard, electrified hardware and access control hardware that fails in materials or workmanship within specified warranty period. Failures include, but are not limited to, the following:
1. Structural failures including excessive deflection, cracking, or breakage.
 2. Faulty operation of the hardware.
 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
- C. Warranty Period: Two year from date of Substantial Completion, unless otherwise indicated.
- D. Special Warranty Periods:
1. Five years for cylindrical locksets.
 2. Five years for exit devices.
 3. Ten years for manual door closers.
 4. Five years for Thresholds, Door Sweeps, Gasketing, Perimeter Weather-stripping.

1.9 MAINTENANCE SERVICE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.
- B. Maintenance Service: Beginning at Substantial Completion, furnish six months' full maintenance by skilled employees of door hardware and integrated access control systems suppliers and installers. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door opening operation. Furnish parts and supplies as used in the manufacture and installation of original products.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

- A. Substitutions will be allowed in accordance with the General Conditions. In addition to the requirements of the General Conditions, provide a list of projects local to the project area where the hardware has been successfully deployed for five (5) or more years.
- B. General: Furnish door hardware for each door to comply with requirements in this Section and the Door Hardware Schedule at the end of Part 3.
 - 1. Door Hardware Sets: Furnish quantity, item, size, finish or color indicated for named products listed in Hardware Sets.
 - 2. Sequence of Operation: Furnish electrified and access control hardware function, sequence of operation, and interface with other building control systems indicated.
- C. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Schedule at the end of Part 3. Products are identified by using door hardware designations, as follows:
 - 1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.

2.2 HINGES AND PIVOTS

- A. Manufacturers: Subject to compliance with requirements, furnish products by one of the following:
 - 1. Hinges:
 - a. Hager Companies (HA).
 - b. McKinney Products (MC).
 - c. Stanley Hardware (ST).
 - 2. Continuous Geared Hinges (Aluminum):
 - a. Hager Companies (HA).
 - b. McKinney Products (MC).
 - c. Pemko Manufacturing (PE).
 - d. Select Hinges (SH).
- B. Standards: BHMA Certified products complying with the following:
 - 1. Butts and Hinges: BHMA A156.1.
 - 2. Continuous Geared Hinges: BHMA A156.26.
 - 3. Template Hinge Dimensions: BHMA A156.7.
- C. Quantity: Furnish the following:
 - 1. Two Hinges: For doors with heights up to 60 inches.
 - 2. Three Hinges: For doors with heights 61 to 90 inches.
 - 3. Four Hinges: For doors with heights 91 to 120 inches.
 - 4. For doors with heights more than 120 inches, furnish 4 hinges, plus 1 hinge for every 30 inches (of door height greater than 120 inches).

- D. Hinge Size: Furnish the following hinge widths sized for door thickness and clearances required:

Maximum Door Size (inches)	Hinge Height (inches)	Metal Thickness (inches)	
		Standard Weight	Heavy Weight
36-in by 86-in by 1-3/4	4-1/2	0.134	0.180
36-in by 120-in by 1-3/4	5	0.146	0.190

- E. Hinge Weight and Base Material: Unless otherwise indicated, furnish the following:

1. Exterior Doors: Heavy weight, non-ferrous, ball bearing hinges.
2. Interior Doors: Standard weight, ball bearing hinges unless Hardware Sets indicate heavy weight.

- F. Hinge Options: Comply with the following where indicated in the Door Hardware Schedule or on Drawings:

1. Non-removable Pins: Furnish set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the following applications:
 - a. Out-swinging exterior doors.
 - b. Out-swinging access controlled doors.

- G. Continuous-Geared Hinges (Aluminum): Minimum 0.120-inch thick, hinge leaves with minimum overall width of 4 inches; fabricated to full height of door and frame. Fabricate hinges non-handed and to template screw locations. Continuous hinges guaranteed for the life of the opening.

2.4 LOCKS AND LATCHES

- A. Manufacturers: Subject to compliance with requirements, furnish products by one of the following:

1. Mechanical Bored Locks and Latches:
 - a. Best Access Systems (BE) – 93K Series
 - b. Corbin Russwin Hardware (CR) - CL3300 Series.
 - c. Sargent Manufacturing (SA) - 10-Line Series.
 - d. Schlage (SC) – ND Series

- e. Yale Security Group (YA) - 5400LN Series.
- B. Standards: Comply with the following:
 - 1. Bored Locks and Latches: BHMA A156.2.
- C. Bored Locks: BHMA Certified Grade 1, Series 4000.
- D. Lock Trim: Match the following design style:
 - 1. Levers:
 - a. Best Access System (BE) –15D
 - b. Corbin Russwin Hardware (CR) - NZD
 - c. Sargent Manufacturing (SA) –LL
 - d. Schlage (SC) –RHO
 - e. Yale Security Group (YA) - AU
- E. Lock Functions: Function numbers and descriptions indicated in the Door Hardware Schedule comply with the following:
 - 1. Bored Locks: BHMA A156.2.
- F. Lock Throw: Comply with testing requirements for length of bolts to comply with labeled fire door requirements, and as follows:
 - 1. Bored Locks: Minimum 1/2-inch latchbolt throw, 3/4" latchbolt throw at fire rated pairs.
- G. Backset: 2-3/4 inches unless otherwise indicated.

2.3 CYLINDERS AND KEYING

- A. Key all locks to a new 6-pin Grand Master key system as directed by the owner during the keying conference.
- B. Manufacturers: Subject to compliance with requirements, furnish products by one of the following:
 - 1. Standard Cylinders:
 - a. Best Access Systems (BE).

- b. Corbin Russwin (RU).
 - c. Sargent Manufacturing (SA).
 - d. Schlage (SC).
 - e. Yale Security Group (YA).
- C. Standards: Comply with the following:
 - 1. Cylinders: BHMA A156.5.
- D. Cylinder Grade: BHMA Certified Grade 1.
- E. Construction Keying: Comply with the following:
 - 1. Construction Master keying: Furnish temporary construction keyed cylinders for the duration of the construction period. Construction cylinders to be voided or replaced prior to turning the building over to the owner. Furnish construction master keys in quantity as required by project Contractor.
- F. Keying System: Unless otherwise indicated, furnish for a keying system complying with the following requirements:
 - 1. New Grand Master Key System: Cylinders are factory keyed operated by a change key, master key, and a grand master key. Conduct keying meeting with End User to define and document keying system instructions and requirements prior to ordering any material on project.
- G. Keys: Furnish nickel-silver keys complying with the following:
 - 1. Stamping: Permanently inscribe each key with a visual key control number and as directed by Owner.
 - 2. Quantity: Furnish the following:
 - a. Cylinder Change Keys (Per Key Set): Four.
 - b. Master Keys (Per Level): Five.
 - c. Grand Master Keys: Two.
- H. Key Registration List: Furnish keying transcript list to Owner's representative for lock cylinders.
- I. Key Control System: Furnish one lockable cabinet for key control and storage for up to 150 percent capacity, type and model to be determined in the keying meeting with the owner.

2.4 STRIKES

- A. Standards: Comply with the following:
 - 1. Strikes for Bored Locks and Latches: BHMA A156.2.
- B. Strikes: Furnish manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:
 - 1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
 - 2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
 - 3. Aluminum-Frame Strike Box: Furnish manufacturer's special strike box fabricated for aluminum framing.

2.5 EXIT DEVICES

- A. Manufacturers: Subject to compliance with requirements, furnish products by one of the following:
 - 1. Exit Devices:
 - a. Corbin Russwin Hardware (CR) - ED4000/ED5000 Series.
 - b. Sargent Manufacturing (SA) - 80 Series.
 - c. Von Duprin (VO) – 35A/98 Series.
 - d. Yale Security Group (YA) – 7200/7000 Series.
 - e. Precision Hardware (PH) – 2000 Series
- B. Standard: BHMA A156.3.
- C. Exit Devices: BHMA Certified Grade 1.
- D. Panic Exit Devices: Listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.
- E. Outside Trim: Match design for locksets and latchsets, unless otherwise indicated.

- F. Through Bolt Installation: For exit devices and trim as required for fire rated wood doors. Where through bolts are used, coordinate the color of bolt on opposite of device with BHMA finish color similar to the color of door finish surface.

2.6 ACCESSORIES FOR PAIRS OF DOORS

- A. Manufacturers: Subject to compliance with requirements, furnish products by one of the following:
 - 1. Keyed Removable Mullions:
 - a. Corbin Russwin Hardware (C-R).
 - b. Sargent Manufacturing (SA).
 - c. Von Duprin (VO).
 - d. Yale Security Group (YA).
 - e. Precision (PH).
- B. Standards: Comply with the following:
 - 1. Removable Mullions: BHMA A156.3.

2.7 CLOSERS

- A. Manufacturers: Subject to compliance with requirements, furnish products by one the following:
 - 1. Surface-Mounted Closers (Heavy Duty): BHMA Certified Grade 1 (to be used at exterior, cross corridor and high frequency use openings):
 - a. Corbin Russwin Hardware (CR) – DC8000 Series.
 - b. LCN Door Closers (LC) – 4040XP Series.
 - c. Norton Door Controls (NO) – 7500 Series.
 - d. Sargent Manufacturing (SA) – 351 Series.
 - e. Yale Security Group (YA) – 4400 Series.

- B. Standards: Comply with the following:
 - 1. Closers: BHMA A156.4.
- C. Size of Units: Unless otherwise indicated, comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Furnish non-handed, factory-sized closers adjustable to meet field conditions and requirements for opening force.
- D. Closer Options: As indicated in hardware sets, furnish door closer options including: delayed action, hold open arms, extra duty cast or forged parallel arms, positive stop/hold open arms, compression stop/hold open arms, special mounting brackets, spacers and drop plates. Through bolt type mounting is required as indicated in the door hardware sets. Where through bolts are used, coordinate the color of bolt on opposite of device with BHMA finish color similar to the color of door finish surface. Bent steel or threaded rod arms are not acceptable unless clearly specified in the Hardware Sets.

2.8 OPERATING AND PROTECTIVE TRIM UNITS

- A. Manufacturers: Subject to compliance with requirements, furnish products by one of the following:
 - 1. Metal Protective Trim Units:
 - a. Hager Companies (HA).
 - b. Ives (IV).
 - c. Rockwood Manufacturing (RO).
 - d. Trimco Manufacturing (TR).
- B. Standard: Comply with BHMA A156.6.
- C. Materials: Fabricate protection plates from the following:
 - 1. Brass/Bronze and Stainless Steel: .050 inches thick, beveled four sides (B4E) with countersunk screw holes.
- D. Push-Pull Design: 1" Round with 10" Centers. Furnish 90 degree offset pulls at exterior openings.
- E. Fasteners: Furnish manufacturer's designated fastener type as indicated in door hardware sets.

- F. Furnish protection plates sized 2 inches less than door width (LDW) on push side and 1 inch less door width on pull side by height specified in door hardware sets.
- G. Coordinate stainless steel hinges, door edges, kickplates and armor plates with less than .09375 inches between meeting edges, regardless of specified sizes in hardware sets.

2.9 STOPS AND HOLDERS

- A. Manufacturers: Subject to compliance with requirements, furnish products by one of the following:
 - 1. Stops and Holders:
 - a. Hager Companies (HA).
 - b. Ives (IV).
 - c. Rockwood Manufacturing (RO).
 - d. Trimco Manufacturing (TR).
- B. Standards: Comply with the following:
 - 1. Stops and Bumpers: BHMA A156.16.
 - 2. Combination Overhead Holders and Stops: BHMA A156.8.
 - 3. Door Silencers: BHMA A156.16.
- C. Stops and Bumpers: BHMA Certified Grade 1.
- D. Combination Overhead Stops and Holders: Certified BHMA Grade 1.
 - 1. Glynn-Johnson (GJ).
 - 2. Rixson Hardware (RX).
 - 3. Sargent Hardware (SA).
- E. Floor Stops: For doors, unless wall or other type stops are scheduled or indicated. Do not mount floor stops where they will impede traffic.
 - 1. Where floor or wall stops are not appropriate, furnish overhead stops.

- F. Silencers for Metal Door Frames: BHMA Grade 1; neoprene or rubber, minimum diameter 1/2 inch fabricated for drilled-in application to frame. Furnish (3) per single door and (2) per paired door frame if applied gasketing is not specified in Hardware Sets.

2.10 DOOR THRESHOLDS, WEATHERSTRIPPING AND GASKETING

- A. Manufacturers: Subject to compliance with requirements, furnish products by one of the following:
1. Door Thresholds, Weatherstripping and Gasket Seals:
 - a. McKinney Weatherstripping Products (MW).
 - b. NGP Manufacturing (NG)
 - c. Pemko Manufacturing (PE).
 - d. Hager Companies (HA).
- B. Standard: Comply with BHMA A156.22.
- C. General: Furnish continuous weatherstrip seal on exterior doors and smoke, light, or sound gasketing on interior doors where specified. Furnish non-corrosive fasteners for exterior applications.
1. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame. Install header seal before mounting door closer arms.
 2. Meeting Stile Astragals: Fasten to meeting stiles, forming seal when doors are closed.
 3. Door Sweep: Apply to bottom of door, forming seal with threshold when door is closed.
- D. Furnish thresholds to meet ADA compliance height, coordinate threshold height with floor pivots, finish floor thickness and door undercut. Extended spindles on pivots may be required due to construction detail and final installation; coordination requirements by door and hardware supplier are required prior to ordering material.
- E. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.
1. Furnish smoke labeled perimeter gasketing at all smoke labeled openings.

- F. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.

1. Intumescent Seals and Gasketing: Furnish concealed, Category A type gasketing systems on assemblies where an intumescent seal is required to meet IBC and UL-10C positive pressure labeling.

2.11 FABRICATION

- A. Fasteners: Furnish door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Furnish screws according to manufacturers recognized installation standards for application intended.

1. Furnish manufactures templated and approved stainless steel screws and fasteners for stainless steel hardware specified in the hardware sets.

- B. Mounting Accessories: Furnish drop plates, filler brackets, extended length screws, through bolts, and accessories for complete mounting with door, frame, light kits, applied molding and special applications as part of the base bid with complete installation per manufactures recommendations.

2.12 FINISHES

- A. Standard: Comply with BHMA A156.18.
- B. Furnish quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware.
- C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable and temporary protective covering before shipping to jobsite.
- D. BHMA Designations: Comply with base material and finish requirements indicated by the following:

1. BHMA 600: Primed for painting, over steel base metal.
2. BHMA 626: Satin chromium plated over nickel, over brass or bronze base metal.
3. BHMA 628: Satin aluminum, clear anodized, over aluminum base metal.
4. BHMA 630: Satin stainless steel, over stainless-steel base metal.
5. BHMA 652: Satin chromium plated over nickel, over steel base metal.
6. BHMA 689: Aluminum painted, over any base metal.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

- A. Steel Doors and Frames: Comply with ANSI/DHI A115 series.
- B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

- A. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
 - 1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
 - 2. Custom Steel Doors and Frames: DHI's "Recommended Locations for Builders' Hardware for Custom Steel Doors and Frames."
 - 3. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
- C. Furnish and coordinate concealed wood blocking for wall mount stops as detailed in Door Hardware Schedule.
- D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

3.4 FIELD QUALITY CONTROL

- A. The Contractor shall comply with AIA A201 1997 section 3.3.1 which reads as follows:
“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, unless the contract Documents give other specific instructions concerning these matters.”
- B. Field Inspection: Supplier and Door Hardware Manufacturer will perform a final inspection of installed door hardware and state in report whether work complies with or deviates from requirements, including whether door hardware is properly installed, operating and adjusted.

3.5 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
 - 1. Door Closers: Adjust sweep period so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the leading edge of the door.
- B. Six-Month Adjustment: Approximately six months after date of Substantial Completion, Installer shall perform the following:
 - 1. Examine and readjust each item of door hardware as necessary to ensure function of doors, door hardware, and electrified door hardware.
 - 2. Consult with and instruct Owner's personnel on recommended maintenance procedures.
 - 3. Replace door hardware items that have deteriorated or failed due to faulty design, materials, or installation of door hardware units.

3.6 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.

- B. Clean operating items as necessary to restore proper finish. Furnish final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes.

3.8 DOOR HARDWARE SETS

- A. The hardware sets listed below represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections.

B. Manufacturer's Abbreviations:

1. MK - McKinney
2. PE - Pemko
3. RO - Rockwood
4. YA - Yale
5. RF - Rixson

Hardware Schedule

Set: 1.0

Doors: 100A, 100F, 102

Description: Exterior Hollow Metal Door

1 Continuous Hinge (HM/WD Doors)	CFM83 x Height Required		PE
1 Exit Device (rim, nightlatch)	7100 632F 1109 x 6-Pin	630	YA
1 Surface Closer	4420	689	YA
1 Kickplate	K1050 10" x 2" LDW 4BE CSK	US32D	RO
1 Institutional Door Stop	462 EXP	US2C	RO
1 Lip Threshold	2005AT x Width Required		PE
1 Rain Guard	346C (4" ODW)		PE
1 Gasketing	303AS (Head and Jambs)		PE
1 Neoprene Sweep	315CN x Door Width		PE

Notes: Integral weatherstripping to be provided with the doors and frames by supplier.

Set: 2.0

Doors: 100B

Description: Egress Pair- HO Closers-NRP- Wide

6 Hinge (heavy weight) NRP	T4A3786 5" x 4-1/2" NRP	US26D	MK
1 Removable Mullion	KRM200 x Height Required	600	YA
1 Exit Device (rim, nightlatch)	7100 632F 1109 x 6-Pin	630	YA
1 Exit Device (rim, exit only)	7100 630F	630	YA
2 Surface Closer - HO	4410	689	YA
2 Kickplate	K1050 10" x 2" LDW 4BE CSK	US32D	RO
2 Floor Stop or Wall Stop	441CU or 406 as Required	US26D	RO
2 Silencer - Metal Frame	608		RO

Set: 3.0

Doors: 100D

Description: Interior Egress Door

3 BB Hinge	TA2714 5" x 4-1/2"	US26D	MK
1 Exit Device (rim, nightlatch)	7100 632F 1109 x 6-Pin	630	YA
1 Surface Closer	4420	689	YA
1 Kickplate	K1050 10" x 2" LDW 4BE CSK	US32D	RO
1 Floor Stop or Wall Stop	441CU or 406 as Required	US26D	RO
3 Silencer - Metal Frame	608		RO

END OF SECTION

SECTION 09 11 10
NON-LOAD-BEARING METAL FRAMING SYSTEM

PART 1 GENERAL 1.1 SUMMARY

- A. Section includes metal stud framing and accessories interior locations.
- B. Related Sections:
 - 1. Section 07840 - Firestopping.
 - 2. Section 09260 - Gypsum Board Assemblies: Metal studs for partitioning.
 - 3. Section 09900 - Paintings and Coatings.

1.2 REFERENCES

- A. ASTM A653/A653M - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- B. ASTM A591/A591M - Steel Sheet, Electrolytic Zinc-Coated, for Light Coating Mass Applications.
- C. ASTM C645 - Non-Load Bearing (Axial) Steel Studs, Runners (Track), and Rigid Furring Channels for Screw Application of Gypsum Board.
- D. ASTM C754 - Installation of Steel Framing Members to Receive Screw-Attached Gypsum Board.
- E. ASTM C1002 - Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases.
- F. SSPC Paint 20 (Steel Structures Painting Council)-Zinc Rich Primers.

1.3 SYSTEM DESCRIPTION

- A. Interior Walls: Metal stud framing system with interior gypsum board specified in Section 09260.
- B. Maximum Allowable Deflection: $L/240$ span.
- C. Wall System:
 - 1. Design to provide for movement of components without damage, failure of joint seals, undue stress on fasteners, or other detrimental effects when subject to seasonal or cyclic day/night temperature ranges.
 - 2. Design system to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.

1.4 SUBMITTALS

- A. Section 01330 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit data describing standard framing member materials and finish, product criteria, load charts, and limitations.

- C. Manufacturer's Installation Instructions: Submit special procedures and perimeter conditions requiring special attention.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with ASTM C754.
- B. Maintain one copy of each document on site.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.
- C. Design structural elements under direct supervision of Professional Engineer experienced in design of this Work and licensed at Project location.

1.7 PRE-INSTALLATION MEETING

- A. Section 01300 - Administrative Requirements: Preinstallation meeting.
- B. Convene minimum one week prior to commencing Work of this section.

1.8 COORDINATION

- A. Section 01300 - Administrative Requirements: Coordination and project conditions.

PART 2 PRODUCTS

2.1 METAL FRAMING SYSTEM

- A. Manufacturers:
 - 1. United States Gypsum Co.
 - 2. Substitutions: Section 01600 - Product Requirements.

2.2 COMPONENTS

- A. Studs: ASTM A591/A591M Coating Class C, non-load bearing rolled steel, channel shaped, punched for utility access, as follows:
 - 1. Depth: 3-5/8 inches.
 - 2. Thickness: 0.057 inch.
- B. Tracks and Headers: Same material and thickness as studs, bent leg retainer notched to receive studs with provision for crimp locking to stud. Ceiling Runners: With extended leg retainer.
- C. Furring and Bracing Members: Of same material as studs; thickness to suit

purpose.

- D. Fasteners: ASTM C1002, self drilling, self tapping screws.
- E. Anchorage Devices: Power actuated.
- F. Firestopping Sealant: As specified in Section 07840
- G. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20 Type I Inorganic zinc rich.

2.3 FABRICATION

- A. Fabricate assemblies of framed sections to sizes and profiles required.
- B. Fit, reinforce, and brace framing members to suit design requirements.
- C. Fit and assemble in largest practical sections for delivery to site, ready for installation.

2.4 SHOP FINISHING

- A. Studs: Galvanize to G90 coating class. Electro-galvanize.
- B. Tracks and Headers: Galvanize to G90 coating class. Electro-galvanized.
- C. Accessories: Same finish as framing members. Galvanize to ASTM A123, G90 coating class. Electro-galvanized.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01300 - Administrative Requirements: Coordination and project conditions.
- B. Verify rough-in utilities are in proper location.

3.2 INSTALLATION

- A. Align and secure top and bottom runners at 12 inches oc.
- B. Achieve air tight seal between runners and substrate with firestopping sealant in conjunction with Section 07840.
- C. Achieve air tight seal between studs and adjacent vertical surfaces with firestopping sealant in conjunction with Section 07840.
- D. Fit runners under and above openings; secure intermediate studs to same spacing as wall studs.

-
- E. Install studs vertically at 12 inches oc.
 - F. Align stud web openings horizontally.
 - G. Secure studs to tracks using fastener method. Do not weld.
 - H. Stud splicing permissible. Splice studs with 8 inch nested lap, secure each stud flange with flush head screw.
 - I. Fabricate corners using minimum of three studs.
 - J. Double stud at wall openings, door and window jambs, not more than 2 inches from each side of openings.
 - K. Brace stud framing system rigid.
 - L. Coordinate erection of studs with requirements of door frames, and window frames; install supports and attachments.
 - M. Coordinate installation of wood bucks, anchors, and wood blocking with electrical and mechanical work to be placed within or behind stud framing.
 - N. Blocking: Secure wood blocking to studs. Secure steel channels to studs. Install blocking for support of plumbing fixtures, toilet partitions, wall cabinets, Toilet accessories, hardware, and opening frames.
 - O. Refer to Drawings for indication of partitions extending to finished ceiling only and for partitions extending through ceiling to structure above. Maintain clearance under structural building members to avoid deflection transfer to studs. Install extended leg ceiling runners.
 - P. Coordinate placement of insulation in stud spaces after stud frame erection.

3.3 ERECTION TOLERANCES

- A. Section 01400 - Quality Requirements: Tolerances.
- B. Maximum Variation From Indicated Position: 1/8 inch in 10 feet.
- C. Maximum Variation From Plumb: 1/8 inch in 10 feet.

END OF SECTION

SECTION 09 29 00
GYPSUM WALLBOARD

The requirements of the "General Conditions", the "Supplementary Conditions", and "Division 1" sections of the Specifications, shall apply to this section of the Specifications.

PART 1 - GENERAL

1.01 SCOPE

- A. Work Included: Provide all labor, materials, equipment, and services necessary for Gypsum Wallboard Work indicated on the Drawings and specified herein. Work includes, but is not limited to the following:
 - 1. Gypsum Wallboard Materials and Accessories.
 - 2. Sound-rated Construction.
 - 3. Non-Load Bearing Metal Stud Framing for Interior Work.
 - 4. Load-Bearing Metal Stud Framing for Interior Work.
 - 5. Suspension System for Gypsum Wallboard.
 - 6. Fire-Rated Wall Construction.
 - 7. Gypsum Sheathing Panels and Accessory Materials.
 - 8. Sanding preparation for painting.
- B. Related Sections: The following items of related Work will be provided under other sections of the Specifications, as indicated:
 - 1. Concrete Form Work - Section 03 10 00.
 - 2. Unit Structural Masonry - Section 04 23 00.
 - 3. Cold-Formed Metal Framing- Section 05 40 00.
 - 4. Miscellaneous Metal Work - Section 05 50 00.
 - 5. Rough Carpentry Work - Section 06 10 00.
 - 6. Thermal Insulation - Section 07 21 00.
 - 7. Board Insulation - Section 07 21 20.

8. Plaster Veneer System - Section 07 24 00.
9. Joint Protection - Section 07 90 00.
10. Aluminum Framed Entrances and Storefronts - Section 08 41 13.
12. Tile Work - Section 09 31 00.
14. Acoustical Panel Ceiling - Section 09 51 13.
15. Resilient Bases and Accessories- Section 09 65 13.
16. Paint and Coatings - Section 09 90 00.

1.02 REFERENCE SPECIFICATIONS

- A. ASTM International Standard Specifications: As referred to herein, and throughout this section.
 1. ASTM C11 - Standard Terminology Relating to Gypsum and Related Building Materials and Systems.
 2. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
 3. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members.
 4. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board.
 5. ASTM C1177 - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
 6. ASTM C1280 - Standard Specification for Application of Gypsum Sheathing.
 7. ASTM C1396 - Standard Specification for Gypsum Board.
 8. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750° C.

1.03 SUBMITTALS

- A. General: Submit Shop Drawings and Product Data to Architect for review in accordance with the requirements in Section 01 33 23 - Shop Drawings and Samples, and as specified herein.

- B. Reports: Submit test reports, procedure specifications and certifications as required to substantiate welded connections design and welding qualifications to the Owner's Representative and the General Contractor for review.
- C. Product Data: Submit Product Data for each type of product specified.
- D. Shop Drawings:
 - 1. Load Bearing Framing: Include placing drawings for framing members showing size and gauge designations, number, type, location, and spacing. Indicate supplemental strapping, bracing, splices, accessories, and details required for proper installation. Detail connections to structural steel and structural concrete. Indicate member gauges, spacing, and sizes.
 - 2. Structural Calculations: Submit complete structural calculations for load bearing metal stud framing indicating loads, stresses, and deflections for members and connections. Calculations shall be sealed by a Professional Engineer licensed in the State of the proposed Project, experienced in the design of light gauge framing.

1.05 SYSTEM REQUIREMENTS

- A. Performance Requirements: Fabricate and install systems as indicated but not less than that required to comply with ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products, under the following conditions:
 - 1. Gypsum Board Partitions:
 - a. Standard Systems: Maximum deflection of L/240 of partition height.
 - b. Systems to receive Water-Resistant Gypsum Board or Cement Backer Board: Maximum deflection of L/360 of partition height.
 - 2. Interior Suspended Ceilings and Soffits: Maximum deflection of L/360 of distance between supports.
- B. Acoustical Ratings: Where sound ratings are indicated, provide materials and application procedures identical to those tested by manufacturer to achieve Sound Transmission Class (STC) scheduled or indicated in accordance with ASTM E90 - Standard Test method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.

1.06 DELIVERY AND STORAGE

- A. General:

1. Deliver all materials to the site in protective wrappings, clearly labeled with pertinent information to facilitate checking. Unload in areas designated by the General Contractor.
 2. When material delivery schedules necessitate delivery of the materials before the building is enclosed, or prior to installation of the materials, provide weathertight protection in the form of frame construction, with solid wall sheathing and a pitched roof, for the temporary storage of the materials. A waterproof covering of wallboard in lieu of the temporary building is not acceptable.
- B. Gypsum Wallboard: When delivered, the wallboard with unbroken bundling tape shall be neatly piled flat on the floor without overlapping the floor. Storage area shall be protected from the weather.
- C. Material Shelf Life: Do not retain material at the jobsite which has exceeded the shelf life recommended by the manufacturer.
- D. Packaging Waste Management: Separate packaging waste materials for reuse, recycling and/or landfill.

1.07 PROJECT CONDITIONS

- A. Exterior gypsum soffit panel application and joint finishing, exterior Work temperature shall be a minimum of 55°F.
- B. Interior gypsum panel application and joint finishing within the building, maintain temperatures within the range of 55°F. to 70°F.
- C. Provide ventilation to remove excess moisture.
- D. Rooms or areas in which Work is to be installed shall be at temperatures as specified herein, twenty-four (24) hours prior to installation to at least five (5) days after completion of installation. Refer to Division 00 "Supplementary Conditions" for description of temporary heat.

1.08 SCAFFOLDING

- A. Furnish, erect, and maintain all scaffolding and ladders in accordance with local, state, and national safety codes. Equipment shall be erected at times and locations so as not to delay any part of Work. When no longer required, promptly dismantle equipment and remove from site.

1.09 WARRANTY

- A. Form of Warranty: Execute a warranty in the approved written form, warranting all materials and workmanship to remain in serviceable and satisfactory condition, and to make good at own expense any imperfections which may develop during the warranty

period, and damage to other Work caused by imperfections or by repairing imperfections.
The warranty period shall be not less than one (1) year from date of Owner's acceptance.

1.10 MATERIAL DELIVERY, STORAGE & HANDLING

- A. Packaging Waste Management: Separate packaging waste materials for reuse, recycling and/or landfill.

PART 2 - PRODUCTS

- 2.01 A. Substitutions: Manufacturers with comparable equivalent products may be acceptable, subject to conformance with these Specifications, the requirements of the Drawings, and the Architect's review. Refer to Specification 01 25 00 – Substitution Procedures.

2.02 GYPSUM WALLBOARD MATERIALS AND ACCESSORIES

- A. Gypsum Wallboard: ASTM Standard 48" wide sheets with tapered or rounded (eased) edges, in lengths as long as practical to minimize jointing, of thickness shown on Drawings, as manufactured by United States Gypsum Company, a subsidiary of USG Corporation; National Gypsum Company; or G-P Gypsum Corporation. Provide the following types:
 - 1. Standard Gypsum Wallboard: ASTM Standard C1396 (formerly ASTM Standard C36).
 - 2. Foil-Back Standard Gypsum Wallboard: ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.
- B. Joint Tape, Joint Cement, and Adhesives:
 - 1. Joint Tape: Perforated paper tape made especially for drywall joint reinforcing, conforming with ASTM C475 - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
 - 2. Joint Cement: Two compound system (joint compound and topping compound) conforming with ASTM Standard C475.
 - a. Provide special joint cement recommended by manufacturer for water-resistant gypsum board.
 - 3. Adhesives: Provide adhesives conforming to ASTM C557 - Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Frame, as recommended by the wallboard manufacturer.
 - a. Volatile Organic Compounds (VOC) Content: paint and coatings product specified herein shall have a VOC content of 50 grams/liter or less when calculated according to 40 CFR 59, subpart D (EPA method 24).

C. Metal Stud Framing Systems:

1. Non Load-Bearing: Framing system consisting of metal studs of sizes required for wall thicknesses, or of sizes noted on the Drawings, with mating floor and ceiling track, and all erection accessories. Studs and tracks shall be of cold rolled steel channels conforming to ASTM Standard C645, with an electro-galvanized finish, of not less than the following thicknesses.
 - a. 25 gauge thick for partitions up to 16'-0" high at 16" O.C.
 - b. 20 gauge thick for partitions over 16'-0" high (but less than 18'-0" high), at 16" O.C.
 - c. Where partitions of greater height are required by the Drawings, a heavier gauge shall be required and shall be subject to the Architect's review.
2. Load-Bearing: Galvanized steel framing system conforming to ASTM C955 – Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases; shall be 20 gauge (min.) "SJ" style stud members ("C" type studs with stiffening ribs) of sizes and lengths noted on Drawings, with mating running track, and all required erection accessories such as lintels, strappings, clip angles, joists, as manufactured by United States Gypsum Company.
3. Recycled Content of Steel Products: Provide products with an recycled content of steel so postconsumer recycled content plus one-half of pre-consumer recycled content is not less than 25 percent.

D. Steel Channels: 1-1/2" cold rolled steel channels weighing not less than 475 pounds per 1000 linear feet; 2-1/2" cold rolled steel channels weighing not less than 800 pounds per 1000 linear feet. All channels shall be galvanized.

1. Recycled Content of Steel Products: Provide products with an recycled content of steel so postconsumer recycled content plus one-half of pre-consumer recycled content is not less than 25 percent.

E. Furring Channels: Provide furring widths (depths) as noted on the Drawings.

1. Hat-Shaped Channels: Cold rolled, electro-galvanized sheet steel, United States Gypsum Company, #DWC-25, 7/8" deep, 25 gauge minimum, conforming to ASTM Standard C645.
2. Z-Furring Channels: Interior Framing Product, Z-Furring (ZF-Series) as manufactured by Dietrich Metal Framing, 200 Old Wilson Bridge Road,

Columbus, OH 43085, (800)873-2604. Furring channels shall be 25 gauge (minimum) corrosion resistant galvanized steel, conforming to ASTM Standards A653 and A754.

3. Recycled Content of Steel Products: Provide products with an recycled content of steel so postconsumer recycled content plus one-half of pre-consumer recycled content is not less than 25 percent.
- F. Felt Protection Strips: Provide Type I, No. 15, unperforated felt conforming to ASTM D226 – Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing, in width as required to fully cover contact surface area between metal studs and/or furring channels and exterior wall.
- G. Hangers: Not less than 8 ga. annealed zinc coated steel wire or 1" x 1/8" unperforated galvanized steel bands.
- H. Tie Wire: Stainless steel or annealed zinc coated steel wire, 16 gauge minimum.
- I. Screws: Phillips head screw fasteners conforming to ASTM Standard C954, with self-drilling point, self-tapping thread, and rust resistant coating, not less than #6 x 1" long, except as otherwise required for fire resistive ratings.
- J. Nails: GWB-54, bright finish, annular ringed nails conforming with ASTM Standard C514 (formerly ASTM Standard C380), of length to provide 3/4" minimum penetration into framing or furring, except as otherwise required for fire resistive ratings.
- K. Corner Beads: Formed to an angle of 90 degrees, zinc-coated steel not lighter than 26 gauge (0.0179 inch in normal thickness) with wings not less than 7/8 inch wide and perforated for screws/nails and cement treatment, or formed of zinc-coated steel or protected aluminum with legs approximately 3/4" wide and cemented under pressure with a rubber base adhesive to tough paper jointing tape wings not less than 1" wide. Zinc-coated steel shall conform to Federal Specification QQ-S-775 Type I, Class C.
- L. Casing Beads: United States Gypsum Company, USG - No. 200-A galvanized metal trim, or equivalent 26 gauge galvanized casing bead by National Gypsum Company.
- M. Control Joints: United States Gypsum Company, USG - Zinc Control Joint No. 093, or equivalent 26 gauge galvanized metal control joint product by National Gypsum Company.
- N. Special Trim: Provide where/if indicated, special trim fabricated from No. 26 gauge galvanized sheet steel to the shape shown on Drawings.
- O. Angle-Type Hangers: Unless otherwise indicated on the Drawings provide angles with legs not less than 7/8 inch wide, formed from 0.0635 inch thick galvanized steel sheet complying with ASTM Standard A653 (formerly ASTM Standard A446), Coating Designation G90, with bolted connections and 5/16 inch diameter bolts.

2.03 GYPSUM SHEATHING PANELS AND MATERIALS

- A. Manufacturers: Panels specified herein shall be as manufactured by Georgia-Pacific Gypsum LLC, 133 Peachtree Street, Atlanta, GA, 30303, (800)947-4497 or (800)225-6119.
 - 1. Comparable Products: Gypsum sheathing panels by manufacturers with comparable equivalent products may be acceptable, subject to conformance with these Specifications, the requirements of the Drawings, and the Architect's review.
- B. Gypsum Sheathing Panels:
 - 1. At Plaster Veneer System: ASTM Standard C1396 (formerly ASTM Standard C79).
 - 2. At Plaster Veneer System: When extensive winter weather exposure is anticipated, provide square edge, noncombustible, gypsum sheathing panels, in accordance with ASTM Standards E136, C1177 and C1396 (formerly ASTM Standard C79), 1/2" (nominal thickness) Dens- Glass™ Exterior Sheathing (formerly Dens-Glass® Gold Exterior Sheathing with R-Value of 0.56 when tested in accordance with ASTM Standard C518. Gypsum panels shall be made of a treated, water-resistant core, surfaced with fiberglass mats and a "Gold" colored primer coating.
- C. Accessory Materials:
 - 1. Fasteners: Steel drill screws, in lengths recommended by sheathing manufacturer for thickness of sheathing board to be attached, with organic-polymer or other corrosion-protective coating.
 - a. For steel framing less than 0.0329 inch thick, attach sheathing with steel drill screws complying with ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
 - b. For steel framing from 0.033 to 0.112 inch thick, attach sheathing with steel drill screws complying with ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Refer to Section 01 31 00 – Project Management & Coordination
- B. Refer to Section 01 73 00 - Execution

3.02 COLD-FORMED (LOAD-BEARING) METAL FRAMING

- A. Exterior Metal Framing: Metal framing shown on Drawings for gypsum wallboard sheathing shall be furnished and installed by the Cold-Formed Metal Framing Contractor.
- B. Wood Framing and Furring: Wood framing and furring where shown on Drawings for gypsum wallboard finish shall be furnished and installed by the Rough Carpentry Contractor.
- C. Load Bearing Metal Stud Framing: Provide load bearing metal stud and joist framing at the following locations:
 - 1. As indicated on the Drawings.

3.03 METAL STUD FRAMING (NON LOAD-BEARING TYPE STUDS)

- A. Furnish and install non-load bearing metal stud framing for gypsum wallboard partitions, support of gypsum wallboard in locations noted, or where other types of framing are not provided. Framing shall consist of vertical studs framed into continuous top and bottom tracks. Studs shall be of sizes noted on the Drawings or as required to produce the partitions of thicknesses noted, and tracks shall be of mating sizes. In general, framing shall be of single stud depth. Where wall thickness is greater than stud depths, and where plumbing spaces are indicated, frame each wall surface with a separate stud frame.
 - 1. Where partitions are to have gypsum wallboard on both sides, use 25 gauge metal studs for partitions up to 16'-0" high; use 20 gauge metal studs for partitions from 16'-0" to 18'-0" in height.
 - 2. Where partitions are to have gypsum wallboard on one side only, use 25 gauge metal studs for partitions up to 14'-6" high; use 20 gauge metal studs for partitions from 14'-6" to 17'-3" in height. At these partitions (wallboard at one side), provide continuous cold rolled stiffener channels at third points, secured with screws or by welding. Securing by wiring shall not be accepted.
 - 3. The above gauge requirements are based on 3-5/8 inch deep studs at 16" centers. Metal gauges for studs of different depth or spacings shall be subject to review by the Architect.

- B. Extend partition framing from floor to underside of finish ceilings, to 6" minimum above finish ceilings, or to underside of metal roof deck construction above, as indicated on the Drawings.
- C. Bottom and Top Track Installation:
 - 1. Secure bottom tracks to supporting construction, both ends, corners, jambs of openings, and 24" centers with bolts and metallic expansion sleeves.
 - 2. Where partition framing extends to underside of metal roof deck, secure top track to roof steel framing where perpendicular thereto. Where partitions are parallel to roof steel, brace top track to adjacent building framing with pieces of studs, at 48" O.C., maximum. Insulation Contractor shall furnish safing insulation for top track and where indicated on Drawings.
 - a. Isolate stud system from transfer of structural loading to system, horizontally and vertically. Provide slip type joints to attain lateral support, allowances for deflection, and avoid axial loading.
 - 3. Where partition framing are ceiling high and ceilings are finished with gypsum wallboard, secure top track through wallboard to ceiling framing, at each intersection.
 - 4. Where partition are ceiling high and ceilings are acoustical ceilings, after acoustic panels above partition are installed, install top track at underside of ceiling grid by bolting the tracks to the grid, separating top track from ceiling with a strip of polyethylene film.
 - 5. In all areas of ceiling high partition, and in areas where framing extends only 4" above finish ceilings, conceal brace the top of the partition to steel framing at 48" O.C., maximum, in the area above the ceilings.
- D. Furnish single length, unspliced studs for all locations. Furnish studs cut short to provide a 1/2" space between top of stud and underside of top track. Secure studs at corners, intersections, ends and both sides of openings to bottom track, at both stud flanges, with screws. In all other locations studs shall twist into tracks so as to be held by friction and to permit differential deflection between top and bottom track support construction. NOTE: In fire-rated walls frame fastening shall be in accordance with code requirements governing fire-rated construction.
- E. Framing:
 - 1. Frame partition corners by butting one wall against the other, with one stud at the end of the abutting wall and with two studs at the end of the other wall, forming a three stud corner.

2. Frame partition intersections by butting the intersecting wall against the wallboard-finished through-wall, providing two studs at intersection in through-wall, one stud at end of abutting wall, and bolting stud at end of abutting wall to wallboard of through-wall, at 24" O.C.
 3. Frame openings with floor track at head and sills, welded to stud at jambs, with jack studs above and below openings to continue stud spacing pattern, omitting sill and bottom studs at door openings. Brace studs at jambs of openings back to first adjacent stud with furring channels at head and at 24" O.C. to floor line, welded in place at both ends.
 4. Control joints shall be framed by placing two studs back to back, with a 1/2" open space between backs, and by interrupting tracks with a 1/2" open space, at the joint.
- F. Completed framing shall provide straight true, plumb planes to receive the gypsum wallboard. Openings shall be true rectangles.

3.04 CEILING AND SOFFIT FRAMING

- A. Hang runner channels from above the hangers spaced at 48" O.C., maximum, along each channel. Erect hangers approximately plumb. Wrap each wire hanger around the runner channel, the steel joist, and around itself three times. If steel band hangers are used, secure each steel band to the runner channel by wrapping tightly around the channel and bolting to itself. All connections shall develop the full strength of the hangers.
1. Do not attach hangers to roof deck, ductwork, duct supports, piping, conduit or hangers for same.
 2. Where ductwork or other construction interferes with typical hanger spacing, provide trapezes, or other approved framing, to frame around such items and to support the hangers.
 3. Pairs of diagonal hangers, extending from runner at midpoint between joists to top chord of joists at each side may be provided to reduce hanger spacing to 48" centers or less along the runner.
 4. Provide additional hangers at light fixtures, diffusers, grilles, and other points of extra loading.
- C. Erect runners level, parallel to room walls and parallel to each other. Provide a runner adjacent to, and within 3" of, walls where parallel to same. Provide runners at top and bottom edges of all ceiling drops. Cut off ends of runners 1/2" from walls where perpendicular thereto. Splice, when required, at hangers only, by lapping 12" and securely tying.

- D. Where control joint or expansion joint is required by Drawings or Specifications, and runners are parallel to the joint, provide runner channel at each side of joint and secure each, independently of each other, to the framing above. Where runners are perpendicular to the joint, terminate runners at each side of joint, allowing a 1/2" wide, minimum, break in the runners, aligned with joint.
- E. Frame and brace all openings in ceilings that have any side dimension over 2 ft. as a part of the suspension system. Provide all required metal framing, bracing, supports, blocking and wedging necessary to install the framing rigidly and securely in position. Do all cutting and drilling required to install and fasten framing and furring in place. Erect runners to true lines, levels and planes so as to provide a true, flat, system or surface to receive the succeeding Work.

3.05 METAL FURRING

- A. Furnish and install metal furring to support gypsum wallboard ceilings, ceiling drops, and soffits at the lines and elevations as shown and/or noted on the Drawings.
- B. Erect furring in straight continuous rows and in parallel alignment, spaced 16" O.C. Splice furring, where required, by nesting or lapping adjacent members not less than 8" and by double tying the lap splice.
 - 1. Where furring is parallel to edges of wallboard finish, provide a furring member at wallboard edge.
 - 2. Where furring is at right angles to edges of wallboard finish, extend furring to such edges, mitering or coping members at corners.
- C. Where control joint or expansion joint is required provide a furring member at each side of joint, along edge of wallboard.
- D. Provide steel framing, bracing, shimming and supplementary framing as required to erect furring at the required lines and elevations. Secure furring to ceiling framing runners and to building framing by saddle tying with two (2) strands of tie wire.
- E. Direct Metal Stud and/or Furring Channel Attachment to Walls: Where dampproofing is not indicated and/or specified and metal stud and/or furring channel is installed directly to exterior wall, install felt protection strip between metal stud and/or furring channel and wall. Attach metal furring channels, spaced 24" O.C. maximum unless otherwise as noted on the Drawings, to interior of masonry and/or concrete surfaces with hammer-set or power-driven fasteners staggered 24" O.C. maximum on opposite flanges.

3.06 GYPSUM WALLBOARD INSTALLATION

- A. Furnish and install gypsum wallboard on the exposed side or sides of stud partition framing and coldformed metal framing, on one side of all furred areas, fire stops, and where shown on Drawings.

1. Unless otherwise indicated on the Drawings, provide multiple-layer wallboard as indicated or required for fire-rated partition construction. Provide single layer wallboard for all other locations.
 - a. Refer to the Drawings for partition framing construction requiring wallboard to metal roof deck.
 - b. Provide fire-rated gypsum wallboard where indicated on Drawings.
 - c. Provide exterior gypsum wallboard sheathing at exterior wall areas for plaster veneer system as indicated on Drawings.
 - d. Provide water-resistant gypsum wallboard at interior face side of Toilet Room walls, and other locations as indicated on the Drawings.
 - e. Provide foil-faced gypsum wallboard where indicated on Drawings.
 - f. Provide standard gypsum wallboard at all other areas.
 2. Cover full height of stud partition framing with wallboard, including the portion above ceilings.
 3. In all wall and partition Work, except where partition framings terminate at underside of ceilings, extend wall and partition wallboard up past edge of ceiling wallboard, and cope edge of ceiling wallboard to such vertical surfaces forming a control joint.
 4. At all control joints, provide a 1/4" wide, straight open joint in the wallboard, at the joint centerline.
 5. In addition to the required fastening of wallboard panels vertically, secure gypsum wallboard at partitions with screws 16" O.C. to bottom and top track; at FIRE-RATED PARTITION(S), spacing of screws at bottom and top track shall be 8" O.C.
- B. Installations:
1. Single Layer Installations:
 - a. If wallboard is obtainable in length to span full height in a single piece, install wallboard with long dimension vertical; otherwise install wallboard with long dimension horizontal; with vertical joints aligned over studs or furring in both cases.

- b. At soffit/ceiling and soffit/ceiling drop Work, install wallboard with long dimension at right angles to support framing, with end joints aligned over framing members.
- c. Apply all wallboard with the reverse side against the framing members, and with the separate boards in moderate contact, but not forced into place. At internal and external corners, conceal the cut edge of the boards with the overlapping covered edge of the abutting board. Stagger the boards so that the corners of any four boards will not meet at a common point except in vertical corners.

C. Screw Fastening:

- 1. Power drive all screws with an electric screwdriver until the screw head provides a slight depression below the surface of the wallboard, but no further. Do not break the paper covering in the board. If the paper surface is broken, place another screw approximately 2 inches from the damaged surface.
- 2. Screws shall be spaced a maximum of 8" O.C., and not closer than 3/8" to edges. Pair, not stagger, fasteners at edge joints between adjacent sheets.
- 3. Fastening for vertical and horizontal application shall begin at the top center of the panel and proceed outward to the edges or ends, with the top completed before proceeding. Fastening the field of the panel shall begin with the member nearest the center of the panel and proceed outward to the edges or ends, with the fastening completed on each member before proceeding to the next member.

D. Nail Fastening:

- 1. Where wallboard is required to be secured to wood furring member, installation shall be with annular nails. Nailing for vertical and horizontal application shall be as specified for screw fastening above, except with maximum (nail) spacings of 7" O.C. at ceilings, and 8" O.C. at walls.
- 2. Wallboard may also be secured to wood framing members and furring with screws, in which case, the application shall be as specified for screw fastening above, including maximum screw spacings.

3.07 EXPANSION JOINTS AND CONTROL JOINTS

- A. Expansion Joints: Provide expansion joints where noted on the Drawings and/or required by field conditions. Provide two (2) metal casing beads, back to back, with open space of size detailed on Drawings between backs, at expansion joint centerlines.
- B. Control Joints: Where not indicated on Drawings, gypsum panel surfaces shall be isolated with control joints where partition or furring run exceeds 30 ft.; where soffit/ceiling

dimensions exceed 50 ft. in either direction, or area within separate soffit/ceiling sections exceeds 2,500 sq. ft.; where wings of "L", "U", and "T" shaped soffit/ceiling areas are joined; where soffits/ceilings abut partition or vertical surface; and where expansion or control joints occur in base exterior wall. Back joint by double studs or furring channels.

1. Where soffits/ceilings abut partitions or vertical surfaces, install dust stop gasket (with slight fullness to allow for movement of joint), then install soffit/ceiling wallboard with metal casing bead at exposed edge, forming a 1/8" to 1/4" wide open space between the abutting surfaces. Casing beads shall be flushed with wallboard in same manner as hereinafter specified for edge treatment.
2. Install at all other control joint locations, approved, roll-formed zinc control joints, attaching with Bostich® 9/16" "G" staples, or approved equal, spaced not over 6" apart. Cut end joints square and align for neat fit. Control joint shall then be given joint finishing treatment as hereinafter specified. Remove protective tape when joint treatment is completed.

3.08 SOUND-RATED CONSTRUCTION:

- A. Insulation: Coordinate with Acoustic Insulation Contractor for installation of acoustic insulation in sound-rated partitions where indicated on the Drawings.
- B. Gypsum Board:
 1. Install gypsum board same as for interior partitions and ceilings.
 2. Coordinate with installation of perimeter sealants.
 3. After installation of gypsum board base layer(s), cut face layer sheets 1/2 inch less than floor-to-ceiling height and position with 1/4 inch open space between gypsum board and floor, ceiling and dissimilar vertical construction.
- C. Sound Flanking Paths: Where sound-rated partition walls intersect non-rated gypsum board partition walls, extend sound-rated construction to completely close sound flanking paths through non-rated construction.

3.09 CORNER AND EDGE TREATMENT

- A. Internal Corners: Treat all exposed internal corners, as specified herein under Article for FINISHING. Reinforcing tape shall be folded lengthwise through the middle and fitted neatly into the corner.
- B. External Corners: At external corners neatly fit a corner bead over the corner and secure with the same type screws used for applying wallboard. Space screws approximately 6 inches on centers, driving through the wallboard into the framing member. After the

corner piece has been secured in place, treat the corner with joint cement and reinforcing tape in the manner as specified herein under Article for FINISHING. Feather final coat of topping compound out from 12 to 16 inches on both sides of corner.

- C. Edges: Finish all exposed edges of wallboard, including perimeter of all soffit/ceiling areas, and edges abutting masonry, concrete, door frames, window frames, and other finish construction, with metal casing beads. Casing beads shall be flushed with wallboard surface in manner herein before specified for external corners, topping compound feathered out from 12 to 16 inches to surfaces of wallboard.
All Work shall be sanded smooth when dry.

3.10 FINISHING

- A. Levels of Finish: Provide levels of gypsum board finish for locations as follows, in accordance with Gypsum Association GA-214, "Recommended Levels of Gypsum Board Finish".
1. Level 1: All joints and interior angles shall have tape set in joint compound. Surface shall be free of excess joint compound. Tool marks and ridges are acceptable.
 - a. Locations: Provide Level 1 finish for gypsum board surfaces in ceiling plenum areas and concealed areas, except provide higher level of finish as required to comply with fire resistance ratings and acoustical ratings.
 2. Level 2: All joints and interior angles shall have tape embedded in joint compound and wiped with a joint knife leaving a thin coating of joint compound over all joints and interior angles. Fastener heads and accessories shall be covered with a coat of joint compound. Surface shall be free of excess joint compound. Tool marks and ridges are acceptable. Joint compound applied over the body of the tape at the time of tape embedment shall be considered a separate coat of joint compound and shall satisfy the conditions of this level.
 - a. Locations: Provide Level 2 finish for gypsum board substrate at tile and FRP panels, except remove tool marks and ridges.
 3. Level 3: All joints and interior angles shall have tape embedded in joint compound and one (1) additional coat of joint compound applied over all joints and interior angles. Fastener heads and accessories shall be covered with two (2) separate coats of joint compound. All joint compound shall be smooth and free of tool marks and ridges. Note: The prepared surface shall be coated with a drywall primer by the Painting Contractor prior to the application of final finishes as specified in Division 09.
 - a. Locations: Provide Level 3 finish for gypsum board surfaces, where heavy- or medium textured finishes or heavy-grade vinyl wallcovering will be used.

4. Level 4: All joints and interior angles shall have tape embedded in joint compound and two (2) separate coats of joint compound applied over all flat joints and one (1) separate coat of joint compound applied over interior angles. Fastener heads and accessories shall be covered with three (3) separate coats of joint compound. All joint compound shall be smooth and free of tool marks and ridges. Note: The prepared surface shall be coated with a drywall primer by the Painting Contractor prior to the application of final finishes as specified in Division 09.

- a. Locations: Provide Level 4 finish for gypsum board surfaces, where smooth flat paints, light textures, or light- or medium-grade wallcoverings are to be applied.

B. Interior Gypsum Board:

1. Prefill:

- a. Use setting-type joint compound. Mix joint compound according to manufacturer's directions.
- b. Fill joints between boards flush to top of eased or beveled edge.
- c. Wipe off excess compound and allow compound to harden.

2. Taping (Level 1):

- a. Use taping or all purpose compound.
- b. Butter taping compound into inside corners and joints.
- c. Center tape over joints and press down into fresh compound.
- d. Remove excess compound.
- e. Tape joints of gypsum board above suspended ceilings.

3. First Coat (Level 2):

- a. Use taping or all-purpose drying-type compound, or setting-type joint compound.
- b. Immediately after bedding tape, apply a thin skim coat of joint compound trowel applied over body of tape and allow to dry completely in accordance with manufacturer's instructions.

- c. Apply first coat of compound over flanges of trim and accessories, and over exposed fastener heads and finish level with board surface.
 - 4. Second Coat (Level 3): Use all purpose or topping drying type joint compound. After first coat treatment is dried, apply second coat of compound over tape and trim, feathering compound 2 inches beyond edge of first coat.
 - 5. Third Coat (Level 4):
 - a. Use all purpose or topping drying type joint compound.
 - b. After second coat has dried, sand surface lightly and apply thin finish coat to joints, fasteners and trim, feathering compound 2 inches beyond edge of second coat.
 - c. Allow third coat to dry. Apply additional compound, and touch-up and sand, to provide surface free of visual defects, tool marks, and ridges, and make suitable and ready for application of final finish by others.
- C. Joint Compound:
 - 1. After skim coat sets, apply finish coat of compound feathering 3 to 4 inches beyond tape edges.
 - 2. Feather coats onto adjoining surfaces so that camber is maximum 1/32 inch.
- D. Trim:
 - 1. Use same fasteners to anchor trim accessory flanges as required to fasten gypsum board to supports, unless otherwise recommended by trim manufacturer.
 - 2. Install metal corner beads at external corners.
 - 3. Install metal casing bead trim whenever edge of gypsum base would otherwise be exposed or semi-exposed, and where gypsum base terminates against dissimilar material.
- E. Control Joints: Install where indicated and specified.
- F. Special Trim and Reveal Joints: Install as indicated on Drawings and in accordance with manufacturer's instructions.

3.11 GYPSUM SHEATHING PANELS

- A. Preparation: Examine exterior metal stud framing and verify that the surface of the framing members to receive the sheathing does not vary more than 1/4" from the plane of faces of adjacent members.
 - 1. Inspection: Steel framing stud spacing shall not exceed 16 inches O.C. for 1/2 inch thick gypsum sheathing panels and 24 inches O.C. for 5/8 inch thick gypsum sheathing panels.
 - 2. Notification: Contact the General Contractor, in writing, for correction, of any condition, detrimental to the installation of this Work.
- B. Sheathing Installation: Provide sheathing where indicated on the Drawings and as specified herein. Install sheathing in accordance with ASTM Standard C1280 and the manufacturer's written installation instructions and recommendations.
 - 1. Fiberglass-faced gypsum sheathing, where indicated on the Drawings, over metal stud framing shall be installed with the "gold side" out (exposed to exterior view/side).
 - a. Fasteners shall be flush to the face of the board, not countersunk.
 - b. Do not laminate sheathing to masonry surfaces.

3.12 SURFACE PREPARATION FOR PAINTING

- A. Where painting of gypsum wallboard surface or vinyl wallcovering is indicated on the Drawings, tape, spackle and sand flush all surface imperfections, cracks, and gouges to make suitable for finish painting by the Painting Contractor.

3.13 CLEAN-UP

- A. During progress of the Work, keep the premises free of all debris and waste materials resulting from the Work of this section. During progress of the Work, upon completion of Work, and before final acceptance of the Work, remove all debris and rubbish to central area designated for clean-up by the General Contractor. Remove all unused materials, tools, and equipment from site.
- B. Waste Management: Collect field generated construction waste created during construction or final cleaning.

END OF SECTION

SECTION 09 65 13
RESILIENT BASES AND ACCESSORIES

The requirements of the "General Conditions", the "Supplementary Conditions", and "Division 1" sections of the Specifications, shall apply to this section of the Specifications.

PART 1 - GENERAL

1.01 SCOPE

- A. Work Included: Provide all labor, materials, equipment, and services necessary for Resilient Bases and Accessory Work indicated on the Drawings and specified herein. Work includes, but is not limited to the following:
 - 1. Roppe Vinyl Transition Strips- (Colors to be selected by Architect refer to plans for color and location.)
 - 2. Roppe Pinnacle butt-toe Rubber Wall Base- ASTM F-1861, Type TS, 4" height (120' coil) Straight and cove. (Refer to plans for location)
- B. Color Selections: 177 Steel Blue.
- C. Room Finish Schedule: Refer to the Drawings.
- D. Related Sections: The following items of related Work will be provided under other sections of the Specifications, as indicated:
 - 1. Cast-in-Place Concrete - Section 03 30 00.
 - 2. Rough Carpentry - Section 06 10 00.
 - 3. Tile Work - Section 09 31 00.

1.02 QUALITY ASSURANCE

- A. General: All material incorporated in the Work shall be subject to the Architect's and Owner's review. Methods of preparation, construction, and installation shall be in accordance with manufacturer's printed specifications, unless otherwise directed by the Owner's Representative.
- B. Unacceptable Materials: Material containing asbestos fibers are prohibited.

1.03 SUBMITTALS

- A. General: Submit Product Data and Samples to the Architect for review in accordance with the requirements in Section 01 33 23 - Shop Drawings and Samples, and as specified herein.
- B. Reports: Submit test reports, procedure specifications and certifications as required to substantiate welded connections design and welding qualifications to the Owner's Representative and the General Contractor for review.
- C. Samples: Submit Samples of all materials for approval PRIOR to installation. Installed materials shall match approved Samples.
 - 1. Submit the following Samples of each type, color and pattern required:
 - a. Accessories: 12" long Samples of items such as reducer strips, transition strips, and wall bases.

1.04 DELIVERY AND STORAGE

- A. Delivery: Deliver only approved materials to the site in original boxes, crates, wrappings, clearly labeled with pertinent information to facilitate checking.
- B. Storage: Store the materials at the site off the ground and in properly protected dry storage facilities, until ready for use. Damaged materials will not be acceptable, and shall be removed from the site.
- C. Material Shelf Life: Do not retain material at the jobsite which has exceeded the shelf life recommended by the manufacturer.
- D. Packaging Waste Management: Separate packaging waste materials for reuse, recycling and/or landfill.

1.05 WARRANTY

- A. Form of Warranty: Execute a warranty in the approved written form warranting all materials and workmanship to remain in serviceable and satisfactory condition, and to make good at own expenses any imperfections which may develop during the period specified, and damage to other Work caused by imperfections or repairing imperfections. The warranty period shall be not less than one (1) year from date of Owner's acceptance.

1.06 EXTRA MATERIAL

- A. General: At completion of the Work, deliver to Owner's Representative, additional replacement materials, in unopened boxes, sealed, and clearly labeled for maintenance purposes, in the following amounts:

1. Rubber Wall Bases: Thirty-two (32) lineal feet of each base type, size and color installed. Bases shall be of equal lengths not less than 4'-0".

PART 2 - PRODUCTS

- 2.01 A. Substitutions: Manufacturers with comparable equivalent products may be acceptable, subject to conformance with these Specifications, the requirements of the Drawings, and the Architect's review. Refer to Specification 01 25 00 – Substitution Procedures.

2.02 MATERIALS

- A. Transition Strips: Roppe Brand, or Armstrong Brand

1. Colors: To match floor color as indicated on drawings.

- B. Rubber Wall Bases Types:

1. Roppe Vinyl Transition Strips- (Colors to be selected by Architect refer to plans for color and location.)
2. Roppe Pinnacle butt-toe Rubber Wall Base- ASTM F-1861, Type TS, 4" and 6" in height (120' coil) Straight and cove. (Colors to be selected by Architect refer to plans for color and location.)
3. Provide pre-molded outside corner base units where required by Drawings or Project conditions.

- C. Patching Compound: Fast patch compound brand name product of type recommended by the manufacturer of the resilient flooring material.

- D. Adhesives: Cutback or clear thin spread type products recommended by the manufacturer of resilient flooring materials. Waterproof adhesives shall be used without adulteration. Floor tile adhesive shall not be used for wall bases, and wall base adhesive shall not be used for Floor Tile Work.

1. Volatile Organic Compounds (VOC) Content: Adhesives product specified herein shall have a VOC content of 50 grams/liter or less when calculated according to 40 CFR 59, subpart D (EPA method 24).

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Refer to Section 01 31 00 – Project Management & Coordination

- B. Refer to Section 01 73 00 - Execution

3.02 INSPECTION AND PREPARATION

- A. Inspection: Carefully inspect all surfaces upon which resilient flooring materials are to be applied. Notify the General Contractor for correction of any defects. Starting Work shall imply acceptance of the job conditions, and an unsatisfactory surface condition for the installation of the materials will not be considered valid in waiving any portion of the warranty.
1. Concrete floors to receive resilient flooring materials shall be smooth and of uniform steel trowel finish, free of curing or sealing compounds.
- B. Preparation: Resilient bases and accessories shall not be laid on uncured or damp concrete. All concrete surfaces receiving resilient flooring materials shall be tested for dampness prior to installation of the flooring material. The following test may be used, or alternate methods as recommended by the resilient flooring manufacturer may be substituted.
1. Test Method for Dampness: Brush on floor primer in several areas approximately 3' x 3', preferably in area least subject to drying conditions. If after twenty-four (24) hours the primer can be scraped or peeled from the surface, the surface is unsuitable for installation of the resilient flooring material. Allow surface to dry further; retest until primer is well bonded to the surface, whereupon installation may proceed.
2. Concrete Floor Preparation: Concrete subflooring to receive resilient flooring materials shall be prepared in accordance with the manufacturer's printed instructions and recommendations.

3.02 INSTALLATION

- A. General: Install all resilient flooring materials specified herein and as indicated on the Drawings in accordance with the manufacturer's printed specifications.
- B. Vinyl Transition Strips: Provide transition strips as required by Drawings and/or field conditions.
- C. Wall Bases: Install premoulded wall bases including external and internal corners, coped neat and sharp.
1. Carpeted Areas: Coordinate Work with Carpeting Contractor for wall bases required in carpeted areas.
2. Prefabricated Cabinet Toe Boards: Install wall bases for exposed toe bases of prefabricated base cabinets.

- D. Bonding Assurance: After installation, floors shall be rolled with heavy roller as recommended by the manufacturer to insure proper bond. Roller surface shall be such as not to damage or otherwise mar finish surfaces of resilient flooring.

3.03 CLEANING PROTECTION

- A. General: Soon after installation of resilient bases and accessories, wipe-off all surplus adhesive and leave surfaces clean and free of surface marks or blemishes. All Work shall be thoroughly cleaned at time of completion, at the final completion of the building areas, and prior to occupancy when directed by the Architect.
- B. Washing: Resilient flooring materials shall not be washed until time period recommended by resilient flooring materials manufacturer has elapsed, to allow materials to become well-sealed in adhesive.
- C. Cleaning, Rinsing, and Sweeping: Clean and rinse all resilient bases and accessories with 140°F. water, and dry. Sweep clean with untreated yarn broom.
- D. Protection: Protect all traffic areas of resilient flooring with undyed, untreated building paper.

3.04 DAMAGED WORK

- A. All damaged or Defective Work shall be replaced. All other Work which becomes damaged in replacing Defective Work shall be replaced by Resilient Flooring Materials Contractor. Patched Work will not be accepted.

3.05 CLEAN-UP

- A. During progress of the Work the premises shall be kept free of all debris and waste materials resulting from the Work of this section. All debris and rubbish shall be removed from the site. Upon completion of Work and before final acceptance of the Work, all debris, rubbish, unused materials, tools, and equipment shall be removed from the site.
- B. Waste Management: Collect field generated construction waste created during construction or final.

END OF SECTION

SECTION 09 65 19
RESILIENT (LVT) FLOORING

PART 1 GENERAL

1.01 THIS SECTION INCLUDES

- A. Resilient Flooring as shown on the drawings and schedules and as indicated by the requirements of this section.

1.02 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract (including General and Supplementary Conditions and Division 1 sections) apply to the work of this section.
- B. Division 6 – Wood and plastic: not covered in this section.
- C. Division 7 – Thermal and humidity protection: not covered in this section.
- D. Division 9 – Other sections containing information related to floor finishes: not covered in this section.

1.03 RELATED SECTIONS

- A. Other Division 9 sections for floor finishes related to this section but not the work of this section.
- B. Division 3 Concrete; not the work of this section.
- C. Division 6 Wood and Plastics; not the work of this section.
- D. Division 7 Thermal and Moisture Protection; not the work of this section.

1.04 QUALITY ASSURANCE AND REGULATORY REQUIREMENTS

- A. Installer Qualifications: Installer experienced in installation or application of systems similar in complexity to those required for this project, including specific requirements indicated.
- B. In accordance with the technical instructions in the Installation Instructions, use all the accessories recommended by Mohawk Group when installing its flooring.

1.05 SUBMITTALS

- A. Submit shop drawings, seaming plan, coving details, and manufacturer's technical data, installation and maintenance instructions (latest edition of "Mannington's Professional Installation Guide,") for flooring and accessories.
- B. Submit the manufacturer's standard samples showing the required colors for flooring and applicable accessories.
- C. If required, submit the manufacturer's certification that the flooring has been tested by an independent laboratory and complies with the required fire tests.

1.06 DELIVERY, HANDLING, STORAGE

- A. Deliver the flooring to the installation site in Mohawk Group's original packaging. Indicate the project name and handling instructions on the outside of the boxes.
- B. Advise the carrier of any damaged material and indicate it on the packing slip.
- C. Store materials in a flat in a dry, warm, ventilated and weather tight location. Protect flooring

products from damage.

D. Install the flooring after all other finishing work, including painting, have been completed.

1.07 PROJECT CONDITIONS

A. Store the flooring inside, sheltered from extreme hot or cold temperatures. Place the material on a smooth level floor or where there is uniform solid support in a clean, dry well-ventilated area. Unstack the pallets. The long-term storage temperature must be maintained between 65°F (18°C) and 85°F (29°C). Protect adhesive and flooring material from freezing, extreme heat and direct sun exposure.

B. Acclimatize the subfloor, all flooring material and adhesive for 48 hours before, during and after the installation by maintaining the room temperature between 65°F (18°C) and 85°F (29°C). The pallets should be unstacked 24 hours prior to use. Page 3 of 5 6063-M (2016-3-21)

C. Afterwards, maintain the room temperature between 55°F (13°C) and 90°F (32°C). Protect the material from direct sources of heat such as air vents and other types of heaters.

D. Do not install on cement slabs unless they are thoroughly cleaned, level, structurally sound and free from paint, varnish, adhesive, oil, grease, solvent, sealer and curing compounds or other foreign substances that may adversely affect adhesion.

PART 2 PRODUCTS

2.01 RESILIENT FLOORING DESCRIPTION

A. Provide **Mohawk Group/ C0016 Morikato Wood/ 222 Japanese Maple/Luxury Vinyl Tile:**

PRODUCT TYPE	Glue Down LVT
CONSTRUCTION	Commercial Grade Enhanced Resilient Tile
GAUGE	10" (2.5mm)
WEAR LAYER	20 mil (0.5mm)
STATIC LOAD	ASTM F970 - Passes, modified - 1500 psi
PRODUCT TYPE	Glue Down LVT
FINISH	M-Force Enhanced Urethane
SIZE	177.8 mm x 1219.2 mm (actual) 7"W x 48"L (nominal)
SQUARE FEET PER CARTON	37.28 sf/ctn (3.34 m ² /ctn)
PIECES PER CARTON	16 pieces/ctn
POUNDS PER CARTON	33.09 lbs/ctn
INSTALLATION	Glue Down
RECOMMENDED ADHESIVE	MS160 Spray Adhesive, M95.0 Resilient Flooring Adhesive, M700 Pressure Sensitive Adhesive
UNDERLAYMENT	Mohawk Accusound

Refer to the product's Technical Specifications data sheet for detailed specifications.

NO SUBSTITUTIONS

2.03 ADHESIVES

Use of Mohawk Group's M700 Pressure Sensitive, M95.0 Acrylic or MS160 Spray adhesive is required. M700 covers 220-260 sf/gallon and M95.0 covers 175-225 sf/gallon when applied with the recommended notched trowel. MS160 covers 145-160 sf/22 oz can.

2.04 OTHER MATERIAL

- A. Subfloor repairs: Use a good-quality Portland-based patching compound modified with latex that has a minimal resistance to compression of 3,500 lbs/sq. in. (246 kg/cm²) to fill, smooth or level subfloor imperfections.
- B. Self-levelling underlayment: Use a Portland-based self-levelling underlayment modified with a polymer that has a minimal resistance to compression of 3,500 lbs/sq. in. (246 kg/cm²)

PART 3 EXECUTION

3.01 SITE INSPECTION

- A. Examine the subfloor before installation to ensure that the surface is clean, dry, smooth, structurally sound and free from foreign substances that may adversely affect adhesion or cause discoloration. Furthermore, ensure that the subfloor is free of paint, varnish, adhesive, oil, grease, solvent and other foreign substances, including treatment compounds, sealers and curing compounds that may adversely affect adhesion or alter the appearance or durability of the vinyl flooring.
- B. Verify the surface to ensure there is no powder, scaling or mold. If there is, remove it with a mechanical sander and level with a good-quality cement-based Portland primer.
- C. Never remove residual or other adhesive with chemical adhesive removal products; their use will automatically void the Mohawk product warranty.
- D. Report and rectify all unsatisfactory conditions. Do not start flooring installation until all rectifications have been completed.

3.02 SUBFLOOR PREPARATION

- A. All subfloors should be smooth, flat and dust free with the tolerance not exceeding more than 1/8" in a 10' span. All subfloor and underlayment patching must be performed with a non-shrinking, water-resistant Portland cement patching compound.
- B. Mechanically remove all surface contaminants such as paint, oil, grease, varnish, adhesive as well as various other products such as treatment compounds.
- C. Measure the humidity and pH levels in the cement in compliance with the following standards before installation:
 - 1. ASTM F 1869, Anhydrous Calcium Chloride test for moisture levels. The maximum allowable reading for M700 adhesive is 5 lbs/1,000 sq. ft./24 hours (2.26 kg/92.9 sq. m/24 hours).
 - 2. ASTM F 2170, Relative Humidity (RH) test using in situ probes. The maximum allowable reading is:
 - a. 85% RH for M700 Adhesive

b. 95% RH for M95.0 Adhesive

c. 93% RH for the MS160 Spray Adhesive

3. ASTM F 710, pH levels (test procedure 5.3.1). The readings should be between 8 and 9. The ASTM test frequency recommendation is 3 measures for the first 1,000 sq. ft. (92.9 sq. m) and one measure for each additional 1,000 sq. ft. (92.9 sq. m).

- D. Ensure Moisture, Relative Humidity and pH tests have all been conducted and measurements meet Mohawk Group's recommendations.
- E. In case of doubt, test the adhesion on the cement subfloor or other surface that will be covered by the flooring. Do the test using the specified flooring and recommended adhesive.

3.03 RESILIENT FLOORING INSTALLATION

- A. Install the flooring according to the latest version of Mohawk Group's Installation Instructions. Use the tools, adhesives, trowel types and procedures recommended in the instructions.
- B. Acclimatize the subfloor, all flooring material and adhesive for 48 hours before and during the installation by maintaining the room temperature between 65°F (18°C) and 85°F (29°C). Afterwards, maintain the temperature between 55°F (13°C) and 90°F (32°C).

3.04 CLEANING AND PROTECTION

- A. Remove all excess adhesive immediately after installation as recommended in Mohawk Group's Installation Instructions.
- B. Before allowing traffic after installation, consult and follow the recommendations in Mohawk Group's Installation Instructions.
- C. Following installation and cleanup, if the work of all other trades has not yet been completed, protect the flooring by laying sheets of non-staining brown Kraft paper, and then a layer of plywood sheets (rolls of nonstaining heavy cardboard material could also be used for protection).
- D. Follow the instructions in Mohawk Group's Maintenance Instructions when performing initial and regular maintenance procedures.

END OF SECTION

SECTION 09 65 19
RESILIENT (VCT) TILE FLOORING

The requirements of the "General Conditions", the "Supplementary Conditions", and "Division 1" sections of the Specifications, shall apply to this section of the Specifications.

PART 1 GENERAL

1.01 THIS SECTION INCLUDES

- A. Flooring and accessories as shown on the drawings and schedules and as indicated by the requirements of this section.

1.02 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract including General and Supplementary Conditions and Division 1 sections apply to the work of this section.

1.03 RELATED SECTIONS:

- A. The following items of related Work will be provided under other sections of the Specifications:
 - 1. Other Division 9 sections for floor finishes related to this section but not the work of this section.
 - 2. Division 3 Concrete; not the work of this section.
 - 3. Division 6 Wood and Plastics; not the work of this section.
 - 4. Division 7 Thermal and Moisture Protection; not the work of this section.

1.04 QUALITY ASSURANCE AND REGULATORY REQUIREMENTS

- A. Environmental Requirements: Paint products such as touch-up field painting and isolation coatings shall comply with all applicable Federal and State Regulations on Volatile Organic Compounds (VOC). PAINT
- B. Select an installer who is competent in the installation of Armstrong resilient tile flooring.
- C. If required, provide types of flooring and accessories supplied by one manufacturer, including leveling and patching compounds, and adhesives.
- D. If required, provide flooring material to meet the following fire test performance criteria as tested by a recognized independent testing laboratory:
 - a. ASTM E 648 Critical Radiant Flux of 0.45 watts per sq. cm. or greater, Class I.

- b. ASTM E 662 (Smoke Generation) Maximum Specific Optical Density of 450 or less.

1.05 SUBMITTALS

- A. General: Submit Shop Drawings and Product Data to the Architect for review in accordance with the requirements in Section 01 33 23 - Shop Drawings and Samples, and as specified herein.
- B. Reports: Submit test reports, procedure specifications and certifications as required to substantiate welded connections design and welding qualifications to the Owner's Representative and the General Contractor for review.
- C. Submit shop drawings, seaming plan, coving details, and manufacturer's technical data, installation and maintenance instructions (latest edition of "Armstrong Guaranteed Installation System," F-5061) for flooring and accessories.
- D. Submit the manufacturer's standard samples showing the required colors for flooring and applicable accessories.
- E. If required, submit the manufacturer's certification that the flooring has been tested by an independent laboratory and complies with the required fire tests.

1.06 ENVIRONMENTAL CONDITIONS

- A. Deliver materials in good condition to the jobsite in the manufacturer's original unopened containers that bear the name and brand of the manufacturer, project identification, and shipping and handling instructions.
- B. Store materials in a clean, dry, enclosed space off the ground, and protected from the weather and from extremes of heat and cold. Protect adhesives from freezing. Store flooring, adhesives and accessories in the spaces where they will be installed for at least 48 hours before beginning installation.
- C. Maintain a minimum temperature in the spaces to receive the flooring and accessories of 65°F (18°C) and a maximum temperature of 100°F (38°C) for at least 48 hours before, during, and for not less than 48 hours after installation. Thereafter, maintain a minimum temperature of 55°F (13°C) in areas where work is completed. Protect all materials from the direct flow of heat from hot-air registers, radiators, or other heating fixtures and appliances.
- D. Install flooring and accessories after the other finishing operations, including painting, have been completed. Close spaces to traffic during the installation of the flooring. Do not install flooring over concrete slabs until they are sufficiently dry to achieve a bond with the adhesive, in accordance with the manufacturer's recommended bond and moisture tests.

1.07 MATERIAL DELIVERY, STORAGE & HANDLING

- A. Packaging Waste Management: Separate packaging waste materials for reuse, recycling and/or landfill.

PART 2 PRODUCTS

2.01 SUBSTITUTIONS:

- A. Manufacturers with comparable equivalent products may be acceptable, subject to conformance with these Specifications, the requirements of the Drawings, and the Architect's review. Refer to Specification 01 25 00 – Substitution Procedures.

2.02 RESILIENT TILE (VCT) FLOORING MATERIALS

- A. Armstrong Flooring. Vinyl Composition Tile. Standard Excelon. Refer Finish Schedule.

2.03 WALL BASE MATERIALS

- A. Refer to related specification.

2.04 ADHESIVES

- A. For Tile Installation System, Full Spread: Provide Armstrong [S-515][S-521][S-700][S-750] Resilient Tile Adhesive under the tile and Armstrong S-725 Wall Base Adhesive at the wall base as recommended by the flooring manufacturer.
- B. [For Tile Installation System, Tile On: Provide Armstrong [S-515][S-521][S-750] Resilient Tile Adhesive under the tile over smooth, completely bonded existing resilient flooring and Armstrong S-725 Wall Base Adhesive at the wall base as recommended by the flooring manufacturer.]
- C. [For Tile High-Moisture Installation Warranty, Full Spread: Provide Armstrong [S-515][S-521] Resilient Tile Adhesive under the tile and Armstrong S-725 Wall Base Adhesive at the wall base as recommended by the flooring manufacturer.]

2.05 ACCESSORIES

- A. For patching, smoothing, and leveling monolithic subfloors (concrete, terrazzo, quarry tile, ceramic tile, and certain metals), provide Armstrong [S-183 Fast-Setting Cement-Based Underlayment] [S-184 Fast-Setting Cement-Based Patch and Skim Coat] [S-194 Fast-Setting Cement-Based Patch and Underlayment].

- B. For sealing joints between the top of wall base or integral cove cap and irregular wall surfaces such as masonry, provide plastic filler applied according to the manufacturer's recommendations.
- C. Provide transition/reducing strips tapered to meet abutting materials.
- D. Provide threshold of thickness and width as shown on the drawings.
- E. Provide resilient edge strips of width shown on the drawings, of equal gauge to the flooring, homogeneous vinyl or rubber composition, tapered or bullnose edge, with color to match or contrast with the flooring, or as selected by the Architect from standard colors available.
- F. Provide metal edge strips of width shown on the drawings and of required thickness to protect exposed edges of the flooring. Provide units of maximum available length to minimize the number of joints. Use butt-type metal edge strips for concealed anchorage, or overlap-type metal edge strips for exposed anchorage. Unless otherwise shown, provide strips made of extruded aluminum with a mill finish.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Refer to Section 01 31 00 – Project Management & Coordination
- B. Refer to Section 01 73 00 - Execution

3.02 INSPECTION

- A. Examine subfloors prior to installation to determine that surfaces are smooth and free from cracks, holes, ridges, and other defects that might prevent adhesive bond or impair durability or appearance of the flooring material.
- B. Inspect subfloors prior to installation to determine that surfaces are free from curing, sealing, parting and hardening compounds; residual adhesives; adhesive removers; and other foreign materials that might prevent adhesive bond. Visually inspect for evidence of moisture, alkaline salts, carbonation, dusting, mold, or mildew.
- C. Report conditions contrary to contract requirements that would prevent a proper installation. Do not proceed with the installation until unsatisfactory conditions have been corrected.
- D. Failure to call attention to defects or imperfections will be construed as acceptance and approval of the subfloor. Installation indicates acceptance of substrates with regard to conditions existing at the time of installation.

3.03 PREPARATION

- A. Smooth concrete surfaces, removing rough areas, projections, ridges, and bumps, and filling low spots, control or construction joints, and other defects with Armstrong [S-183 Fast-Setting Cement-Based Underlayment][S-184 Fast-Setting Cement-Based Patch and Skim Coat][S-194 Fast-Setting Cement-Based Patch and Underlayment] as recommended by the flooring manufacturer.
- B. Remove paint, varnish, oils, release agents, sealers, and waxes. Remove residual adhesives as recommended by the flooring manufacturer. Remove curing and hardening compounds not compatible with the adhesives used, as indicated by a bond test or by the compound manufacturer's recommendations for flooring. Avoid organic solvents.
- C. For Tile Installation System, Full Spread or for Tile Installation System, Tile On , perform subfloor moisture testing in accordance with [ASTM F 2170, "Standard Test Method for Determining Relative Humidity in Concrete Slabs Using *in-situ* Probes"] [ASTM F 1869, "Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride"] and Bond Tests as described in publication F-5061, "Armstrong Guaranteed Installation System," to determine if surfaces are dry; free of curing and hardening compounds, old adhesive, and other coatings; and ready to receive flooring. [Relative humidity shall not exceed 80%.][MVER shall not exceed 5 lbs./1000 sq. ft./24 hrs.] On installations where both the Percent Relative Humidity and the Moisture Vapor Emission Rate tests are conducted, results for both tests shall comply with the allowable limits listed above. Do not proceed with flooring installation until results of moisture tests are acceptable. All test results shall be documented and retained.
- D. For Tile High-Moisture Installation Warranty, perform subfloor moisture testing in accordance with [ASTM F 2170, "Standard Test Method for Determining Relative Humidity in Concrete Slabs Using *in-situ* Probes"] [ASTM F 1869, "Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride"] and Bond Tests as described in publication F-5061, "Armstrong Guaranteed Installation System," to determine if surfaces are dry; free of curing and hardening compounds, old adhesive, and other coatings; and ready to receive flooring. [Relative humidity shall not exceed 90%.][MVER shall not exceed 7 lbs./1000 sq. ft./24 hrs.] On installations where both the Percent Relative Humidity and the Moisture Vapor Emission Rate tests are conducted, results for both tests shall comply with the allowable limits listed above. Do not proceed with flooring installation until results of moisture tests are acceptable. All test results shall be documented and retained].
- E. Perform pH tests on concrete floors regardless of their age or grade level. All test results shall be documented and retained
- F. Vacuum or broom-clean surfaces to be covered immediately before the application of flooring. Make subfloor free from dust, dirt, grease, and all foreign materials.

3.04 INSTALLATION OF TILE FLOORING

- A. Install flooring in strict accordance with the latest edition of "Armstrong Guaranteed Installation System", F-5061.
- B. Install flooring wall to wall before the installation of floor-set cabinets, casework, furniture, equipment, movable partitions, etc. Extend flooring into toe spaces, door recesses, closets, and similar openings as shown on the drawings.
- C. If required, install flooring on pan-type floor access covers. Maintain continuity of color and pattern within pieces of flooring installed on these covers. Adhere flooring to the subfloor around covers and to covers.
- D. Scribe, cut, and fit to permanent fixtures, columns, walls, partitions, pipes, outlets, and built-in furniture and cabinets.
- E. Install flooring with adhesives, tools, and procedures in strict accordance with the manufacturer's written instructions. Observe the recommended adhesive trowel notching, open times, and working times.

3.05 INSTALLATION OF ACCESSORIES

- A. Apply top set wall base to walls, columns, casework, and other permanent fixtures in areas where top-set base is required. Install base in lengths as long as practical, with inside corners fabricated from base materials that are mitered or coped. Tightly bond base to vertical substrate with continuous contact at horizontal and vertical surfaces.
- B. Fill voids with plastic filler along the top edge of the resilient wall base or integral cove cap on masonry surfaces or other similar irregular substrates.
- C. Place resilient edge strips tightly butted to flooring, and secure with adhesive recommended by the edge strip manufacturer. Install edge strips at edges of flooring that would otherwise be exposed.

3.06 CLEANING AND PROTECTION

- A. Perform initial maintenance according to the latest edition of "Armstrong Guaranteed Installation System," F-5061.
- B. Protect installed flooring as recommended by the flooring manufacturer against damage from rolling loads, other trades, or the placement of fixtures and furnishings. (See Finishing The Job in "Armstrong Guaranteed Installation System," F-5061.)
- C. Waste Management: Collect field generated construction waste created during construction or final cleaning.

END OF SECTION

SECTION 09 90 01
PAINTS AND COATINGS

The requirements of the "General Conditions", the "Supplementary Conditions", and "Division 1" sections of the Specifications, shall apply to this section of the Specifications.

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. This Section includes surface preparation, painting, and finishing of exposed interior and exterior items and surfaces.
 - 1. Surface preparation, priming, and finish coats specified in this section are in addition to shop priming and surface treatment specified under other sections.
- B. Paint exposed surfaces whether or not colors are designated in "schedules," except where a surface or material is specifically indicated not to be painted or is to remain natural. Where an item or surface is not specifically mentioned, paint the same as similar adjacent materials or surfaces. If color or finish is not designated, the Architect will select from standard colors or finishes available. Sherwin Williams Coatings listed at the end of this specification where used to establish the level of quality of the coating systems. The coating manufacturer shall match the colors identified in the finish schedule.
 - 1. Painting includes field painting exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron work, and primed metal surfaces of mechanical and electrical equipment.
- C. Painting is not required on pre-finished items, finished metal surfaces, concealed surfaces, operating parts, and labels.
 - 1. Pre-finished items not to be painted include the following factory-finished components:
 - a. Acoustic materials.
 - b. Finished mechanical and electrical equipment.
 - c. Light fixtures.
 - d. Switchgear.
 - e. Distribution cabinets.

- f. Plastic laminate wood doors.
 - g. Wood veneer doors
 - h. Metal lockers.
 - i. Plastic laminate covered architectural casework.
 - j. Wood veneer woodwork and casework.
 - k. Metal flashings.
 - l. Curtain wall system.
2. Concealed surfaces not to be painted include wall or ceiling surfaces in the following generally inaccessible areas:
- a. Furred areas.
 - b. Pipe spaces.
 - c. Ceiling plenums, with the following exception:
3. Finished metal surfaces not to be painted include:
- a. Anodized aluminum.
 - b. Stainless steel.
 - c. Chromium plate.
 - d. Copper.
 - e. Bronze or brass.
4. Operating parts not to be painted include moving parts of operating equipment such as the following:
- a. Valve and damper operators.
 - b. Linkages.
 - c. Sensing devices.

- d. Motor and fan shafts.
 - 5. Labels: Do not paint over Underwriter's Laboratories, Factory Mutual or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.
- 1.02 RELATED SECTIONS: The following items of related Work will be provided under other sections of the Specifications:
- A. Section 01 35 45 - Sustainable Design Project Requirements.
 - B. Section 01 74 19 - Construction Waste Management
 - C. Section 05 12 00 - Structural Steel Framing: Shop Primed Items.
 - D. Section 05 21 00 - Steel Joist Framing: Shop Primed Items.
 - E. Section 05 50 00 - Metal Fabrications: Shop Primed Items.
 - F. Section 05 51 00 - Metal Stairs: Shop Primed, Field Painted.
 - G. Section 08 12 14 - Standard Steel Frames: Shop Primed, Field Painted.
 - H. Section 08 13 14 - Standard Steel Doors: Shop Primed, Field Painted.
 - I. Section 22 05 53 - Identification for Plumbing Piping and Equipment.
 - J. Section 23 05 53 - Identification for HVAC Piping and Equipment.
 - K. Section 26 05 53 - Identification for Electrical Systems.
 - L. Section 27 05 53 - Identification for Communication Systems.
 - M. Section 05 05 13 - Shop Applied Coatings for Metal
 - N. Section 06 01 40 - Architectural Woodwork Refinishing
 - O. Section 06 05 83 - Shop Applied Wood Coatings
 - P. Section 07 19 00 - Water Repellents.
 - Q. Section 09 67 00 - Fluid Applied Flooring for Concrete
 - R. Section 09 93 00 - Stains and Transparent Finishes

- S. Section 09 96 00 - High-Performance Coatings

1.03 REFERENCES

- A. SSPC-SP 1 - Solvent Cleaning
- B. SSPC-SP 2 - Hand Tool Cleaning
- C. SSPC-SP 3 - Power Tool Cleaning
- D. SSPC-SP 13 / Nace No. 6 Surface Preparation for Concrete
- E. EPA-Method 24
- F. GS-11, GC-03

1.04 SUBMITTALS

- A. General: Submit Shop Drawings and Product Data to the Architect for review in accordance with the requirements in Section 01 33 23 - Shop Drawings and Samples, and as specified herein.
- B. Submit, in accordance with, Section 01 33 00 – Submittal Procedures.
- C. Product Data: Manufacturer's technical information, label analysis, application instructions and MSDS sheets for each material proposed for use.
 - 1. List each material and cross-reference the specific coating and finish system and application. Identify each material by the manufacturer's catalog number and general classification.
 - 2. Provide Material Safety and Data Sheets on each product specified.
- D. Samples: Upon selection of colors by the architect, submit samples for Architect's review of color and texture only. Provide a listing of material and application for each coat of each finish sample.
 - 1. On 12" x 12" hardboard, provide one sample of each paint color listed in the color schedule, with texture to simulate actual conditions. Resubmit samples as requested by Architect until acceptable sheen, color, and texture is achieved. Samples shall be steeped to show primer, first coat, and second coat.

2. On actual wood surfaces, provide two 4" x 8" samples of stained wood finish.
3. On actual wall surfaces and other exterior and interior building components, duplicate painted finishes of prepared samples when requested by Architect. On at least 100 sq. ft. of surface as directed, provide full-coat finish samples until required sheen, color and texture is obtained; simulate finished lighting conditions for review of in-place work.
4. Do not proceed with painting until materials and finishes are approved by Architect.

1.05 QUALITY ASSURANCE

- A. Single-Source Responsibility: Provide primers and undercoat paint produced by the same manufacturer as the finish coats.
- B. Coordination of Work: Review other sections in which primers are provided to ensure compatibility of the total systems for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
 1. Notify the Architect of problems anticipated using the materials specified.
- C. Material Quality: Provide the manufacturer's best quality trade sale paint material of the various coating types specified. Paint material containers not displaying manufacturer's product identification will not be acceptable.
 1. Proprietary names used to designate colors or materials are not intended to imply that products named are required or to exclude equal products of other manufacturers.
 2. Federal Specifications establish a minimum quality level for paint materials, except where other product identification is used. Provide written certification from the manufacturer that materials provided meet or exceed these criteria.
 3. Products that comply with qualitative requirements of applicable Federal Specifications, yet differ in quantitative requirements, may be considered for use when acceptable to the Architect. Furnish material data and manufacturer's certificate of performance to Architect for proposed substitutions.
- D. Interior coating type: Provide interior painting systems which are VOC compliant as per Green Seal Environmental Standard GS-11 for interior paint VOC thresholds:
 1. Non-flat: VOC not more than 50 g/L.

2. Flat: VOC not more than 50 g/L.
- E. Interior/Exterior coatings type: Provide interior/exterior coating systems which are VOC compliant as per Rule 1168 of the South Coast Air Quality Management District for coatings, primers, stains:
1. Primers, Sealers and Undercoaters: VOC not more than 200 g/L.
 2. Clear Wood Finishes:
 - a. Varnish: VOC not more than 350 g/L.
 - b. Sanding Sealers: VOC not more than 350 g/L.
 - c. Lacquers: VOC not more than 275 g/L.
 3. Stains, interior: VOC not more than 250 g/L.
 4. Floor coatings: VOC not more than 100 g/L.
- F. Exterior coating type: Provide exterior painting systems which are VOC compliant as per Green Seal Environmental Standard GS-11 for exterior paint VOC thresholds:
1. Non-flat: VOC not more than 200 g/L.
 2. Flat: VOC not more than 100 g/L.
- G. Interior/Exterior anti-corrosive and anti-rust coating types for ferrous metals: Provide interior/exterior painting systems for ferrous metals which are VOC compliant as per Green Seal Environmental Standard GC-03 for interior/exterior paint VOC thresholds:
1. Gloss: VOC not more than 250 g/L.
 2. Semi-Gloss: VOC not more than 250 g/L.
 3. Flat: VOC not more than 250 g/L.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the job site in the manufacturer's original, unopened packages and containers bearing manufacturer's name and label and the following information:
1. Product name or title of material.

2. Product description (generic classification or binder type).
 3. Federal Specification number, if applicable.
 4. Manufacturer's stock number and date of manufacture.
 5. Contents by volume, for pigment and vehicle constituents.
 6. Thinning instructions.
 7. Application instructions.
 8. Color name and number.
 9. VOC content.
- B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F (7 deg C). Maintain containers used in storage in a clean condition, free of foreign materials and residue.
1. From freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.
- C. Packaging Waste Management: Separate packaging waste materials for reuse, recycling and/or.

1.07 JOB CONDITIONS

- A. Section 01 60 00 – Product Requirements.
- B. Do not apply materials when surface and ambient temperatures are outside temperature ranges required by paint manufacturer.
- C. Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50 deg F (10 deg C) and 90 deg F (32 deg C).
- D. Apply solvent-thinned paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 45 deg F (7 deg C) and 95 deg F (35 deg C).
- E. Do not apply paint in snow, rain, fog, or mist, when the relative humidity exceeds 85 percent, at temperatures less than 5 deg F (3 deg C) above the dew point, or to damp or wet surfaces.

1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by the manufacturer during application and drying periods.

F. Provide lighting level of 80 foot candle measured mid-height at substrate surface.

1.08 EXTRA MATERIAL

- A. Provide one gallon of each different paint system, and color with manufacturers name and color clearly labeled on the top of each container.

1.09 PRE-PAINTING CONFERENCE

- A. Prior to finish painting, exterior and interior, General Contractor shall schedule a "Pre-Painting Conference" to be attended by the Architect, Contractor, Painting Subcontractor and Manufacturer's Representative (Manufacturer's Rep. to attend when required for special finishes.)
- B. Agenda to include submittal of color and finishes sample (RE: Article 1.04 "Submittals" and review of color schedule.
- C. Contractor to record discussions of conference including agreements and/or disagreements and distribute a copy of record to each party in attendance.

PART 2- PRODUCTS

2.01 SUBSTITUTION

- A. Manufacturers with comparable equivalent products may be acceptable, subject to conformance with these Specifications, the requirements of the Drawings, and the Architect's review. Refer to Specification 01 25 00 – Substitution Procedures.

2.02 MANUFACTURERS

- A. Coating Manufacturer:
 1. Sherwin-Williams (S-W).
 - a. Refer to "List of Finishes" located on the drawings for paint colors. Coating manufacturer shall computer match the colors selected.

- B. Substitutions are permitted. Coating systems submitted from Benjamin Moore and Co. or Pratt and Lambert shall match the systems including VOC limits and ASTM numbers specified at the end of this section.
- C. Color Pigments: Pure, non-fading, applicable types to suit substrates and service indicated.
 - 1. Lead content in pigment, if any, is limited to contain not more than 0.06% lead, as lead metal based on the total non-volatile (dry-film) of paint by weight.

PART 3- EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions under which painting will be performed for compliance with requirements for application of paint. Do not begin paint application until unsatisfactory conditions have been corrected.
 - 1. Start of painting will be construed as the Applicator's acceptance of surfaces and conditions within a particular area.
- B. Refer to Section 01 31 00 – Project Management & Coordination
- C. Refer to Section 01 73 00 - Execution

3.02 PREPARATION

- A. General Procedures: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items in place that are not to be painted, or provide surface-applied protection prior to surface preparation and painting. Remove these items if necessary for complete painting of the items and adjacent surfaces. Following completion of painting operations in each space or area, have items reinstalled by workers skilled in the trades involved.
 - 1. Clean surfaces before applying paint or surface treatments. Remove oil and grease prior to cleaning. Schedule cleaning and painting so that dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.
- B. Surface Preparation: Clean and prepare surfaces to be painted in accordance with the manufacturer's instructions for each particular substrate condition and as specified.

1. Provide barrier coats over incompatible primers or remove and reprime. Notify Architect in writing of problems anticipated with using the specified finish-coat material with substrates primed by others.
2. Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.
 - a. Scrape and clean small, dry, seasoned knots and apply a thin coat of white shellac or other recommended knob sealer before application of primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.
 - b. Prime, stain, or seal wood to be painted immediately upon delivery. Prime edges, ends, faces, undersides, and backsides of wood, including cabinets, counters, cases, and paneling.
 - c. When transparent finish is required, backprime with spar varnish.
 - d. Seal tops, bottoms, and cutouts of wood doors with a heavy coat of varnish or sealer immediately upon delivery.
3. Ferrous Metals: Clean non-galvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with recommendations of the Steel Structures Painting Council.
 - a. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by the paint manufacturer, and touch up with the same primer as the shop coat.
4. Galvanized Surfaces: Allow to weather a minimum of 6 months prior to coating. Clean per SSPC-SP1 using detergent and water or a degreasing cleaner, then prime as required. When weathering is not possible or the surface has been treated with chromates or silicates, first Solvent Clean per SSPC-SP1 and apply a test area, priming as required. Allow the coating to dry at least one week before testing. If adhesion is poor, Brush Blast per SSPC-SP7 as necessary to remove these treatments.
5. Aluminum: Remove all oil, grease, dirt, oxide and other foreign material by solvent cleaning per SSPC-SP1, solvent cleaning.
6. Cementitious Materials: Prepare concrete, concrete masonry block, cement plaster, and mineral-fiber-reinforced cement panel surfaces to be painted.

Remove efflorescence, chalk, dust, dirt grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.

- a. Use abrasive blast-cleaning methods if recommended by paint manufacturer.
 - b. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application. Do not paint surfaces where moisture content exceeds that permitted in manufacturer's written instructions.
 - c. Cementitious materials shall have cured for a minimum of 30 days prior to painting.
 - d. Damaged areas shall be repaired using appropriate materials.
7. Drywall: Surface must be clean and dry. All nail or screw heads must be set and spackled. Joints must be taped and covered with joint compound. Spackled fastener heads and tape joints must be sanded smooth and all dust removed prior to painting.
8. Previously coated surfaces: Remove all surface contamination such as oil, grease, loose paint, mill scale, dirt, rust, mold, mildew, mortar efflorescence and scalers. Glossy surfaces of old paint films shall be clean and dull before painting. Clean and dull surface either by washing with an abrasive cleaner, or by washing and sanding. Spot prime bare areas with appropriate primer. Check for compatibility by applying a test patch of the specified system, coating an area of 3 square feet. Allow to dry for one week before testing adhesion as per ASTM D3359. If coating is incompatible, prepare surface in conformance with ASTM D4259.
- C. Materials Preparation: Carefully mix and prepare paint materials in accordance with manufacturer's directions.
1. Maintain containers used in mixing and application of paint in a clean condition, free of foreign materials and residue.
 2. Stir material before application to produce a mixture of uniform density; stir as required during application. Do not stir surface film into material. Remove film and if necessary, strain material before using.
 3. Use only thinners approved by the paint manufacturer, and only within recommended limits.

3.03 APPLICATION

- A. Apply paint in accordance with manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied.
 - 1. Non-zinc coated architectural metals, steel doors and steel frames shall have all coatings spray applied. Brush application is not acceptable.
- B. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
 - 1. Paint colors, surface treatments, and finishes are indicated in "schedules."
 - 2. Provide finish coats that are compatible with primers used.
 - 3. The number of coats and film thickness required is the same regardless of the application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. Sand between applications where sanding is required to produce an even smooth surface in accordance with the manufacturer's directions.
 - 4. Apply additional coats when undercoats, stains, or other conditions show through final coat of paint until paint film is of uniform finish, color, and appearance. Give special attention to ensure that surfaces, including edges, corners, crevices, welds, and exposed fasteners, receive a dry film thickness equivalent to that of flat surfaces.
 - 5. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, convactor covers, covers for finned tube radiation, grilles, and similar components are in place. Extend coatings in these areas as required to maintain the system integrity and provide desired protection.
 - 6. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Paint surfaces behind permanently fixed equipment or furniture with prime coat only before final installation of equipment.
 - 7. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, non-specular black paint.
 - 8. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
 - 9. Finish exterior doors on tops, bottoms, and side edges same as exterior faces.

10. Sand lightly between each succeeding enamel or varnish coat.
- C. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pre-treated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
1. Allow sufficient time between successive coats to permit proper drying. Do not recoat until paint has dried to where it feels firm, and does not deform or feel sticky under moderate thumb pressure and where application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.
- D. Minimum Coating Thickness: Apply materials at not less than the manufacturer's recommended spreading rate. Provide a total dry film thickness of the entire system as recommended by the manufacturer.
- E. Mechanical and Electrical work: Painting mechanical and electrical work is limited to items exposed in mechanical equipment rooms and in occupied spaces.
- F. Prime Coats: Before application of finish coats, apply a prime coat of material as recommended by the manufacturer to material that is required to be painted or finished and has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears to assure a finish coat with no burn through or other defects due to insufficient sealing.
- G. Pigmented (Opaque) Finishes: Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.
- H. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not in compliance with specified requirements.
- I. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.
- J. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, runs, cloudiness, color irregularity, brush marks, orange peel, nail holes, or other surface imperfections.
1. Provide satin finish for final coats.
- K. Stripple Enamel Finish: Roll and redistribute paint to an even and fine texture. Leave no evidence of rolling, such as laps, irregularity in texture, skid marks, or other surface imperfections.

- L. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

3.04 CLEANING

- A. Cleanup: At the end of each work day, remove empty cans, rags, rubbish, and other discarded paint materials from the site.
- B. Upon completion of painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping, using care not to scratch or damage adjacent finished surfaces.

3.05 PROTECTION

- A. Protect work of other trades, whether to be painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as acceptable to Architect.
- B. Provide "wet paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others for protection of their work after completion of painting operations.
 - 1. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.06 EXTERIOR PAINT SCHEDULE

- A. General: Provide the following paint systems for the various substrates, as indicated:
- B. Metals:
 - 1. Ferrous Metal (Anti-Corrosive coating):
 - a. Semi-Gloss Acrylic Latex: 2 finish coats over primer on properly prepared surface:
 - b. Primer:
 - 1) Sherwin-Williams Pro-Cryl Universal Water Based Primer (B66-310 Series) (5.0-10.0 mils wet, 2.0-4.0 mils dry).
VOC: Unreduced 89 g/L < 250 g/L.
 - c. First and Second Coats:

- 1) Sherwin-Williams Sher-Cryl™ HPA High Performance Acrylic (B66-300 Series) (6.0 - 10.0 mils wet, 2.5 - 4.0 mils dry per coat) spray applied.
VOC: 189 g/L. < 250 g/L.
 - d. Third Coat:
 - 1) Sherwin-Williams Sher-Clear™ 1K Acrylic Clear Coat (3 mils wet, 1 mil dry)
VOC: <100 g/L < 200 g/L
2. Zinc-Coated Metal:
 - a. Gloss Latex: 2 finish coats over primer on properly prepared surfaces:
 - b. Primer:
 - 1) Sherwin-Williams Pro-Cryl Universal Water Based Primer (B66-310 Series) (5.0-10.0 mils wet, 2.0-4.0 mils dry).
VOC: Unreduced 89 g/L < 250 g/L.
 - c. First and Second Coats:
 - 1) Sherwin-Williams Pro Industrial 0 VOC Acrylic Semi-Gloss, (B66W611) (6.5 - 10.0 mils wet, 2.5 - 4.0 mils dry per coat).
VOC: 0 g/L < 200 g/L.
3. Stucco Surfaces and EIFS Substrates:
 - a. Primer:
 - 1) Sherwin-Williams Loxon Concrete and Masonry Primer A24W8300 VOC: 97 g/L.
 - b. First and Second Coats:
 - 1) Sherwin-Williams ConFlex XL High Build Elastomeric A05-450 Series (13.0 - 16.0 mils wet, 6.0 - 7.5 mils dry per coat)
4. Bollards:
 - a. Primer:
 - 1) Sherwin-Williams Pro Industrial Pro-Cryl Universal Primer B66W300 VOC: 97 g/L.

b. First and Second Coats:

- 1) Sherwin-Williams Pro Industrial Urethane Alkyd (Safety Yellow) B54-150 Series

5. Parking Striping/Curb Ramps

a. One Coat:

- 1) Sherwin-Williams Set Fast Acrylic Traffic Marking Paint (Yellow)

3.07 INTERIOR PAINT SCHEDULE

A. General: Provide the following paint systems for the various substrates as indicated.

B. Drywall (walls and ceiling): Furnish sample on 2'x2' piece of drywall for architect to approve prior to application.

1. Gypsum Drywall Systems:

a. Semi-Gloss Acrylic Enamel: 2 finish coats over primer on properly prepared surface:

b. Texture

- 1) USG Sheetrock Brand Wall and Ceiling Spray Texture (Multipurpose) (fine orange peel).
- 2) Texture Additive: Sheetrock Brand First Coat: Add at a rate of 1 gal. per bag of texture-substitute for 1 gal. of water.
VOC: 2 g/L.

c. Primer:

- 1) Sherwin-Williams Pro Mar 200 Zero VOC Primer B28W2600 (4 mils wet; 1.3 mils dry)
VOC: 43 g/L < 50 g/L

d. First and Second Coats:

- 1) Sherwin-Williams Pro Mar 200 Zero VOC Acrylic Semi-Gloss (B31W2600) (4 mils wet, 1.4 mils dry per coat).
VOC: 0 g/L < 50 g/L.

2. Gypsum Drywall Systems:

- a. Egg-Shell Acrylic Enamel: 2 finish coats over primer on properly prepared surface:
- b. Texture
 - 1) USG Sheetrock Brand Wall and Ceiling Spray Texture (Multipurpose) (fine orange peel).
 - 2) Texture Additive: Sheetrock Brand First Coat: Add at a rate of 1 gal. per bag of texture-substitute for 1 gal. of water.
VOC: 2 g/L.
- c. Primer:
 - 1) Sherwin-Williams Pro Mar 200 Zero VOC Primer B28W2600 (4 mils wet; 1.3 mils dry)
VOC: 43 g/L < 50 g/L
- d. First and Second Coats:
 - 1) Sherwin-Williams Pro Mar 200 Zero VOC Interior Latex Eg-Shel B20W2600 (4 mils wet, 1.7 mils dry per coat).
VOC: 41 g/L < 50 g/L.

C. Metals

1. Ferrous Metals:

- a. Semi-Gloss Acrylic Enamel: 2 finish coats over primer on properly prepared surface:
- b. Primer:
 - 1) Sherwin-Williams Pro-Cryl Universal Water Based Primer (B66-310 Series) (5.0-10.0 mils wet, 2.0-4.0 mils dry).
VOC: Unreduced 89 g/L < 250 g/L.
- c. First and Second Coats:
 - 1) Sherwin-Williams Pro Industrial 0 VOC Acrylic Semi-Gloss (B31 Series) (4 mils wet, 1.4 mils dry per coat).
VOC: 0 g/L < 50 g/L.

2. Zinc Coated Metals:

a. Semi-Gloss Acrylic Enamel: 2 coats on properly prepared surface:

b. Primer

- 1) Sherwin-Williams Pro-Cryl Universal Water Based Primer (B66-310 Series) (5.0-10.0 mils wet, 2.0-4.0 mils dry).
VOC: Unreduced 89 g/L < 250 g/L.

c. First and Second Coats:

- 1) Sherwin-Williams Pro Industrial 0 VOC Acrylic Semi-Gloss (B66 W611) (4 mils wet, 1.4 mils dry per coat).
VOC: 0 g/L < 50 g/L.

3. Ferrous Metal Handrails and Guardrails:

a. Handrails:

- 1) Semi-Gloss Acrylic Enamel: 2 finish coats over primer on properly prepared surface.

2) Primer:

- a) Sherwin-Williams Pro-Cryl Universal Water Based Primer (B66-310 Series) (5.0-10.0 mils wet, 2.0-4.0 mils dry). VOC: Unreduced 110 g/L < 200 g/L.

3) First and Second Coats:

- a) Sherwin-Williams Pro Industrial 0 VOC Acrylic Semi-Gloss (B66W611) (4 mils wet, 1.4 mils dry per coat).
VOC: 0 g/L < 50 g/L.

D. Wood (Trim) Painted

1. Semi-Gloss Acrylic Enamel: 2 coats over primer on properly prepared surface: Verify all fasteners are set below the surface of the wood. Apply wood filler, compatible with paint, to all exposed indentations. Sand smooth.

2. Primer:
 - a. Sherwin-Williams Premium Wood and Wall Primer (B28W08111) (3 mils wet, 1.3 mils dry)
 - b. Sand prime coats with 220 grit sand paper.
VOC: 36 g/L < 200 g/L.
 3. First and Second Coats:
 - a. Sherwin-Williams ProClassic Waterborne Acrylic Semi-Gloss (B31 Series) (4.0 mils wet, 1.4 mils dry per coat).
VOC: 144 g/L < 150 g/L.
- E. Wood (Trim) Clear wood finish:
1. Polyurethane, Satin: 2 coats. Verify all fasteners are set below the surface of the wood. Apply wood filler to all exposed indentations. Sand smooth.
 2. First and Second Coats:
 - a. Sherwin-Williams Wood Classics Waterborne Polyurethane Varnish (A68 Series) (3.2 -4 mils wet; 0.8-1.0 mils dry per coat)
VOC: Satin 309 g/L < 350 g/L.
- F. Wood (Stained) with clear polyurethane varnish
1. Stain: One coat of MINWAX Low VOC Wood Finish. Stain color as selected by Architect. VOC: 250 g/L = 250 g/L.
 2. First and Second Coats:
 - a. MinWax 250 Waterbased Varnish (3.2 -4 mils wet; 0.8-1.0 mils dry per coat) VOC: Satin 309 g/L < 350 g/L.
- G. Exposed Concrete Floors and Curbs in HVAC rooms:
1. Waterbased Urethane Finish: 2 coats over primer on properly prepared surface with anti-slip additive. Prepare concrete surfaces in accordance with SSPC-SP13/NACE 6.
 2. Primer:
 - a. Sherwin-Williams ArmorSeal Water Based Epoxy Primer (B70AQ11, B60VQ11) (6.0-8.0 mils wet; 5.0-7.0 dry).

VOC: <20 g/L < 200 g/L.

3. First and Second Coats:

- a. Sherwin-Williams ArmorSeal Armor-Plex Water Based Urethane (B65-750, B65V750), (3.5-5.0 mils wet, 2.0-3.0 mils dry per coat).
- b. Anti-slip additive: H&C SharkGrip added to the coating.
VOC: Unreduced < 50 g/L < 150 g/L.

H. Masonry

1. Concrete Masonry Units:

- a. Semi-Gloss Acrylic Enamel: 2 finish coats over primer on properly prepared surface:
- b. Primer:
 - 1) Sherwin-Williams PrepRite Block Filler (B25W25) (16 mils wet, 8 mils dry) VOC: 45 g/L.
- c. First and Second Coats:
 - 1) Sherwin-Williams ProClassic Waterborne Acrylic Semi-Gloss (B31 Series) (4 mils wet, 1.4 mils dry per coat).
VOC: 144 g/L < 150 g/L.

3.08 CLEAN-UP

- A. Waste Management: Collect field generated construction waste created during construction or final cleaning.

END OF SECTION

SECTION 10 44 00
FIRE PROTECTION SPECIALTIES

The requirements of the "General Conditions", the "Supplementary Conditions", and "Division 1" sections of the Specifications, shall apply to this section of the Specifications.

PART 1 - GENERAL

1.01 SCOPE

- A. Work Included: Provide all labor, materials, equipment, apparatus, tools, transportation, protection and services necessary for, and reasonably incidental to the proper execution and completion of all Fire Protection Specialties Work, as indicated on the Drawings and/or specified herein. Work includes, but is not necessarily limited to the following:

- 1. Portable Fire Extinguishers and Accessories.

1.02 REFERENCE SPECIFICATIONS, CODES, AND APPLICABLE STANDARDS

- A. Requirements of Regulatory Agencies: Furnish miscellaneous accessories in accordance with laws, codes, ordinances and regulations of the public authorities having jurisdiction, including Title III of The Americans with Disabilities Act (ADA), Public Law 101-336.

1.03 QUALITY ASSURANCE

- A. General: All materials, articles, accessories incorporated in the Work shall be type and quality specified herein, and subject to the Architect's review. Methods of preparation, construction and installation of such materials, articles and accessories shall be strictly in accordance with the accepted standard practices, manufacturer's printed specifications and/or instructions, the architect's Drawings and Specifications, and as directed by the Architect.
- B. UL-Listed Products: Fire extinguishers shall meet Underwriters Laboratories Inc., UL 299 UL Standard for Safety Dry Chemical Fire Extinguishers.

1.04 SUBMITTALS

- A. Reports: Submit test reports, procedure specifications and certifications as required to substantiate welded connections design and welding qualifications to the Owner's Representative and the General Contractor for review.
- B. General: Submit Shop Drawings, Product Data and Samples to the Architect for review in accordance with the requirements in Section 01 33 23 - Shop Drawings and Samples, and as specified herein.

- C. Shop Drawings: Submit fully detailed layout and setting drawings, illustrative plates or drawings, and Supplementary Shop Drawings of all items.
- D. Samples: Submit 4" x 4" Samples of fire extinguisher cabinets colors and/or finishes specified herein, for approval PRIOR to installation. Written approval shall be secured from the Architect, and installed materials shall match approved Samples.

1.05 MATERIAL DELIVERY AND STORAGE

- A. Delivery: Deliver only acceptable materials to the site in original boxes, crates, and wrappings, clearly labeled with all pertinent information to facilitate checking.
- B. Storage: Materials shall be stored at the site, off the ground in properly protected dry storage facilities, until ready for use. Damaged materials will not be acceptable, and shall be removed from the site.
- C. Packaging Waste Management: Separate packaging waste materials for reuse, recycling and/or landfill.

1.06 WARRANTY

- A. Form of Warranty: Execute a warranty in the approved written form, warranting all materials and workmanship to remain in serviceable and satisfactory condition, and to make good at own expense any imperfections which may develop during the warranty period, and any damage to other Work caused by imperfections or by repairing imperfections. The warranty period shall be not less than one (1) year from date of Owner's acceptance.
- B. Fire Extinguishers: In addition to the above warranty, the fire extinguisher manufacturer shall provide industry standard of not less than a six (6) year written warranty covering materials and workmanship, at no charge to the Owner.

PART 2 - PRODUCTS

2.01 MANUFACTURER

- A. Acceptable Manufacturer: Fire Extinguishers and Accessories and Fire Extinguisher Semi-Recessed Cabinets specified herein shall be as manufactured by Larsen's® Manufacturing Company, 7421 Commerce Lane N.E., Minneapolis, MN 55432, (763)571-1181 or (800)527-7367; www.larsensmfg.com.

2.02 PORTABLE FIRE EXTINGUISHERS

- A. Fire Extinguishers: Larsen's®, MP Series Multi-Purpose Dry Chemical Model Number MP10 extinguishers.
 - 1. Type: Extinguishers as specified herein shall be portable, hand-carried type, 10 pound nominal capacity 4A-60BLC, with self-closing hand valve, discharge hose, pressure gauge, in manufacturer's standard container with corrosion and impact resistant polyester/epoxy "red" paint finish. UL Rating 4A-60B:C for Class A, B and C fires. Units shall contain Halotran I.
 - 2. Miscellaneous Requirements: Furnish test, refill schedules, procedures, and recertification requirements in accordance with National Fire Protection Association, NFPA 10 - Standard for Portable Fire Extinguishers, latest edition.
- B. Fire Marshal's Approval: Size, type, and quantities of fire extinguishers as indicated on the Drawings and/or specified herein shall be subject to review and approval by the Fire Marshal.
- C. Accessories:
 - 1. Mounting Brackets: Provide manufacturer's recommended and compatible standard mounting extinguisher brackets and anchors. Brackets shall be of size and design to accommodate the accepted manufacturer's fire extinguishers.
 - 2. Signage: Provide signs identifying the locations of fire extinguishers as required by local authorities.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Refer to Section 01 31 00 – Project Management & Coordination
- B. Refer to Section 01 73 00 - Execution

3.02 INSTALLATION

- A. General: Provide products specified herein for installations, as indicated on the Drawings or required.
 - 1. Install items included in this section in locations and at mounting heights indicated, or if not indicated, at heights to comply with applicable regulations of governing authorities.

2. Comply with ADA and code requirements for facilities for individuals with a disability. Should governing code requirements differ from any specified herein, the more stringent requirement shall be met.
 3. Fire Extinguisher Semi-Recessed Cabinets with solid door and stainless steel trim and mounting brackets for wall hung fire extinguishers shall be securely fastened to structure, square and plumb, and in compliance with manufacturer's instructions. Submit submittal for Architects review and approval.
 4. Protective covers installed by manufacturers to protect the finishes, shall not be removed until final cleaning.
- B. Fire Extinguishers: Provide portable fire extinguishers for wall mounted installations on mounting brackets, in quantities as required by the Fire Marshal.
1. General: Install fire extinguishers and identifying signs in accordance with local authorities, ADA guidelines, and manufacturer's recommendations, at locations designated by the Fire Marshal.
 2. Inspection: Verify servicing, charging and tagging of all fire extinguishers.

3.03 MAINTENANCE INSTRUCTIONS

- A. Furnish the Owner with all manufacturers' printed data, including service and parts manual, necessary for proper maintenance of the products specified herein.

3.04 CLEAN-UP

- A. Waste Management: Collect field generated construction waste created during construction or final cleaning.

END OF SECTION

SECTION 11 06 00
STAGE CURTAIN

Preface

A. Intent

1. The intent of this specification is to provide a basis of quality and define the scope of work for products and services provided by a Theatrical Contractor. It shall be understood that a complete and fully functional stage curtain system inclusive of all installation services, rigging, tracks, motors, and accessories as well as all intangibles such as freight, mobilization, insurance, and permitting fees as are necessary to complete the project are included whether individually enumerated or not.

B. Scope

1. Provide Stage Curtains, Tracks, Rigging, Motors, accessories and installation in accordance with plans, specifications and schedules.
2. Provide submittals with full line color selection cards and samples as required.
3. Blocking such as furring strips, pre-engineered strut, wire rope, and the like shall be the responsibility of the Theatrical Contractor. Principal structural steel and supplemental steel requiring attachment by means of welding shall be by others.

C. Quality Standard

1. All products provided shall be first quality and warrantied against defects in materials and workmanship for a period of 2 years. Abuse, neglect, and accidental damaged are exempted.
2. Manufacturing and installation practices shall be compliant with these specifications, all applicable ANSI standards, and all local and national building codes. Installation methods shall comply with individual product manufacturers' recommendations and best industry practices as documented by NFPA, PLASA, and USITT.
3. Under no circumstances shall any product be installed in a manor inconsistent with the manufacturer's design intent.
4. Manufacture for basis of design:
BellaTEX, Inc. of Jackson, TN
(800) 372-3373 bellatex.com
5. Approved manufacturers:

Thern Stage Equipment of Winona, MN
(800) 553-2204 hernstage.com

H&H Specialities of South El Monte, CA
(800) 221-9995 hhspecialties.com

ADC, Inc of Allentown, PA
(610) 797-6000 ☐☐ automaticdevices.com

Milliken & Company of Spartenburg, SC
(864) 503-2020 ☐☐ milliken.com

KM Fabrics, Inc. of Greenville, SC
(864) 295-2550

Fred Krieger & Company of Jericho, NY
(516) 935-1150

6. Pre-approved Theatrical Contractors:

Integrator #1
(800) XXX-XXXX

Integrator #2
(800) XXX-XXXX

Integrator #3
(800) XXX-XXX

7. Additional approvals shall be by addenda. Approval does not relieve manufacturer/ contractor from performing work to the specified standards.

II. Stage Curtains

A. General Construction

1. All napped fabrics shall be sewn nap down unless noted otherwise.
2. Curtains shall be sewn without puckering. Vertical seams and hems shall fall straight and even. Bottom & top hems shall be straight, parallel, and shall not droop or draw up at vertical seams. Unless stated otherwise, seam allowances shall be $\frac{1}{2}$ ", +/- $\frac{1}{4}$ ". Tolerance for all other seams shall be $\frac{1}{2}$ the specified seam allowance.
3. Panels shall be full length without horizontal splices except when specifically listed as "horizontally seamed" cycs and/or drops.
4. Box pleats on valances & borders with 50% fullness or less shall be adjusted to prevent vertical seams from falling on the face of the pleat. Adjustments shall not be visibly detectable. Overall amount of pleated fabric shall not be increased or decreased by adjustments and no pleat shall be adjusted in pleat size and/or location by more than $\frac{1}{2}$ " per pleat. Any adjustments in pleat size and/or spacing that is visibly detectable shall be considered a defect in workmanship.
5. Except for item #4 above all pleats shall be perfectly even in spacing and size, sewn 12" o.c., and be neat and straight. Pleats shall be formed by first sewing a 4" long vertical stitch to create a 3" (25% fullness), 6" (50% fullness), 9" (75% fullness) or 12" (100% fullness) loop of fabric. The loop will then be pressed flat and sewn in place to form a box pleat.
6. 3" wide heavy weight synthetic webbing shall be used to reinforced the top hem. White webbing shall be used for white, light grey, light blue or other light colored fabrics. Black webbing shall be used for all others.
7. No less than 4" of webbing shall be turned under and sewn vertically at the side hems to create a double layer of webbing for the two end grommets.
8. Webbing will first be sewn to the face side of the curtain, with the webbing and fabric overlapping not less than $\frac{1}{2}$ ". The webbing will then be flipped over, to the back side of the curtain, and sewn with two additional parallel rows of stitching $\frac{1}{8}$ " from the top and bottom of the webbing. The top of the webbing shall sit approximately $\frac{1}{8}$ " below the top of the curtain. Horizontal stitching shall be situated so it will not be cut by grommets.
9. Chain weight shall be #8 galvanized Jack Chain and sewn into a 5" canvas pocket with ties sewn every 18" to secure the chain to the pocket in a fashion to prevent chain movement and reduce chain noise.
10. Front Setting curtains and curtains without fullness that require a weighted hem, excluding curtains specified with pipe pockets or pipe flaps, shall be weighted with steel weight tape. Weight tape shall weigh no less than 9oz per linier foot, be fully encapsulated in a synthetic sheath and sewn into a 5" canvas pocket to prevent any noise during movement. Lead weight shall not be used.

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11. All raw fabric edges shall be tucked under $\frac{1}{2}$ " or more and sewn into hems so the raw edge is not exposed. Alternatively, raw edges may be serged with a 3 thread cover stitch at 20 or more stitches per inch, to prevent fraying and give a finished appearance.
 12. General construction stitches shall be a 2 thread machine-sewn lock stitch with no fewer than 7 stitches per linear inch for durability and to prevent light leaks at seams.
 13. Thread shall be nylon or polyester, size TEX 70 or greater with a tensile strength not less than 9 pounds. Thread color shall match face side of fabric. Light weight cyc, scrim, and drop fabrics will be sewn with size TEX 40.
 14. Grommets shall be #3 brass and machine set. Nickel plated grommets shall be used on white webbing and black oxidized grommets shall be used on black webbing. Grommets shall be placed in the center of each pleat or every 12" o.c. Two grommets shall be placed at each top corner, spaced 1" and 3-1/2" from outside edge of curtain side hem. For draw curtains, spacing of corner grommets shall be adjusted if necessary to match the master carrier.
 15. For curtains greater than 8' wide and not attaching to a track, the center grommet(s) shall be the alternate color. If exact center of the drape is greater than 4" from a grommet, the grommet on either side of center shall be the alternate color.
 16. Curtains attaching to tracks will be equipped with a model #427 bit snap. Fasteners that do not have a spring-loaded gate, are not user replaceable, or are secured by a means providing less surface area contact or lessor tear out strength than a #3 grommet, shall not be used.
 17. Curtains tying to a batten shall be equipped with a 30" long #4 tie line. Both ends of tie line shall be secured to prevent fraying. Frayed tie lines shall be considered a defect for warranty purposes. Black grommets shall receive black tie line; nickel grommets shall receive white tie line.
 18. For window and door curtains where a standard grommet may be seen by the public, curtains will be equipped with hidden grommets and ties for pipe mounting or harness snaps sewn flush to the curtain top, for track mounting. Grommets, rivets, or other fasteners shall not be visible on the face of the curtain. In this case, an exception shall be made for the requirement for hardware being user replaceable.
 19. Each curtain shall contain a printed label stating FR/IFR compliance, size, fabric, color, manufacturing date, manufacturer name, product serial/identification number, and Theatrical Contractor's name, address and phone number.
 20. Curtains shall be lined if indicated in the curtain schedule or drawings.
 - a) Lining shall be the same fullness as specified for the face material.
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- b) Unless otherwise specified, lining fabric shall be 8oz IFR Apollo blackout by BellaTEX, Inc. or approved equal. If lining faces a window, color shall be white. Otherwise lining shall be black.
 - c) Lining edges shall fall at least 1" inside the side and bottom hems of the face fabric. Side hem widths shall be sized accordingly, but not less than 2". The inside of the lining hems shall align to the inside of the face curtain hems. 6" long tabs of 2" wide industrial hook & loop tape shall be sewn into the hems to mate the lining and face curtain. Hook & loop tabs shall be placed every 2' o.c. along sides and 3' o.c. along bottom and in both lower corners.
- 21. FR Test Swatches: All seamless goods and curtains indicated on the schedule or drawing to have an FR Test Swatch shall have a 18" X 18" square of material from the same lot as the face fabric. Swatch shall be sewn into the upper SL (or off stage) corner. Swatch is provided for NFPA 705 testing and small repairs.
 - 22. Paging Handles: If indicated on the schedule or drawings drape shall have a total of (4) paging handles. A handle shall be sewn into the inside edge of the turn back and first panel seam on both the stage left and stage right sides. Handles shall be located 60" above the bottom hem of the curtain. Handles shall be formed by sewing 2" white synthetic webbing into a loop apx 12" long. Handles shall be sewn at an angle so they lay flat against the drape when not in use. The handles shall not be visible from the front of the curtain.
 - 23. Dust Ruffles: If indicated on the schedule or drawings the drape shall have a dust ruffle that extends 2" below the bottom hem. The dust ruffle shall be 2 layers of fabric and constructed from the same fabric as the drape, black Prospect by BellaTEX, or approved equal. Secure and finish the top raw edge by serging with a 3 thread cover stitch at no less than 20 stitches per inch. Sides shall be hemmed inward and secure with a lock stitch in a matching fashion to a closed bottom hem. The top of the dust ruffle shall be fold over 1/2" inch, concealing the cover stitch, and secured to the back of drape sewing along the bottom hem stitch line. A straight seam shall be maintained so it is concealed in the bottom hem stitch line. The Dust Ruffle shall be sewn in a fashion so it can be removed and replaced without damage to the curtain or releasing the bottom hem.

B. Seamless Cycs, Scrims, & Drops

- 1. All seamless goods shall be sewn from a single piece of fabric with sufficient size to complete the drape to it's indicated height and width inclusive of hems.
- 2. Top hems shall be double turned with a 3" tuck.
- 3. Side hems shall be 3" double turned with a 3" tuck.
- 4. Bottom hems not containing an internal pipe pocket or weight tape pocket shall be 6" double turned with a 6" tuck.

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5. Pipe pockets shall be made from heavy cotton canvas or synthetic canvas to best match the drape and shall be sewn inside the bottom hem. Pocket shall keep the pipe 2" above the bottom of the bottom hem. There shall be no seams or snags inside the pocket.
 6. Pipe Flap shall be made from heavy cotton canvas or synthetic canvas to best match the drape and shall be sewn to the back side of the bottom hem. Pocket shall keep the pipe 2" above the bottom of the bottom hem. There shall be no seams or snags inside.

C. Fabrics

1. Curtains of like fabric and color shall be from a single dye lot. In the event the size and quantity of curtains exceeds the maximum dye lot size, no curtain or curtain pair shall be made from more than 1 lot. Dye lots shall be arranged to minimize any differences.
2. Front Setting Curtains: 20 oz IFR woven velour, Color to be chosen from standard line containing not less than 38 colors.
"Crescent" by BellaTEX, Inc or preapproved equal.
3. Rear Setting Curtains: 22 oz knitted IFR velour, Color to be chosen from standard line containing not less than 15 colors.
"Encore 22" by Milliken or "Prospect" by BellaTEX, Inc. or preapproved equal
4. Sharkstooth Scrim Fabric: Seamless FR cotton Scrim, Color per schedule, width as required. "Sharkstooth Scrim" by BellaTEX, Inc. or preapproved equal.
5. Cyclorama Fabric: Seamless Heavy Weight FR cotton Muslin, Color per schedule, width as required. "Heavy Wt. Muslin" by BellaTEX, Inc. or preapproved equal.

III. Tracks & Battens

A. Tracks

1. Small curtains weighting no more than 3 pounds per linier foot and no more than 8' H shall be equipped with Hall Stage T40 track, H&H model 100 series, or other approved equal.
2. Midsized Curtains weighing no more than 9 pounds per linier foot and no more than 14' H shall be equipped with T60 track, H&H model 200 series, or other approved equal.
3. Heavy Curtains weighing no more than 15.5 pounds per linier foot and more than 20'H shall be equipped with T70 track or H&H model 400 series or other approved equal.
4. Lightweight curved tracks shall be as specified above when possible or H&H 300 series with a matching curved 1.5" diameter schedule 40 steel pipe batten backbone.

5. Midsize and Heavy weight curved tracks shall be as specified above when possible or H&H 500 series.

B. Carrier & Pulley Sizes

1. Curtains weighing less than 50% of the maximum specified weight above may utilize standard carriers and pulley options. All others shall utilize ball-bearing carriers and larger pulley options.
2. All Grand Drape tracks and any rope operated track greater than 32' overall width shall be supplied with back-pack guides even if not part of the standard model package.
3. All Grand Drape tracks shall utilize a minimum of 3/8" diameter rope.

C. Pipe Battens

1. Pipe Battens shall be constructed from 1.5" id schedule 40 steel pipe. Lengths greater than 20' shall be formed by means of an internal sleeve not less than 2' long with a 1/4" or greater wall thickness and no more than 1/16" play. Internal sleeve will be fixed in place by means of (4) 3/8" G5 bolts and nylock nuts or plug welding.
2. Batten for weight pipes shall be 3/4" id schedule 40 steel pipe. Lengths shall be 10'. Splices shall be formed by threaded coupling.
3. All burrs and sharp edges are to be removed. Pipe battens are to be cleaned and powder coated black with a non-gloss finish.
4. For each 1.5" batten supply batten clamp with a 1400 lbs WLL. Supply not less than (1) clamp for every 8' of batten length, or portion thereof, plus (1) clamp.

IV. Rigging Hardware for Overhead Components

- A. With regard to load bearing components, except for wire rope all products shall be manufactured and distributed by entities within the United States. Components shall be load rated and documentation of such shall be freely and publicly available from the manufacturer. Each component must bear an indelible manufacturer's mark and must be clearly identifiable by make and model without ambiguity.
- B. Wire rope shall comply with above or may be a product of Korea, provided it is distributed by a domestic cooperation who has performed destructive testing to verify tensile strength and who fully backs the product against defect.

V. Bill of Materials

- A. The following bill of materials is intended for the aid of determining scope and product details. It is not intended to be a comprehensive list of all items required. **Measurements are approximate and are to be field verified by the Theatrical Contractor prior to construction.**

B. Schedule:

Item	Qty	Size (W X H)	Full	Color	Notes
Valance	1		75%	TBD	
Grand Drape	2		75%	TBD	
Borders	3		50%	Black	
Legs	6		50%	Black	
Mid / Rear Draw	4		50%	Black	
Tabs	6		50%	Black	
Seamless Scrim	1		Flat	Black	
Seamless Cyc	1		Flat	White	

No. 570 - SuperSafe FR Wall Pad

FIRE RATED WALL PAD

PORTER

WALL PAD SPECIFICATION SHEET

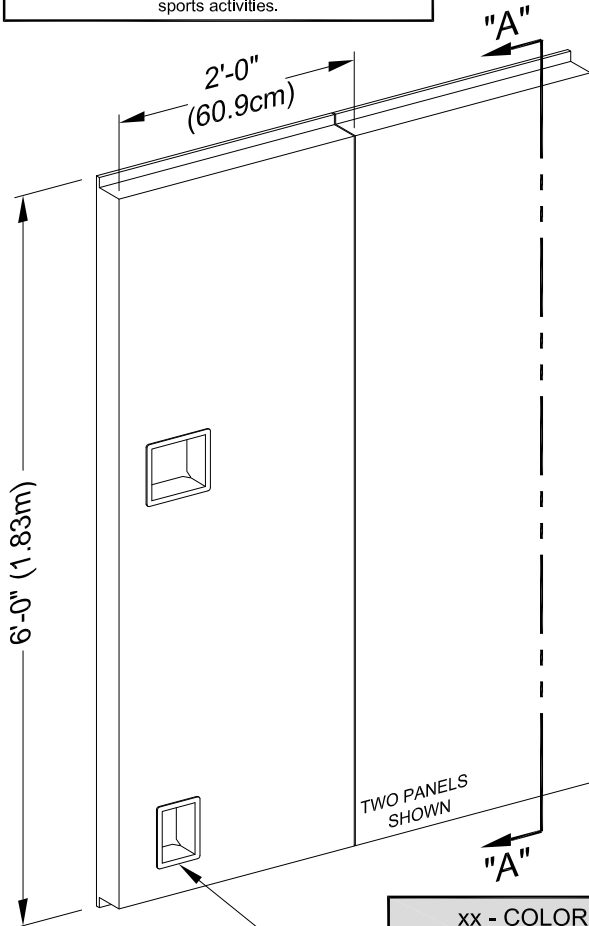
G-570

8/11/2017

WWW.PORTERATHLETIC.COM/FACILITY

WARNING

This wall pad meets the level of protection per ASTM Standard Specification F2440. This pad is provided to reduce the possibility of minor injuries. However, any activity involving motion and severe impacts may result in serious injuries, including but not limited to paralysis or death. No wall pad can guarantee the prevention of serious head or neck injuries that are due to a violent impact while participating in various sports activities.

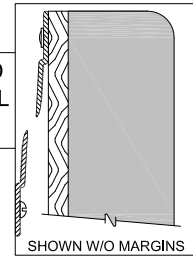


See Page No. G-343
For Optional No. 343
and 344 Molded Inserts

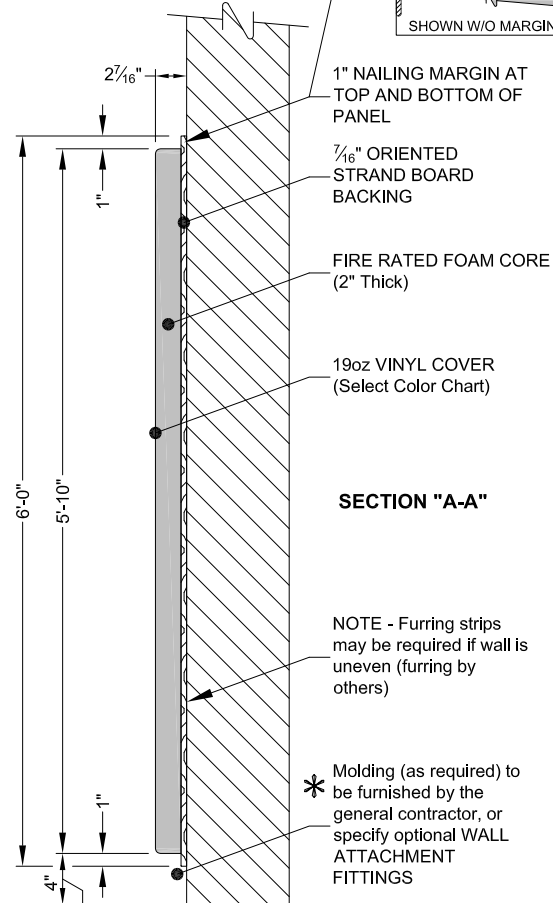
xx - COLOR SELECTION			
<input type="checkbox"/>	01 - Light Blue	<input type="checkbox"/>	09 - Gray
<input type="checkbox"/>	02 - Royal Blue	<input type="checkbox"/>	10 - Maroon
<input type="checkbox"/>	03 - Red	<input type="checkbox"/>	11 - Purple
<input type="checkbox"/>	04 - White	<input type="checkbox"/>	12 - Black
<input type="checkbox"/>	05 - Orange	<input type="checkbox"/>	13 - Navy Blue
<input type="checkbox"/>	06 - Yellow Gold	<input type="checkbox"/>	14 - Kelly Green
<input type="checkbox"/>	08 - Tan	<input type="checkbox"/>	15 - Dark Green

— 5700xx	SUPERSAFE WALL PAD - 2'-0" X 6'-0" X 2" WITH NAILING MARGINS
— 5701xxSP	SUPERSAFE GRAPHIC WALL PAD - 2'-0" X 6'-0" X 2" WITH NAILING MARGINS
— 5701xx	SUPERSAFE WALL PAD - 2'-0" X 5'-10" X 2" WITHOUT NAILING MARGINS
— 5701xxSP	SUPERSAFE GRAPHIC WALL PAD - 2'-0" X 5'-10" X 2" WITHOUT NAILING MARGINS
— 5720xx	SUPERSAFE WALL PAD - 2'-0" X 6'-0" X 3" WITH NAILING MARGINS
— 5720xxSP	SUPERSAFE GRAPHIC WALL PAD - 2'-0" X 6'-0" X 3" WITH NAILING MARGINS
— 5721xx	SUPERSAFE WALL PAD - 2'-0" X 5'-10" X 3" WITHOUT NAILING MARGINS
— 5721xxSP	SUPERSAFE GRAPHIC WALL PAD - 2'-0" X 5'-10" X 3" WITHOUT NAILING MARGINS
— 570280xx	SUPERSAFE WALL PAD - 2'-0" X 8'-0" X 2" WITH NAILING MARGINS
— 570280xxSP	SUPERSAFE GRAPHIC WALL PAD - 2'-0" X 8'-0" X 2" WITH NAILING MARGINS
— 570281xx	SUPERSAFE WALL PAD - 2'-0" X 8'-0" X 2" WITHOUT NAILING MARGINS
— 570281xxSP	SUPERSAFE GRAPHIC WALL PAD - 2'-0" X 8'-0" X 2" WITHOUT NAILING MARGINS

SEE PAGE No. G-347-3 AND
G-347 FOR OPTIONAL WALL
ATTACHMENT FITTINGS



SHOWN W/O MARGINS



SECTION "A-A"

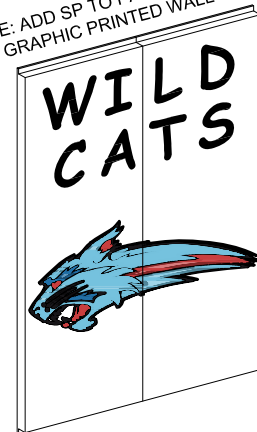
NOTE - Furring strips
may be required if wall is
uneven (furring by
others)

* Molding (as required) to
be furnished by the
general contractor, or
specify optional WALL
ATTACHMENT
FITTINGS

MAXIMUM ALLOWABLE DIMENSION TO MINIMIZE
THE POSSIBILITY OF BODY CONTACT WITH THE
WALL (Per ASTM Standard Specification F2440)

* SEE PAGE No. G-301-1 FOR
TYPICAL INSTALLATION
AND CUT-OUT DETAILS

NOTE: ADD SP TO PART NUMBER FOR
GRAPHIC PRINTED WALL PAD



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PROJECT NUMBER

PROJECT NAME

No. 570 - SuperSafe FR Wall Pad

FIRE RATED WALL PAD

SPECIFICATIONS

PORTER No. 5700xx SUPERSAFE GYMNASIUM WALL PADDING PANEL SIZE: 2'-0" X 6'-0" X 2" WITH NAILING MARGINS

Panel shall meet the min. ASTM F2440 Standard Specification for impact performance requirements. The maximum gmax values for the padding shall not exceed 200 and the HIC shall not exceed 1000 when tested at a 4'-0" drop height. Panels that have not been tested to this minimum standard shall not be considered as equal.

Entire pad assembly has been tested and meets the requirements of NFPA 101 Life Safety Code when tested in accordance with NFPA 286. Entire pad assembly has been tested and meets the criteria set forth in the International Building Code (2003 IBC section 803.2.1) when tested in accordance with NFPA 286. ASTM E-84 test is not considered an equal test to NFPA 286.

Wall pad shall be 2'-0" wide x 6'-0" high, with a 1" nailing margin top and bottom for securing panels to the wall. Panels shall be constructed with a 2" thick flame retardant foam. Interior foam shall be bonded to a 7/16" oriented strand wood board to minimize warping.

Entire face of panel, including the 1" nailing margins, shall be upholstered in a heavy (19-oz.) fire-retardant, high tensile, vinyl-coated polyester fabric material. Wall pads using less than 19oz vinyl shall not be considered equal. Cover material shall be designated as flame resistant in accordance with NFPA 701, and State of California. The cover material shall have a tear strength of 100 P.S.I. and shall be mildew and rot resistant and fortified with an infection combating fungicide. Vinyl covering shall be folded and stapled securely to backside of oriented strand board. Vinyl covering is available in 14 colors - see color chart for options.

The installing contractor shall be responsible for proper inspection and installation of all panels. Installation shall be made in accordance with current factory procedures, and ASTM Standard Specification F2440. Also, the *NCAA MEN'S AND WOMEN'S BASKETBALL RULES AND INTERPRETATIONS* book states: "It is recommended that padding that meets current ASTM standards be used on walls and other facility features in or around the playing area that a student-athlete might contact during play. Padding should be installed no more than 4 inches from the floor up to 6 feet".

Custom wall pad sizes are available. Custom wall pad worksheets can be found online at www.porterathletic.com

PORTER No. 5701xx SUPERSAFE GYMNASIUM WALL PADDING PANEL SIZE: 2'-0" X 5'-10" X 2" WITHOUT NAILING MARGINS

Same specification as No. 5700xx above, except without nailing margins

PORTER No. 5720xx SUPERSAFE GYMNASIUM WALL PADDING PANEL SIZE: 2'-0" X 6'-0" X 3" WITH NAILING MARGINS

Same specification as No. 5700xx above, except with 3" thick foam

PORTER No. 5721xx SUPERSAFE GYMNASIUM WALL PADDING PANEL SIZE: 2'-0" X 5'-10" X 3" WITHOUT NAILING MARGINS

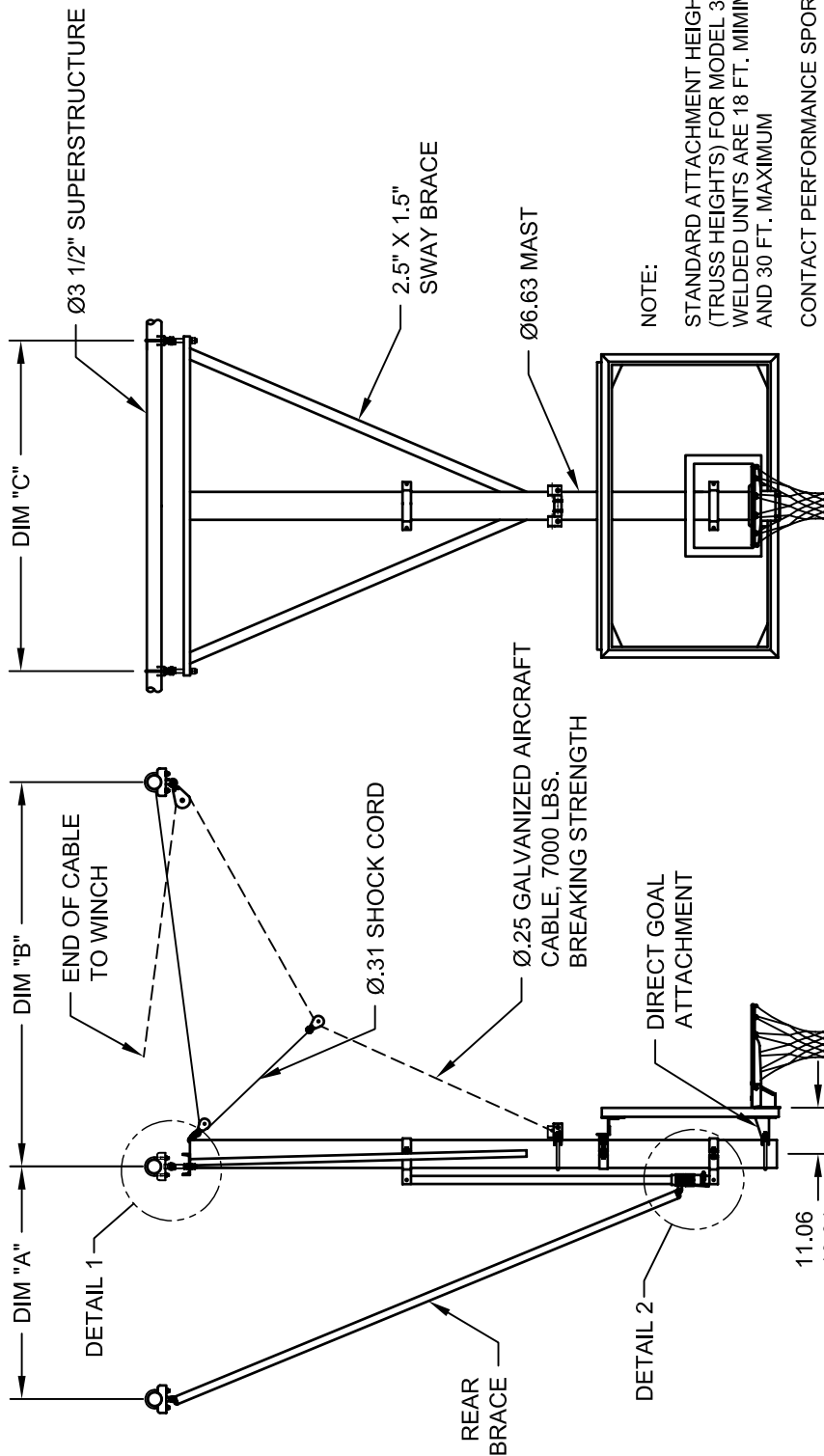
Same specification as No. 5700xx above, except with 3" thick foam and no nailing margins

PORTER No. 570280xx SUPERSAFE GYMNASIUM WALL PADDING PANEL SIZE: 2'-0" X 8'-0" X 2" WITH NAILING MARGINS

Same specification as No. 5700xx above, except 8'-0" high

PORTER No. 570281xx SUPERSAFE GYMNASIUM WALL PADDING PANEL SIZE: 2'-0" X 8'-0" X 2" WITHOUT NAILING MARGINS

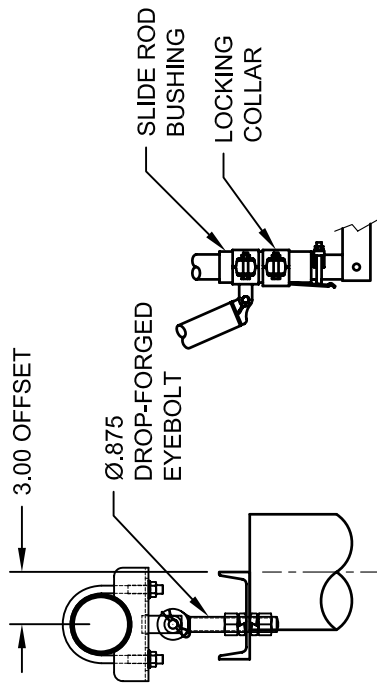
Same specification as No. 5700xx above, except 8'-0" high and no nailing margins



NOTE:

STANDARD ATTACHMENT HEIGHTS
(TRUSS HEIGHTS) FOR MODEL 3103
WELDED UNITS ARE 18 FT. MINIMUM
AND 30 FT. MAXIMUM

CONTACT PERFORMANCE SPORTS
SYSTEMS FOR INFORMATION IF TRUSS
HEIGHTS ARE NOT WITHIN THIS RANGE.



DETAIL 2

DETAIL 1

TRUSS HEIGHT FEET & (METERS)	DIM "A" Ft.-In. (Meters)	DIM "B" Ft.-In. (Meters)	DIM "C" Ft.-In. (Meters)
18 TO 18.9 (5.48-5.78M)	3'-2" (.97M)	4'-0" (1.22M)	4'-9" (1.45M)
19 TO 19.9 (5.79-6.09M)	3'-8" (1.18M)	5'-0" (1.52M)	4'-9" (1.45M)
20 TO 20.9 (6.10-6.39M)	4'-0" (1.22M)	6'-0" (1.83M)	6'-6" (1.98M)
21 TO 21.9 (6.40-6.69M)	4'-7" (1.40M)	7'-0" (2.13M)	6'-6" (1.98M)
22 TO 22.9 (6.70-7.00M)	5'-0" (1.52M)	8'-0" (2.44M)	6'-6" (1.98M)
23 TO 23.9 (7.01-7.31M)	5'-6" (1.68M)	9'-0" (2.74M)	6'-6" (1.98M)
24 TO 24.9 (7.32-7.61M)	6'-0" (1.83M)	10'-0" (3.05M)	6'-6" (1.98M)
25 TO 25.9 (7.62-7.92M)	6'-5" (1.96M)	11'-0" (3.35M)	7'-9" (2.36M)
26 TO 26.9 (7.93-8.22M)	6'-11" (2.11M)	12'-0" (3.66M)	7'-9" (2.36M)
27 TO 27.9 (8.23-8.52M)	7'-4" (2.23M)	13'-0" (3.96M)	7'-9" (2.36M)
28 TO 28.9 (8.53-8.83M)	7'-10" (2.39M)	14'-0" (4.27M)	7'-9" (2.36M)
29 TO 30.0 (8.84-9.14M)	8'-4" (2.54M)	15'-0" (4.57M)	7'-9" (2.36M)

DIMENSIONS ABOVE ARE ± 1/2"

REVISION

REV.	DATE	BY
A	10/15/03	JJC
B	12/09/03	JJC
C	06/29/05	DAM
D	12/18/06	RWP
E	05/12/08	RWP



Gared Holdings, LLC

9200 E. 146th St. Noblesville, IN 46060

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REAR BRACED FRONT FOLD BACKSTOP

DRAWN	CONNERLEY	DATE	04/30/03	MATERIAL	N/A
APPROVED	JJC	DATE	04/30/03	FINISH	N/A
FILE LOC.	Q:\Final Release\Specifications			DWG. NO.	3103
SIZE	SCALE	SHT. NO.	PART NO.		
A	NONE	1 OF 1		3103	
					REV E



MODEL 3103

Welded Single Post Rear Braced Front Folding Basketball Backstop

Recommended Application

This model is designed for those areas allowing sufficient space behind the backboard for a rear brace. This single post unit can be used at heights from 18' to 30'.

Overhead Structure

Unit shall be supported from 3-1/2" O.D. x 0.120" wall ASTM A-500 Grade B horizontal and 2-3/8" O.D. x 12 gauge (0.109") wall ASTM A-513 vertical structural steel tubing secured to the building with heavy gauge steel stampings or weldments (as required by building conditions). When truss span widths exceed 10'-0", 3-1/2" O.D. x Schedule 40 (0.216") wall ASTM A-500 Grade B will be used for the horizontals. Spans over 14'-0" will use welded bridge pipe.

Backstop

The backstop shall be of a single post design with a main vertical mast made of 6-5/8" O.D. x 0.120" wall ASTM A-500 Grade B structural steel tubing with 2-1/2" x 1-1/2" x 14 gauge (0.083") wall ASTM A-513 rectangular steel tube sway braces miter cut and welded in place to a top horizontal 4" x 1-1/2" x 0.18" web ASTM A-36 steel channel. Main mast will be suspended from superstructure with an offset hanger 3" in front of the pivot point. Units with less than 3" offset will not be approved as equal. Backstop shall be manufactured to allow 6" vertical adjustment for plumbing of the backboard. All fittings shall be heavy gauge steel stampings or weldments. A direct goal attachment is used to transfer stress from the goal to the main mast assembly preventing strain on the backboard.

Rear brace shall be 1-7/8" O.D. x 12 gauge (0.109") wall ASTM A-513 steel tubing with a slide mechanism and steel bushing for travel on a 1-7/8" O.D. slide rod. When truss heights are higher than 27'-0", rear brace shall be 2-3/8" O.D. x 12 gauge (0.109") wall ASTM A-513 steel tubing. The entire assembly shall be self-aligning and designed to be self-locking and self-releasing. Backstop shall be raised and lowered with 1/4" galvanized aircraft cable with a breaking strength of 7000 lbs. Cable automatically retracts by means of 5/16" diameter shock cord. Backstop manufactured in accordance with 1994 rule 1, section 8, stating that all parts of the backboard support system shall be at least 6" behind backboard.

All steel has a black powder coat finish, standard. Optional colors are available.

Accessories

Backboards and Goals - See the backboards and goals section in the specification manual.

Backboard Padding - See the accessories section in the specification manual.

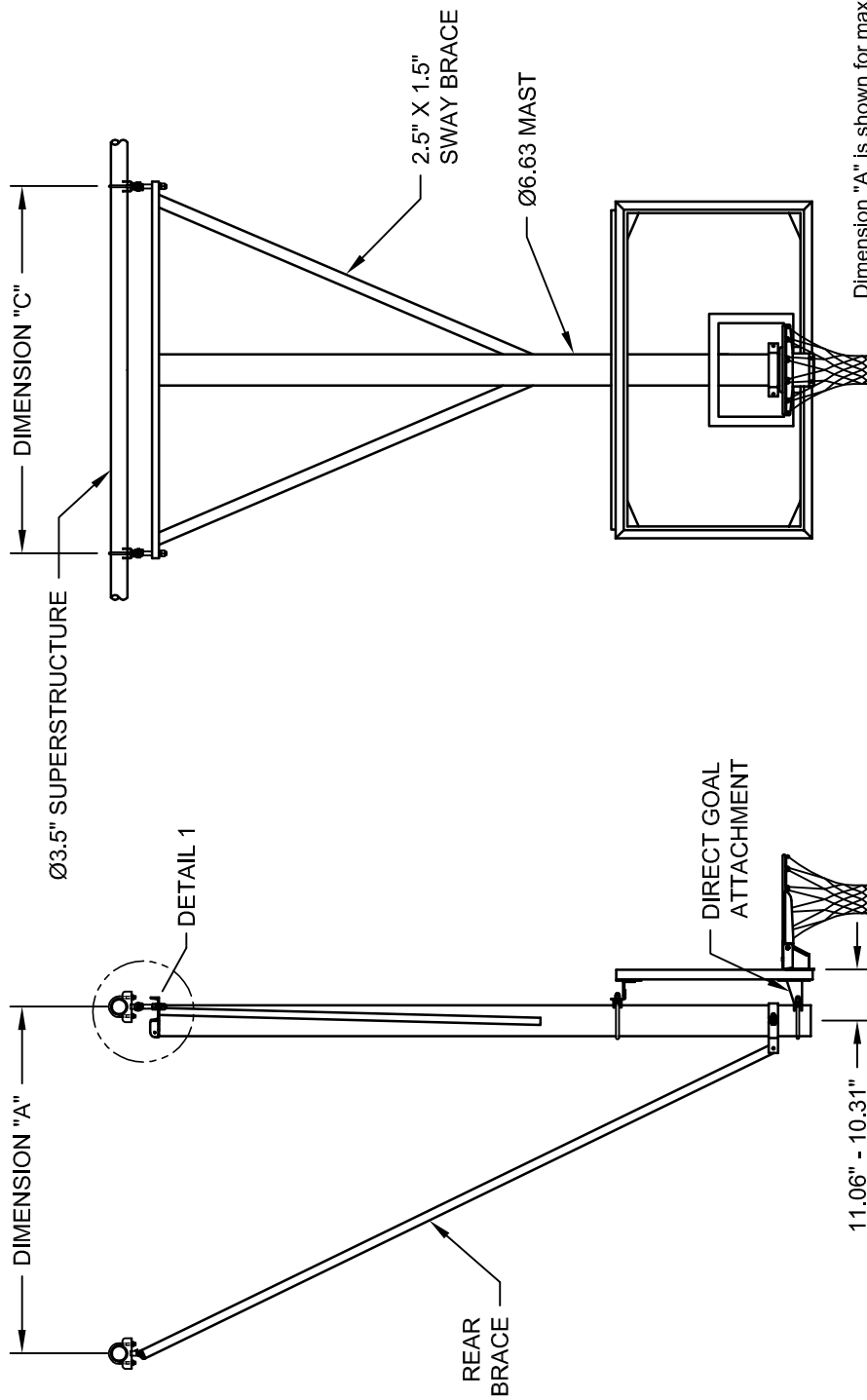
Hoists - Electric hoist or manual winch available on all folding units. See the accessories section in the specification manual.

Certifications

Unit meets all requirements of the NCAA and NFHS. Unit complies with design standards of the California Department of State Architects. Unit is approved by FIBA for international Level 2 competition. Certificate of Approval available.



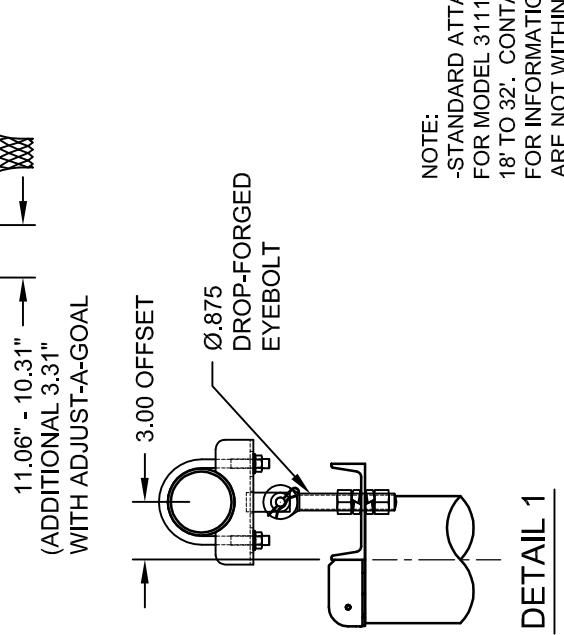
Subject to design change and current manufacturing practices.
Revised April 4, 2008 ©2008 Gared Holdings, LLC



Dimension "A" is shown for maximum elevation of the truss range and may vary to fit the exact attachment elevation and building structure.

TRUSS HEIGHT FEET & (METERS)	DIM "A" Ft.-In. (Meters)	DIM "C" Ft.-In. (Meters)
18 TO 18.9 (5.48-5.78M)	4'-4" (1.32M)	4'-10" (1.47M)
19 TO 19.9 (5.79-6.09M)	4'-9" (1.46M)	4'-10" (1.47M)
20 TO 20.9 (6.10-6.39M)	5'-3" (1.60M)	6'-9" (2.06M)
21 TO 21.9 (6.40-6.69M)	5'-9" (1.74M)	6'-9" (2.06M)
22 TO 22.9 (6.70-7.00M)	6'-2" (1.88M)	6'-9" (2.06M)
23 TO 23.9 (7.01-7.31M)	6'-8" (2.03M)	6'-9" (2.06M)
24 TO 24.9 (7.32-7.61M)	7'-1" (2.17M)	6'-9" (2.06M)
25 TO 25.9 (7.62-7.92M)	7'-7" (2.31M)	7'-10" (2.39M)
26 TO 26.9 (7.93-8.22M)	8'-1" (2.45M)	7'-10" (2.39M)
27 TO 27.9 (8.23-8.52M)	8'-6" (2.60M)	7'-10" (2.39M)
28 TO 28.9 (8.53-8.83M)	9'-0" (2.74M)	7'-10" (2.39M)
29 TO 30.0 (8.84-9.14M)	9'-5" (2.88M)	7'-10" (2.39M)
30 TO 30.9 (9.14-9.44M)	9'-11" (3.02M)	7'-10" (2.39M)
31 TO 31.9 (9.45-9.74M)	10'-4" (3.16M)	7'-10" (2.39M)

NOTE:
 -STANDARD ATTACHMENT HEIGHTS FOR MODEL 3111 WELDED UNITS ARE 18' TO 32'. CONTACT GARED HOLDINGS FOR INFORMATION IF TRUSS HEIGHTS ARE NOT WITHIN THIS RANGE.
 -DIMENSION ABOVE ARE $\pm \frac{1}{2}$ ".



REVISION		
REV.	DATE	BY
A	10/15/03	JJC
B	12/11/03	JJC
C	01/27/04	MDL
D	06/29/05	RWP
E	12/18/06	WAE
F	05/13/08	RWP
G	07-01-13	WDC




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WELDED REAR BRACED STATIONARY BACKSTOP

DRAWN	CONNERLEY	DATE	04/30/03	MATERIAL	N/A
APPROVED	JJC	DATE	04/30/03	FINISH	N/A
FILE LOC. Q:\Final Release\Specifications				DWG. NO. 3111	
SIZE	SCALE	SHT. NO.	PART NO.	REV	
A	NONE	1 OF 1		G	

3111



MODEL 3111

Welded Single Post, Ceiling Rear Braced, Stationary Basketball Structure

Recommended Application

This model is designed for those areas not requiring the structure to fold into a storage position. This unit is typically used when backstop is more than 10' from the wall or when the wall will not support wall mounted or braced units. This single post unit can be used at heights from 18' to 32'.

Overhead Structure

Unit shall be supported from 3-1/2" O.D. x 0.120" wall ASTM A-513 horizontal and 2-3/8" O.D. x 14 gauge (0.083") wall ASTM A-513 vertical structural steel tubing secured to the building with heavy gauge steel stampings or weldments (as required by building conditions). When truss span widths exceed 10'-0", 3-1/2" O.D. x Schedule 40 (0.216") wall ASTM A-500 Grade B will be used for the horizontals. Spans over 14'-0" may use welded bridge pipe.

Backstop

The backstop shall be of a single post design with a main vertical mast made of 6-5/8" O.D. x 0.120" wall ASTM A-500 Grade B structural steel tubing with 2-1/2" x 1-1/2" x 14 gauge (0.083") wall ASTM A-513 rectangular steel tube sway braces miter cut and welded in place to a top horizontal 4" x 1-1/2" x 0.18" web ASTM A-36 steel channel. Main mast will be suspended from superstructure with an offset hanger 3" in front of the pivot point. Units with less than 3" offset will not be approved as equal. Backstop shall be manufactured to allow 3" vertical adjustment for plumbing of the backboard. All fittings shall be heavy gauge steel stampings or weldments. A direct goal attachment is used to transfer stress from the goal to the main mast assembly preventing strain on the backboard.

Ceiling rear brace shall be 1-7/8" O.D. x 14 gauge (0.083") wall ASTM A-513 steel tubing attached to the main mast 12" to 18" above bottom of mast pipe. When truss heights are higher than 24'-0", ceiling brace shall be 2-3/8" O.D. x 14 gauge (0.083") wall ASTM A-513 steel tubing. Backstop manufactured in accordance with 1994 rule 1, section 8, stating that all parts of the backboard support system shall be at least 6" behind backboard.

All steel has a black powder coat finish, standard. Optional colors are available.

Accessories

Backboards and Goals - See the backboards and goals section in the specification manual.

Backboard Padding - See the accessories section in the specification manual.

Certifications

Unit meets all requirements of the NCAA and NFHS. Unit complies with design standards of the California Department of State Architects. Unit is approved by FIBA for international Level 2 competition. Certificate of Approval available.



SECTION 23 02 00 - BASIC MATERIALS AND METHODS

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 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 Energy Conservation Code, IECC.
 - 13. International Building Code.
 - 14. International Mechanical Code.
 - 15. International Fire Code.
 - 16. International Gas Code.
- 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.

1.11 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 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.

1.12 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 his trades 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.

1.13 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 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. HVAC Fans
20. Series Fan Powered Terminal Units
21. Single Duct VAV Terminal Box
22. Parallel Fan Powered Terminal Unit
23. Dual Duct Air Terminal Units
24. Air Distribution Devices
25. Air Filters
26. Flue Pipe Systems
27. Non-Condensing Boiler-Gas Fired (Forced Draft)
28. Condensing Boiler – Gas Fired
29. Finned Water-Tube Boilers
30. Steel Water-Tube Boilers
31. Gas Fired Furnaces
32. Gas Fired Roof Mounted Make-up Air Unit Heaters
33. Shell and Tube Heat Exchanger
34. Centrifugal Liquid Chiller
35. Rotary Screw Water Chillers
36. Air Cooled Rotary Liquid Chiller
37. Induced Draft Cooling Tower
38. Energy Recovery Ventilator
39. Modular Indoor Central Station Air Handling Units
40. Packaged Air Handling Unit
41. Modular Outdoor Central Station Air Handling Units
42. 100% Outside Air Rooftop Unit with Gas Heat
43. Self-Contained Air Conditioners
44. Rooftop Heating and Cooling Units Electric Cooling-Gas Heating
45. Rooftop Heating and Cooling Units Electric Cooling-Electric Heat
46. Variable Air Volume Rooftop Units
47. Variable Refrigerant Flow (VRF) for HVAC System
48. Water Source Heat Pump Unit
49. Fan Coil Unit
50. Unit Ventilators
51. Electric Duct Heaters
52. Radiant Heating Electric Cables
53. 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.

1.14 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 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.

1.15 RECORD DOCUMENTS

- A. Prepare Record Documents in accordance with the requirements in Special Project Requirements, in addition to the requirements specified in Division 23, indicate 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.
- B. 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.

- C. 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.
- D. Refer to Division 00 and Division 01 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 re-producibles is a condition of substantial completion.
- E. 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 pipe or duct, locations of all concealed valves, controls and devices 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.
- F. Submit three prints of the tracings for review. Make corrections to tracings as directed and deliver "Auto Positive Tracings" to the Architect. "As-Built" drawings shall be furnished in addition to submittals.
- G. When the option described in paragraph F above is not exercised, then upon completion of the Work, the Contractor shall transfer all marks from the tracings and submit a set of clear concise 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 Engineer's 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)

1.16 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.
 - 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.

1.17 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 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.

1.18 OPERATING AND MAINTENANCE MANUALS

- A. Coordinate with Division 00 and Division 01 for operating and maintenance manual requirements. Unless noted otherwise, bind together in "D ring type" binders (National model no. 79-883 or equal). Binders shall be large enough to allow ¼" of spare capacity. Three (3) sets of all reviewed submittals, fabrication drawings, bulletins, maintenance instructions, operating instructions and parts exploded views and lists for each and every piece of equipment furnished under these Specifications. All sections shall be typed and indexed into sections and labeled for easy reference and shall 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.
- B. Prepare maintenance manuals in accordance with Special Project Conditions. In addition to the requirements specified in Division 23, include the following information for equipment items:
 - 1. Identifying names, name tag designations and locations for all equipment.
 - 2. Valve tag lists with valve number, type, color coding, location and function.
 - 3. Reviewed 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 and motor 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 piping.
 - 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 00 and Division 01 for additional information on Operating and Maintenance Manuals.
 - D. Operating and Maintenance Manuals shall be turned over to the Owner or Engineer for review a minimum of 14 working days prior to the beginning of the operator training period.

1.19 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 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 23 Sections for additional Operator Training requirements.

1.20 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.

1.21 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 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.

1.22 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 (See 2.4 in Section 26 02 00)

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 strains 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 02 01 - COORDINATION DRAWINGS

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. The requirements of the General Conditions 013100 and Supplementary Conditions apply to all Work herein.

1.2 COORDINATION DRAWINGS

- A. The Contractor shall take the lead in coordinating the Mechanical, Electrical, Plumbing, Communications, Electronic Safety/Security and Fire Protection systems within the building.
- B. The Mechanical Contractor shall coordinate a three-dimensional (3D) model of the building which includes the Mechanical, Electrical, Plumbing, and Fire Protection systems. The Electrical, Plumbing, and Fire Protection Contractors shall prepare their work and generate 3D models which will be given to the Mechanical Contractor for coordination. The Contractor will be provided with the REVIT model that was used to generate the contract documents, this file may be used as the background file. The Contractor shall replace the systems drawn with the actual shop drawing models. The Contractor is not limited to using REVIT, but may use any 3-D software in generating and combining the coordination model.
- C. Submitting the contract drawings as coordination drawings will not be acceptable.
- D. The model shall include detailed and accurate representations of all equipment to be installed based upon the reviewed equipment submittals.
- E. The Mechanical Contractor shall hold a 3-D coordination meeting with all sub-contractors present to review the model and discuss coordination of the installation of the building systems.
- F. Upon completion of the coordination meeting, the Contractor shall submit the 3-D model and 1/4" scale drawings for review.
- G. The model shall detail major elements, components, and systems 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.
- H. Sequence of Coordination

Below is hierarchy of model elements and the sequencing by which the models will be coordinated.
 - 1. Structural and Architectural model
 - 2. Miscellaneous steel
 - 3. Perform preliminary space allocation
 - 4. Identify hard constraints (locations of access panels, lights, A/V space requirements, etc.)
 - 5. Main and medium pressure ducts from the shaft out
 - 6. Main graded plumbing lines and vents
 - 7. Sprinkler mains and branches
 - 8. Cold and hot water mains and branches
 - 9. Lighting fixtures and plumbing fixtures
 - 10. Smaller sized ducts and flex ducts
 - 11. Smaller size cold water and hot water piping, flex ducts, etc.
- I. The Contractor and Sub-Contractors shall not install any item until the coordination has been completed and reviewed by the Construction Manager, Owner, and A/E team.
- J. 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.
- K. 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

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. The Basic Materials and Methods, Section 23 02 00, 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.
- B. WORK SPECIFIED ELSEWHERE:
 - 1. Painting
 - 2. Automatic temperature controls.
 - 3. Power control wiring to motors and equipment.

1.3 WARRANTY

Warrant the Work specified herein for one year and motors for five years beginning on the date of substantial completion.

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 variations, and accessories.
- C. MOTOR NAMEPLATE INFORMATION: Manufacturer's name, address, utility and operating data.
- D. Refer to Division One for additional information.

1.5 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 1/2 HP: Provide permanent split, capacitor-start single phase motors with inherent overload protection.
2. 3/4 HP AND LARGER: Provide squirrel-cage induction polyphase motors.
3. Provide two separate windings on 2-speed polyphase motors.
4. Name plate voltage shall be the same as the circuit's normal 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 zero 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:

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. EFFICIENCY: Minimum full load efficiency listed in the following table, when tested in accordance with IEEE Test Procedure 112A, Method B, including stray load loss measure.

Motor Horsepower	NEMA Efficiency INDEX Letter	Minimum Efficiency %
1800 RPM Synchronous Speed		
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	94.5
60	C	95.0
75	C	95.0
100-125	B	95.4
150-200	B	95.8
1200 RPM Synchronous Speed		
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 3/4 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 2.1/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 All equipment shall be installed in accordance with the manufacturers' recommendations and printed installation instructions.
- 3.2 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.
- 3.3 INSTALLATION
 - A. GENERAL: Install in a professional manner. Any part or parts not meeting this requirement shall be replaced or rebuilt without extra expense to Owner.
 - B. Install rotating equipment in static and dynamic balance.
 - C. Provide foundations, supports, and isolators properly adjusted to allow minimum vibration transmission within the building.
 - D. Correct objectionable noise or vibration transmission in order to operate equipment satisfactorily as determined by the Engineer.

END OF SECTION

SECTION 23 05 29 – HANGERS AND SUPPORTS FOR PIPING AND EQUIPMENT - HVAC

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 is included as a part of this Section as though written in full in this document.

1.2 WORK INCLUDED

- A. Pipe, and equipment hangers, supports and associated anchors.
- B. Sleeves and seals.
- C. Flashing and sealing equipment and pipe stacks.

1.3 RELATED WORK

- A. Section 21 00 00 – Fire Suppression.
- B. Section 22 10 00 – Plumbing Piping and Pumps.
- C. Section 23 05 48 – Vibration and Seismic Controls for HVAC Piping and Equipment.
- D. Section 23 07 16 – HVAC Equipment Insulation.
- E. Section 23 07 19 – HVAC Piping Insulation.
- F. Section 23 21 13 – Above Ground Hydronic Piping.
- G. Section 23 21 16 – Underground Hydronic Piping.

1.4 REFERENCES

- A. ANSI/ASME B31.1 - Power Piping.
- B. NFPA 13 - Standard for the Installation of Sprinkler Systems.
- C. NFPA 14 - Standard for the Installation of Standpipe and Hose Systems.

1.5 QUALITY ASSURANCE

- A. Supports for Sprinkler Piping: In conformance with NFPA 13.
- B. Supports for Standpipes: In conformance with NFPA 14.

1.6 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Division One.
- B. Indicate hanger and support framing and attachment methods.

PART 2 - PRODUCTS

2.1 PIPE HANGERS AND SUPPORTS

- A. Hangers for Pipes Sizes 1/2 to 1-1/2 Inch: Malleable iron, adjustable swivel, split ring.
- B. Hangers for Pipes Sizes 2 to 4 Inch: Carbon steel, adjustable clevis.
- C. Hangers for Pipes Sizes 6 Inches and Over: Adjustable steel yoke, cast iron roller, double hanger.
- D. Multiple or Trapeze Hangers: Steel channels with welded spacers, pre-formed manufactured saddles and hanger rods; cast iron roller and stand for pipe sizes 6 inches and over.
- E. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
- F. Wall Support for Pipe Sizes 4 Inches and over: adjustable steel yoke and cast iron roller.
- G. Vertical Support: Steel riser clamp.
- H. Floor Support for Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, locknut nipple, floor flange, and concrete pier or steel support.
- I. Floor Support for Pipe Sizes 6 Inches and Over: Adjustable cast iron roller and stand, steel screws, and concrete pier or steel support.
- J. Roof Pipe Supports and Hangers: Galvanized Steel Channel System as manufactured by Portable Pipe Hangers, Inc. or approved equal.
 - 1. For pipes 2-1/2" and smaller – Type PP10 with roller
 - 2. For pipes 3" through 8" – Type PS
 - 3. For multiple pipes – Type PSE - Custom
- K. Copper Pipe Support and Hangers: Electro-galvanized with thermoplastic elastomer cushions; Unistrut "Cush-A-Clamp" or equal. Hangers: Plastic coated; Unistrut or equal.
- L. Shields for Vertical Copper Pipe Risers: Sheet lead.
- M. Pipe Rough-In Supports in Walls/Chases: Provide preformed plastic pipe supports, Sioux Chief "Pipe Titan" or equal.

2.2 HANGER RODS

- A. Galvanized Hanger Rods: Threaded both ends, threaded one end, or continuous threaded.

2.3 INSERTS

- A. Inserts: Malleable iron case with galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

2.4 FLASHING

- A. Metal Flashing: 20 gage galvanized steel.

- B. Lead Flashing: 4 lb. /sq. ft. sheet lead for waterproofing; 1 lb. /sq. ft. sheet lead for soundproofing.
- C. Caps: Steel, 20 gage minimum; 16 gage at fire resistant elements.
- D. Coordinate with roofing contractor/Architect for type of flashing on metal roofs.

2.5 EQUIPMENT CURBS

- A. Fabricate curbs of hot dipped galvanized steel.
- B. For metal roof construction, roof curbs shall be made of aluminum or stainless steel. Coordinate with Architectural Drawings and details.

2.6 SLEEVES

- A. Sleeves for Pipes through Non-fire Rated Floors: Form with 18 gage galvanized steel, tack welded to form a uniform sleeve.
- B. Sleeves for Pipes through Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Form with steel pipe, Schedule 40.
- C. Sleeves for Pipes through Fire Rated and Fire Resistive Floors and Walls, and Fireproofing: Prefabricated fire rated steel sleeves including seals, UL listed.
- D. Sleeves for Round Ductwork: Form with galvanized steel.
- E. Sleeves for Rectangular Ductwork: Form with galvanized steel.
- F. Fire Stopping Insulation: Glass fiber type, non-combustible, U.L. listed.
- G. Caulk: Paintable 25-year acrylic sealant.
- H. Pipe Alignment Guides: Factory fabricated, of cast semi-steel or heavy fabricated steel, consisting of bolted, two-section outer cylinder and base with two-section guiding spider that bolts tightly to pipe. Length of guides shall be as recommended by manufacturer to allow indicated travel.

2.7 FABRICATION

- A. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.
- B. Design hangers without disengagement of supported pipe.
- C. Design roof supports without roof penetrations, flashing or damage to the roofing material.

2.8 FINISH

- A. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

PART 3 - EXECUTION

3.1 INSERTS

- A. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams. Coordinate with Structural Engineer for placement of inserts.
- B. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
- C. Where concrete slabs form finished ceiling, provide inserts to be flush with slab surface.
- D. Where inserts are omitted, drill through concrete slab from below and provide thru-bolt with recessed square steel plate and nut recessed into and grouted flush with slab. Verify with Structural Engineer prior to start of work.

3.2 PIPE HANGERS AND SUPPORTS

- A. Support horizontal piping as follows:

<u>PIPE SIZE</u>	<u>MAX. HANGER SPACING</u>	<u>HANGER DIAMETER</u>
(Steel Pipe)		
1/2 to 1-1/4 inch	7'-0"	3/8"
1-1/2 to 3 inch	10'-0"	3/8"
4 to 6 inch	10'-0"	1/2"
8 to 10 inch	10'-0"	5/8"
12 to 14 inch	10'-0"	3/4"
15 inch and over	10'-0"	7/8"
(Copper Pipe)		
1/2 to 1-1/4 inch	5'-0"	3/8"
1-1/2 to 2-1/2 inch	8'-0"	3/8"
3 to 4 inch	10'-0"	3/8"
6 to 8 inch	10'-0"	1/2"
(Cast Iron)		
2 to 3 inch	5'-0"	3/8"
4 to 6 inch	10'-0"	1/2"
8 to 10 inch	10'-0"	5/8"
12 to 14 inch	10'-0"	3/4"
15 inch and over	10'-0"	7/8"
(PVC Pipe)		
1-1/2 to 4 inch	4'-0"	3/8"
6 to 8 inch	4'-0"	1/2"

10 and over 4'-0" 5/8"

- B. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
- C. Place a hanger within 12 inches of each horizontal elbow, and at the vertical to horizontal transition.
- D. Use hangers with 1-1/2 inch minimum vertical adjustment.
- E. Support horizontal cast iron pipe adjacent to each hub, with 5 feet maximum spacing between hangers.
- F. Support vertical piping at every floor. Support vertical cast iron pipe at each floor at hub.
- G. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- H. Support riser piping independently of connected horizontal piping.
- I. Install hangers with nut at base and above hanger; tighten upper nut to hanger after final installation adjustments.
- J. Portable pipe hanger systems shall be installed per manufacturer's instructions.
- K. Distances between supports are maximum distance. Supports shall be provided to carry the pipe/equipment load.

3.3 INSULATED PIPING: Comply with the following installation requirements.

- A. Clamps: Attach galvanized clamps, including spacers (if any), to piping with clamps projecting through insulation; do not exceed pipe stresses allowed by ASME B31.9.
- B. Saddles: Install galvanized protection saddles MSS Type 39 where insulation without vapor barrier is indicated. Fill interior voids with segments of insulation that match adjoining pipe insulation. Secure the full contact area of the saddle to the pipe insulation with 1/8" thick coat of mastic.
- C. Shields: Install protective shields MSS Type 40 on cold and chilled water piping that has vapor barrier. Secure the full contact area of the shield to the pipe insulation with 1/8" thick coat of mastic.
- D. Shields shall span an arc of 180 degrees and shall have dimensions in inches not less than the following:

NPS	LENGTH	THICKNESS
1/4 THROUGH 3-1/2	12	0.048
4	12	0.060
5 & 6	18	0.060
8 THROUGH 14	24	0.075

- E. Piping 2" and larger: provide galvanized sheet metal shields with calcium silicate insulation at hangers/supports.
- F. Insert material shall be at least as long as the protective shield.
- G. Thermal Hanger Shields: Install where indicated, with insulation of same thickness as piping.

3.4 EQUIPMENT BASES AND SUPPORTS

- A. Provide equipment bases of concrete.
- B. Provide templates, anchor bolts, and accessories for mounting and anchoring equipment.
- C. Construct support of steel members. Brace and fasten with flanges bolted to structure.
- D. Provide rigid anchors for pipes after vibration isolation components are installed.

3.5 FLASHING

- A. Provide flexible flashing and metal counter flashing where piping and ductwork penetrate weather or waterproofed walls, floors, and roofs.
- B. Flash vent and soil pipes projecting 8 inches minimum above finished roof surface with lead worked one inch minimum into hub, 8 inches minimum clear on sides with 24 x 24 inches sheet size. For pipes through outside walls, turn flanges back into wall and caulk. Provide metal counter flash and seal.
- C. Flash floor drains in floors with topping over finished areas with lead, 10 inches clear on sides with minimum 36 x 36 inch sheet size. Fasten flashing to drain clamp device.
- D. Seal floor, shower, mop sink, and all other drains watertight to adjacent materials.
- E. Provide curbs for mechanical roof installations 8 inches minimum high above roofing surface. Contact Architect for all flashing details and roof construction. Seal penetrations watertight.

3.6 SLEEVES

- A. Set sleeves in position in formwork. Provide reinforcing around sleeves.
- B. Extend sleeves through floors minimum one inch above finished floor level. Caulk sleeves full depth with fire rated thermafiber and 3M caulking and provide floor plate.
- C. Where piping or ductwork penetrates floor, ceiling, or wall, close off space between pipe or duct and adjacent work with U.L. listed fire stopping insulation and caulk seal air tight. Provide close fitting metal collar or escutcheon covers at both sides of penetration.
- D. Fire protection sleeves may be flush with floor of stairways.

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. This Section and Section 23 02 00 – Basic Materials and Methods are part of each Division 23 Section which references the vibration control products specified herein.

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. Amber/Booth Company, Inc.
- B. Mason Industries, Inc.
- C. Kinetics Noise Control, 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 Amber/Booth products are included for identification. Products of the additional manufacturers will be acceptable provided they comply with all the requirements of this specification.

2.3 FLOOR MOUNTED AIR HANDLING UNITS

- A. Provide Amber/Booth 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 2" thick Amber/Booth NRC ribbed neoprene pads to address high frequency breakout and afford additional unit elevation for condensate drains. Ribbed neoprene pads shall be located in accordance with the air handling unit manufacturer's recommendations.

2.4 SUSPENDED AIR HANDLING UNITS

- A. Provide Amber/Booth HRS-2 combination spring and rubber-in-shear isolation hanger sized for 2" static deflection.
- B. If suspended air handling units are furnished with internal vibration isolation option, furnish Amber/Booth HR rubber-in-shear isolation hangers sized for approximately ½" deflection to address high frequency break-out.

2.5 SUSPENDED FANS AND FAN COIL UNITS

- A. Provide Amber/Booth HS spring hangers sized for 1" static deflection.

2.6 BASE MOUNTED PUMPS

- A. Provide Amber/Booth SP-NR style E flexplate pad isolators consisting of two layers of 3/8" thick alternate ribbed neoprene pad bonded to a 16 gage galvanized steel separator plate.
- B. Pads shall be sized for approximately 40 PSI loading and 1/8" deflection.
- C. Provide Amber/Booth CPF, 8" concrete inertia base. Base shall be welded steel construction with concrete in-fill supplied by the contractor on site and shall incorporate standard rebar reinforcement, spaced a maximum of 12" on center. Provide Amber/Booth AWH, floor mounted spring isolators sized for 1" static deflection.
- D. Provide inertia bases for all base mounted pump applications in which the pumps are to be installed on any floor level other than the ground floor or grade level. Inertia bases shall also be provided for base mounted pump applications in which the associated mechanical room where they are housed is in a noise sensitive location, regardless of floor level.

2.7 BASE MOUNTED CHILLERS

- A. Amber/Booth SP-NR style E flexplate pad isolators consisting of two layers of 3/8" thick alternate ribbed neoprene pad bonded to a 16 gage galvanized steel separator plate.
- B. Pads shall be sized for approximately 40 PSI loading and 1/8" deflection.

2.8 ROOF MOUNTED COOLING TOWERS

- A. Provide Amber/Booth M series steel housed spring isolators with vertical uplift restraints sized for 3" static deflection.

- B. Isolators to have weatherproof construction with cadmium plated springs, hot-dip galvanized housings, and zinc-electroplated hardware. Removable spring packages to include ¼" ribbed neoprene pad under baseplate(s).
- C. Steel beams between the top of the isolators and bottom of cooling tower cells shall be provided and coordinated with the structural engineer.

2.9 PIPING

- A. Provide spring and rubber-in-shear hangers, Amber/Booth HRS 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. Springs shall be sized for 1" deflection.
- B. Floor supported piping is required to be isolated with Amber/Booth AW-1 open springs sized for 1" deflection.
- C. All condenser water piping shall be supported with Amber/Booth AW-1 with 1" deflection for floor or roof mounted piping and Amber/Booth HRS isolators with 1" deflectors for suspended piping.
- D. Furnish line size flexible connectors at supply and return of pumps, Amber/Booth style 2800 single sphere EPDM construction, connector shall include 150 lb. cadmium plated carbon steel floating flanges.

2.09 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 All equipment shall be installed in accordance with the manufacturer's recommendations and printed installation instructions.
- 3.2 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.
- 3.3 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.
- 3.4 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 53 – IDENTIFICATION 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 is included as a part of this Section as though written in full in this document.

1.2 SCOPE

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 Refer to Architectural Sections for additional requirements.

PART 2 - PRODUCTS

2.1 VALVE AND PIPE IDENTIFICATION

A. Valves:

- 1. All valves shall be identified with a 1-1/2" diameter brass disc wired onto the handle. The disc shall be stamped with 1/2" high depressed black filled identifying numbers. These numbers shall be numerically sequenced for all valves on the job.
- 2. The number and description indicating make, size, model number and service of each valve shall be listed in proper operational sequence, properly typewritten. Three copies to be turned over to Owner at completion.
- 3. Tags shall be fastened with approved meter seal and 4 ply 0.018 smooth copper wire. Tags and fastenings shall be manufactured by the Seton Name Plate Company or approved equal.
- 4. All valves shall be numbered serially with all valves of any one system and/or trade grouped together.

B. Pipe Marking:

- 1. All interior visible piping located in accessible spaces such as above accessible ceilings, equipment rooms, attic space, under floor spaces, etc., shall be identified with all temperature pipe markers as manufactured by W.H. Brady Company, 431 West Rock Ave., New Haven, Connecticut, or approved equal.
- 2. All exterior visible piping shall be identified with UV and acid resistant outdoor grade acrylic plastic markers as manufactured by Set Mark distributed by Seton (Name plate Company Factory location 20 Thompson Road, Branford, Connecticut) or approved equal.
- 3. Generally, markers shall be located on each side of each and every partition, on each side of every tee, on each side of every valve and/or valve group, on each side of every piece of equipment, and, for straight runs, at equally spaced intervals not to exceed 75 feet. In congested area, marks shall be placed on each pipe at the points where it enters and leaves the area and at the point of connection of each piece of equipment and automatic control valve. All markers shall have directional arrows.
- 4. Markers shall be installed after final painting of all piping and equipment and in

such a manner that they are visible from the normal maintenance position. Manufacturer's installation instructions shall be closely followed.

5. Markers shall be colored as indicated below per ANSI/OSHA Standards:

<u>SYSTEM</u>	<u>COLOR</u>	<u>LEGEND</u>
Chilled Water	Green	Chilled Water Supply Chilled Water Return
Hot Water	Reddish Orange	Hot Water Supply Return
Condenser Water	Green	Condenser Water Supply Condenser Water Return
Compressed Air	Blue	Compressed Air
Pneumatic Control	Yellow	Pneumatic Controls
Oxygen	Yellow	Oxygen
Nitrogen	Green	Nitrogen
Deionized Water	Green	Deionized Water
Steam	Yellow	Steam Supply Steam Return

C. Pipe Painting:

1. All piping exposed to view shall be painted as indicated or as directed by the Architect in the field. Confirm all color selections with Architect prior to installation.
2. All piping located in mechanical rooms and exterior piping shall be painted as indicated below:

<u>System</u>	<u>Color</u>
Condenser Water Supply and Return	Light Green
Chilled Water Supply and Return	Light Blue
Heating Hot Water Supply and Return	Reddish Orange

2.2 EQUIPMENT IDENTIFICATION

- 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.

PART 3 - EXECUTION

- 3.1 All labeling equipment shall be installed as per manufacturer's printed installation instructions.
- 3.2 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 manufacturer's requirements.
- 3.3 All piping shall be cleaned of rust, dirt, oil and all other contaminants prior to painting. Refer to

Division 9 for Architect's required paint system(s).

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 is included as a part of this Section as though written in full in this document.

1.2 RELATED DOCUMENTS

Approved submittal date on equipment installed, to accomplish the test procedures, outlined under paragraph 3.1 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 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.

1.5 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 (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 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.

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
The test apparatus shall consist of:
 - a. A source of high pressure air--a portable rotary blower or a tank type vacuum cleaner.
 - b. 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

- 1.2 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 25% 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 is included as a part of this Section as though written in full in this document.

1.2 WORK INCLUDED

- A. Ductwork system insulation.

1.3 RELATED SECTIONS

- A. Section 23 05 29 - Hangers and Support for HVAC Piping and Equipment
- B. Section 23 05 53 – Identification for HVAC Piping and Equipment
- C. Section 23 31 13 – Metal Ductwork

1.4 REFERENCE STANDARDS

- A. ASTM International. (ASTM)
- B. American Society of Heating, Refrigerating, and Air Conditioning Engineers, Inc. (ASHRAE).
- C. North American Insulation Manufacturers Association (NAIMA).
- D. National Fire Protection Association (NFPA).
- E. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA).
- F. Underwriter's Laboratories (UL).
- G. Underwriter's Laboratories Environmental (UL Environment).

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. Flame/Smoke Ratings: Provide composite mechanical insulation (insulation, jackets, coverings, sealers, mastics and adhesives) that is UL Classified per UL 723 or with flame-spread index of 25 or less, and smoke-developed index of 50 or less, as tested by ASTM E 84 (NFPA 255) method.
 - 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 2015 International Energy Conservation Code and ASHRAE 90.1 - 2013.

- D. Adhesive and other material shall comply with NFPA and NBFU Standards No. 90A and 90B.

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, 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 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. Glass mineral wool 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 barrier, etc., as the types specified herein, subject to review by the Engineer.
- B. Adhesives shall be as manufactured by Minnesota Mining, Arabol, Benjamin-Foster, Armstrong or Insulmastic, Inc., 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 Primer Refractories, A.P. Green

Refractories or approved equal.

PART 3 - EXECUTION

3.1 GENERAL

- 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 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 barrier with 3-inch wide strips of white glass fabric embedded between two coats of vapor barrier mastic, Childers CP-30 or approved equal.
- C. All external duct insulation shall be Knauf Insulation Atmosphere Duct Wrap with ECOSE Technology, Johns Manville Microlite EQ duct wrap insulation with reinforced aluminum facing or approved equal.
- D. 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 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 4.2 when ducts are located in conditioned spaces.
 - 2. 2" thick with a minimum installed R-value of 6 when ducts are located in unconditioned spaces, such as ceiling plenum space.
- E. 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 E 84 testing requirements shall be provided with a single layer of duct wrap to establish a noncombustible rating per ASTM E 136. 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 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. All portions of duct designed to receive duct liner shall be completely covered with liner as specified. The smooth, black, mat facing or acrylic-coated surfaces with flexible glass cloth reinforcement shall face the airstream. All duct liner shall be cut to assure tight, overlapped corner joints. The top pieces shall be supported by the sidepieces. Duct liner

shall be installed following the guidelines in the NAIMA "Duct Liner Installation Standard".

- C. The duct liner shall be tested according to erosion test method in ASTM C 1071 and shall be guaranteed to withstand velocities in the duct system up to 6000 fpm without surface erosion.
- D. Duct liner shall be adhered to the sheet metal with full coverage of an approved adhesive that conforms to ASTM C 916, and all exposed leading edges and transverse joints shall be coated with Permacote factory-applied or field-applied edge coating and shall be neatly butted without gaps. Shop or field cuts shall be liberally coated with Johns Manville SuperSeal® duct butter and Edge Treatment or approved adhesive.
- E. 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.
- F. When velocity exceeds 4000 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.
- G. The liner shall further be secured with Graham welding pins and washers on not more than 18 inch centers both vertical and horizontal surfaces, and the pins and washers shall be pointed up with adhesive.
- H. Duct liner shall be Knauf Insulation Atmosphere Duct Liner with ECOSE Technology, Johns Manville Linacoustic RC duct liner with factory-applied edge coating and acrylic coating on the mat surface of airstream side or approved equal. The liner shall meet the Life Safety Standards as established by NFPA 90A and 90B, FHC 25/50 and Limited Combustibility and the air stream surface coating should contain an immobilized, EPA-registered, anti-microbial agent so it will not support microbial growth as tested in accordance with ASTM G21 and G22. The duct liner shall conform to the requirements of ASTM C 1071, UL 2824, with an NRC not less than .70 as tested per ASTM C 423 using a Type "A" mounting, and a thermal conductivity no higher than 0.24 BTU•in/(hr•ft²•°F) at 75°F mean temperature.
- I. Line supply and return ductwork at connection of HVAC unit to a point of 15 feet upstream and downstream of the equipment and in return air boots. Attach with full cover coat of cement, duct dimensions up to 16 inches; provide stick clips or screws and cap for dimensions over 16 inches, spaced 16 inches o.c. maximum. Provide sheet metal liner cap over all leading edges of internal insulation exposed to air stream.
- J. Duct liner shall be provided as follows:
 - 1. 1" Thick, 1.5 PCF density minimum; minimum installed R-value of 4.2 when ducts are located in conditioned spaces.
 - 2. 1 ½" Thick with a minimum installed R-value of 6 when ducts are located in unconditioned spaces, such as ceiling plenum space.
 - 3. 2" Thick with a minimum installed R-value of 8 when ducts are located outdoors.

3.4 EXPOSED DUCTWORK LOCATED INDOORS

- A. Duct routed exposed in occupied spaces shall be double wall.
- B. Round and flat oval duct routed exposed shall be double wall with perforated inner liner and 1" thick layer of glass mineral wool insulation as manufactured by United McGill Company model no. Acousti-27 or approved equal. Insulation density shall be a minimum of 1.0 PCF.

3.5 EXPOSED DUCT LOCATED OUTDOORS

- A. All duct located outdoors shall be internally lined as specified and shall have a 2" thick, 6 lb. density rigid board external duct insulation, finished with aluminum jacketing.
- B. 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 1½ inch thick external duct wrap.
- B. The contractor shall install an additional layer of 1-½ inch thick external glass mineral wool 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.

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 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.
- B. Work specified elsewhere.
 - 1. Basic materials and methods.
 - 2. Piping systems.
 - 3. Air distribution equipment.

1.3 REFERENCE STANDARDS

- A. ASTM International. (ASTM)
- B. American Society of Heating, Refrigerating, and Air Conditioning Engineers, Inc. (ASHRAE).
- C. North American Insulation Manufacturers Association (NAIMA).
- D. National Fire Protection Association (NFPA).
- E. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA).
- F. Underwriter's Laboratories (UL).
- G. Underwriter's Laboratories Environmental (UL Environment).

1.4 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.

1.5 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, product variations, and accessories.

1.6 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 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.
- 2.2 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.
- 2.3 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.
- 2.4 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.
- 2.5 All insulation shall have composite (insulation, jacket or facing, and adhesive used to adhere the facing or jacket to insulation) fire and smoke hazard as tested by Procedure ASTM E084, NFPA 255 and UL 723 not exceeding:

Flame Spread 25
Smoke Developed 50
- 2.6 All HVAC equipment insulation shall comply with minimum requirements of 2015 International Energy Conservation Code and ASHRAE 90.1 - 2013.
- 2.7 Accessories, such as adhesives, mastics and cements shall have the same component ratings as listed above.
- 2.8 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 All insulation shall be installed in accordance with the manufacturer's recommendations and printed installation instructions.

- 3.2 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.

END OF SECTION

SECTION 23 08 00 – COMMISSIONING OF HVAC SYSTEMS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract Documents, including General and Supplementary Conditions and Division 01 Specifications, apply to this section.
- B. Related SECTIONS:
 - 1. SECTION 01 91 00 - GENERAL COMMISSIONING REQUIREMENTS
 - 2. SECTION 23 09 63 - ENERGY MANAGEMENT AND CONTROL SYSTEMS.

1.2 SUMMARY

- A. The commissioning of the HVAC system and associated controls shall be performed by an impartial technical firm hired by the owner. The commissioning provider shall be certified under one or more of the following certifications:
 - 1. CxA – Certified Commissioning Authority – ACG
 - 2. CBCP – Certified Building Commissioning Professional – AEE
 - 3. CCP – Certified Commissioning Professional – BCA
 - 4. CPMP – Certified Process Management Professional – ASHRAE
 - 5. BSC – Building System Commissioning Certification – NEBB
- B. The commissioning provider (Commissioning authority) shall be responsible for leading the entire construction team through the commissioning process including, but not limited to, conducting the commissioning kick-off meeting, preparing the commissioning plan, preparing pre-functional checklists, preparing functional test scripts, participation in functional testing and preparation of required documentation and reports.

1.3 RESPONSIBILITIES

- A. Contractor: Responsibilities of the Contractor as related to the Commissioning Process include, but are not limited to the following:
 - 1. Facilitate coordination of Commissioning work by Commissioning authority.
 - 2. Attend Commissioning meetings or other meetings called by Commissioning authority to facilitate the Commissioning Process.
 - 3. Review Functional Performance Test procedures for feasibility, safety, and impact on warranty, and provide Commissioning authority with written comment on same.
 - 4. Provide all documentation relating to manufacturer's recommended performance testing of equipment and systems.
 - 5. Provide Operations & Maintenance data to Commissioning authority for preparation of checklists and training manuals.
 - 6. Provide Testing and Balancing Report before Functional Testing begins.
 - 7. Provide As-built drawings and documentation to facilitate Testing.
 - 8. Assure and facilitate participation and cooperation of Sub Contractors and equipment suppliers as required for the Commissioning Process.
 - 9. Certify to Commissioning authority that installation work listed in Pre-Functional Checklists has been completed.
 - 10. Install systems and equipment in strict conformance with project specifications, manufacturer's recommended installation procedures, and Pre-Functional Checklists.
 - 11. Provide data concerning performance, installation, and start-up of systems.

12. Provide copy of manufacturers filled-out start-up forms for equipment and systems.
 13. Ensure systems have been started and fully checked for proper operation prior to arranging for Testing with Commissioning authority. Prepare and submit to Commissioning authority written certification that each piece of equipment and/or system has been started according to manufacturer's recommended procedure, and that system has been tested for compliance with operational requirements.
 - a. Contractor shall carry out manufacturer's recommended start-up and testing procedures, regardless of whether or not they are specifically listed in Pre-Functional Checklists.
 - b. Contractor is not relieved of obligation for systems/equipment demonstration where performance testing is required by specifications, but a Functional Performance Test is not specifically designated by Commissioning authority.
 14. Coordinate with Commissioning authority to determine mutually acceptable date of Functional Performance Tests.
 15. Provide qualified personnel to assist and participate in Commissioning.
 16. Provide test instruments and communications devices, as prescribed by Commissioning authority, required for carrying out Testing of systems.
 17. Proprietary test equipment required by the manufacturer, whether specified or not, shall be provided by the manufacturer of the equipment. Manufacturer shall provide the test equipment, demonstrate its use, and assist the Test Engineer in the commissioning process. Proprietary test equipment shall become the property of the Owner upon completion of commissioning.
 18. Ensure deficiencies found in the Commissioning Issues Log are corrected within the time schedule shown in the Commissioning Plan.
 19. Provide Commissioning authority with all submittals, start-up instructions manuals, operating parameters, and other pertinent information related to Commissioning Process. This information shall be routed through Architect.
 20. Prepare and submit to Commissioning authority proposed Training Program outline for each system.
 21. Coordinate and provide training of Owner's personnel.
 22. Prepare Operation & Maintenance Manuals and As-Built drawings in accordance with specifications; submit copy to Commissioning authority in addition to other contractually required submissions. Revise and resubmit manuals in accordance with Design Professionals and Commissioning authority comments.
 23. Commissioning requires participation of this Division Subcontractors to ensure that systems are operating in manner consistent with Contract Documents. All costs associated with the participation of Contractor, Sub-Contractors, Design Professionals, and Equipment Vendors in the Commissioning Process shall be included as part of the Construction Contract.
- B. Subcontractors and vendors shall prepare and submit to Commissioning authority proposed Startup procedures to demonstrate proper installation of systems, according to these specifications and checklists prepared by Commissioning authority

1.4 COMMISSIONING PLAN

- A. Commissioning Process tasks and activities:
1. Commissioning kick-off meeting: Conducted by commissioning authority and attended by construction team and design team.
 2. Pre-functional checklists: Prepared by the commissioning authority and filled out by subcontractors performing the work that is applicable.
 3. Site visits to review installation of applicable systems and progress of checklist documentation performed and reported by commissioning authority.
 4. Functional testing: Commissioning authority shall conduct functional testing with

assistance of applicable subcontractors and document successful results as well as deficiencies (issues). Functional performance testing shall demonstrate the installation and operation of components, systems, and system-to-system interfacing in accordance with plans and specifications. Testing shall include all modes and sequence of operation, including under full-load, part-load and emergency conditions (including all alarms). Controls system shall be tested to document that control devices, components, equipment and systems are calibrated and adjusted and operate in accordance with the plans and specifications. Sequences shall be functionally tested to document they operate in accordance with plans and specifications.

5. Preliminary commissioning report: Commissioning authority shall issue a preliminary commissioning report to the owner that has results of the first round of functional testing including deficiencies discovered.
6. Air and hydronic system balancing: Air and water flow rates shall be measured and adjusted to deliver final flow rates within the tolerances provided in the contract documents. System balancing shall be performed by T.A.B. contractor as specified in the Testing, Adjusting and Balancing specification section 23 05 93.
7. Systems manual: Commissioning authority shall compile the systems manual using submittal data provided by the general contractor and applicable subcontractors.
8. Final commissioning report: Commissioning authority shall issue final commissioning report documenting the entire process and final results of functional testing. Report shall include final testing and balancing report.

B. Equipment to be tested

1. Energy Management and Control System:
 1. Graphical User Interface
 2. Automation Software
 3. Field Level Controllers
 4. Field Level Devices
 5. Control Sequences
2. Air Handling Systems (All AHU's)

C. Testing functions and conditions

1. Energy conservation programs (economizer, optimal start, etc)
2. Verify shutdown of systems when scheduled.
3. Calibration of sensors
4. Testing shall affirm winter and summer design conditions.
5. Test under full outside air conditions.
6. Confirm functionality of all specified sequences of operations.
7. Verify the functionality of all alarms.

D. Performance criteria

1. Air and water temperatures shall be within tolerances specified in the contract documents.
2. Space temperatures shall be maintained within 1 degree of specified set points.
3. Space humidity shall be maintained within 5% of specified levels.

PART 2 – PRODUCTS

2.1 NO PRODUCTS SUPPLIED

PART 3 – EXECUTION

3.1 GENERAL

- A. This Division has startup responsibilities and are required to complete sub-systems so COMPLETE SYSTEMS are fully functional. Insuring they meet design requirements of Contract Documents. Commissioning procedures and testing do not relieve or lessen this responsibility or shift this responsibility, in whole or in part, to Commissioning Agent or Owner.
- B. Coordinate with other Sub-Contractors and equipment vendors to set aside adequate time to address Pre-Functional Checklists, Functional Performance Tests, Operations & Maintenance Manual creation, Owner Training, and associated coordination meetings.
- C. Commissioning authority will also conduct site inspections at critical times and issue Cx Field Reports with observations on installation deficiencies so that they may be issued by Architect as deemed appropriate.

3.2 WORK PRIOR TO COMMISSIONING

- A. Complete all phases of the work so the systems can be started, adjusted, balanced, tested, and otherwise tested.
- B. See pertinent specification sections in this Division, which outline responsibilities for start-up of equipment with obligations to complete systems, including all sub-systems so that they are fully functional.
- C. Assist commissioning authority with all information pertaining to actual equipment and installation as required complete the full commissioning scope.
- D. Contractor shall prepare startup procedures to demonstrate compliance with pre-functional checklists, and coordinate scheduling for completion of these checklists.
- E. A minimum of 7 days prior to date of system startup, submit to Commissioning authority for review, detailed description of equipment start-up procedures which contractor proposes to perform to demonstrate conformance of systems to specifications and Checklists.

3.3 PARTICIPATION IN COMMISSIONING

- A. Attend meetings related to the Commissioning Process; arrange for attendance by personnel and vendors directly involved in the project, prior to testing of their systems.
- B. Provide skilled technicians to startup and test all systems, and place systems in complete and fully functioning service in accordance with Contract Documents.
- C. Provide skilled technicians, experienced and familiar with systems being commissioned, to assist Commissioning authority in commissioning process.

3.4 WORK TO RESOLVE DEFICIENCIES

- A. Complete corrective work in a timely manner to allow expeditious completion of Commissioning Process. If deadlines pass without resolution of identified problems, Owner reserves the right to obtain supplementary services and/or equipment to resolve the

problem. Costs thus incurred will be Contractor's responsibility.

3.5 PRE-FUNCTIONAL CHECKLISTS (PFC)

- A. Contractor shall complete Pre-Functional Checklists to validate compliance with Contract Documents installation and start-up requirements, for this Division's systems.
- B. Refer to commissioning plan for detailed list of equipment to be commissioned.

3.6 FUNCTIONAL PERFORMANCE TESTING (FPT)

- A. Contractor, in cooperation with Commissioning Agent, shall conduct Functional Performance Testing to validate compliance with Contract Documents.
- B. Refer to commissioning plan for detailed list of equipment to be commissioned.
- C. Assist Commissioning authority in Functional Testing by removing equipment covers, opening access panels, etc. Furnish ladders, flashlights, meters, gauges, or other inspection equipment as necessary.

3.7 TRAINING

- A. The following requirements are in addition to Operations & Maintenance requirements specified elsewhere in this specifications manual.
- B. Contractor shall be responsible for training coordination and scheduling, and ultimately to ensure that training is completed.
- C. The training agenda (plan) shall include, at a minimum, the following elements:
 - 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.
- D. Commissioning authority shall be responsible for overseeing and approving content and adequacy of training of Owner personnel for all installed systems. Provide Commissioning authority with training plan two weeks before planned training.

3.8 OPERATIONS & MAINTENANCE MANUALS

- A. The following requirements are in addition to Operations & Maintenance requirements specified elsewhere in this specifications manual.
- B. Sub-Contractor shall compile and prepare documentation for equipment and systems specified in this Division, and shall deliver documentation to Contractor for inclusion in Operation & Maintenance Manuals, in accordance with requirements of Division 01, prior to training Owner personnel.
- C. Provide Commissioning authority with a single, electronic copy of Operation & Maintenance Manuals for review. Commissioning authority copy of O&M manuals shall be submitted through Architect.

- D. Operation and maintenance manuals shall include, service agency contact information, maintenance requirements, controls system settings and a narrative of how each system is intended to operate, including set points.

3.9 DOCUMENTATION

- A. Commissioning authority shall provide documentation of process as follows:
 - 1. Preliminary commissioning report including test procedures, results of testing, itemization of deficiencies, deferred tests and climatic conditions required for performance of deferred tests. Preliminary commissioning report shall be issued to owner to demonstrate the first pass of testing has occurred and to demonstrate compliance with applicable codes.
 - 2. Final commissioning report shall include the final test and balance report, final results of functional testing, disposition of deficiencies discovered during testing, including the details of corrective measures used and functional testing procedures used for repeatability of testing in the future.

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 is included as a part of this Section as though written in full in this document.

1.2 SCOPE

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.

PART 2 - PRODUCTS

2.1 GENERAL

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: Copper ACR hard-drawn tubing.
- B. FITTINGS: Wrought copper streamlined sweat fitting.
- C. SOLDER: Sil-Fos; except on valves use solder recommended by valve manufacturer.

2.3 ACCESSORIES

All accessories shall be UL listed and rated in accordance with ARI Standard 710.

- A. On systems 7-1/2 tons and larger, each separate refrigerant circuit shall have a separate filter drier. 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 Brass Company model Drymaster micro-guard refillable filter series SD-485 through SD19217 or Sporlan catch-all.
- B. On systems less than 7-1/2 tons, the filter drier shall be the sealed type; sizes as above. One drier per refrigerant circuit.
- C. Liquid-Moisture Indicator shall be installed in liquid refrigerant line; full line size similar to Mueller Brass Company model "Vuemaster" with soldered ends.
- D. Thermostatic expansion valve shall have adjustable super heat and be as manufactured by Sporlan.

2.4 EVACUATION

Evacuate moisture completely by applying a commercial vacuum pump for a minimum of 24 hours. Moisture indicator shall indicate a completely moisture-free condition at time of final inspection. The vacuum pump shall run until the system indicates a maximum of 35 degrees FDB. 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.

2.5 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 All equipment and piping shall be installed in accordance with the manufacturer's recommendations and printed installation instructions.
- 3.2 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.

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. Duct cleaning.

1.2 RELATED SECTIONS

Division 9 - Finishes: Weld priming, weather resistant, paint or coating.

- A. Section 23 02 00 - Basic Material and Methods.
- B. Section 23 05 29 – Hangers and Support for Piping and Equipment HVAC.
- C. Section 23 05 93 - Testing, Adjusting and Balancing.
- D. Section 23 07 13 - Duct Insulation.
- E. Section 23 33 00 - Ductwork Accessories.
- F. Section 23 37 13 - Air Distribution Devices.

1.3 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.
- C. Codes and Standards:
 - 1. SMACNA Standards: Comply with latest SMACNA's "HVAC Duct Construction Standards, Metal and Flexible" for fabrication and installation of metal ductwork.
 - 2. ASHRAE90.1 Standards: Comply with ASHRAE Handbook, Equipment Volume, Chapter 1 "Duct Construction", for fabrication and installation of metal ductwork.
 - 3. NFPA Compliance: Comply with NFPA 90A "Standard for the Installation of Air Conditioning and Ventilating Systems", NFPA 90B "Standard for the Installation of Warm Air Heating and Air Conditioning Systems", and NFPA 96 Standard.
 - 4. IECC 2015: Comply with 2015 International Energy Conservation Code.

1.4 GENERAL DESCRIPTION

- A. Extent of metal ductwork is indicated on drawings and in schedules, and by requirements of this section.

1.5 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.

1.6 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.

1.7 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 A 527, lockforming quality, with G 90 zinc coating in accordance with ASTM A 525; and mill phosphatized for exposed locations.
- C. Stainless Steel Sheet: Where indicated, provide stainless steel complying with ASTM A167; 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 B 209, 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 3M or approved equal, corrosive resistant galvanized steel formed and mechanically locked to inner fabric with 1" thick insulation when flexible ducts are located in conditioned spaces and with R-5 insulation when located in unconditioned spaces. Flexible duct shall have reinforced metalized outer jacket 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 Duct Construction 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 Duct Construction 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 Duct Construction 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.

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 four feet maximum length of flexible duct. Do not use flexible duct to change direction.
- E. Connect diffusers or troffer boots to low pressure ducts with 6 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 floors, provide structural angles for duct support. Where ducts pass through walls in exposed areas, install suitable sheet metal escutcheons as closers.
- 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 6'-0" extended length.
- B. Installation: Install in accordance with Section III of SMACNA's, "HVAC Duct Construction Standards, Metal and Flexible".

3.3 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.

3.4 DUCTWORK APPLICATION SCHEDULE

AIR SYSTEM

Low Pressure Supply

MATERIAL

Galvanized Steel, Aluminum

Medium and High Pressure Supply	Galvanized Steel
Return and Relief	Galvanized Steel, Aluminum
General Exhaust	Galvanized Steel, Aluminum
Outside Air Intake	Steel

3.5 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. 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.

3.6 AIR DUCT LEAKAGE: (From SMACNA Duct Standards Latest Edition) Test all ductwork (designed to handle over 1000 CFM) as follows:

A. Test apparatus

The test apparatus shall consist of:

- 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 joint 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.

3.7 DUCT SYSTEM CLEANING

- A. Duct system cleaning shall be performed in accordance with the current published standards of ASHRAE and NADCA.
- 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. Temporary Closure: At 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.

- K. 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.

3.8 DUCT JOINTS AND SEAMS

- A. Seal all non-welded duct joints with duct sealant as indicated.

END OF SECTION

SECTION 23 31 14 - FABRIC AIR DISPERSION SYSTEM

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 is included as a part of this Section as though written in full in this document.

1.2 WORK INCLUDED

- A. Non-metal fabric ductwork.
- B. Internal fabric duct rigid framework and support grids.
- C. External hangers, supports, suspension system and related accessories.
- D. Air distribution and delivery devices.

1.3 RELATED WORK

- A. Section 23 31 13 – Metal Ductwork.
- B. Section 23 33 00 – Ductwork Accessories.
- C. Section 23 05 29 – Hangers and Supports for Piping and Equipment HVAC
- D. Section 23 05 93 – Testing, Adjusting, and Balancing

1.4 REFERENCES

- A. NFPA 90A – Installation of air conditioning and ventilating systems.
- B. ASTM E 84 (NFPA 255) – Standard method of test of surface burning characteristics of building materials.
- C. UL 2518

1.5 SUBMITTALS

- A. Product Data: Submit manufacturer's specifications on materials and manufactured products used for work of this section, including fabric duct, duct fittings, connections, supports, air delivery devices and all associated accessories.
- B. Building Code Data: Submit UL file number under which product is Classified by Underwriters Laboratories.
- C. Provide detailed drawings from the fabric duct manufacturer confirming configuration of Fabric Tensioning System (components, support locations, segment lengths) and Textile Dispersion System (diameter, lengths, airflow, pressure, velocity, and textile permeability).
- D. Provide detailed installation instructions for components to be installed.

1.6 WARRANTY

- A. Manufacturer must provide a complete product (20) twenty year pro-rated warranty for products supplied for the fabric and suspension of this system as well as a Design and Performance Warranty. Laundering frequency nor any other conditions shall pertain to warranty terms.
 - 1. Years (1) one through (10) ten: 100% coverage.
 - 2. Years (11) eleven through (15) fifteen: 50% coverage.
 - 3. Years (16) sixteen through (20) twenty: 25% coverage.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Protect fabric air dispersion systems from damage, water, and moisture during shipping, storage and handling.
- B. Where possible, store products inside and protect from weather. Where necessary to store outside, store above grade and enclose with a vented waterproof wrapping.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with requirements, provide products by the following:

- 1. DuctSox – Sedona Xm
- 2. KE Fibertec - KE-Direjet
- 3. FabricAir, Inc. - Combi 80
- 4. Prihoda – PM

2.2 NON-METAL FABRIC DUCT SYSTEM

- A. Fabric

- 1. Filament/filament twill polyester that includes 55% recycled content, treated with a machine washable EPA approved anti-microbial agent by the fabric manufacturer, fire retardant in accordance with UL 2518. Non-linting filament yarn to meet the requirements of ISO Class 3 environment.
- 2. Base Permeability @ 0.5" WG: 2 CFM / ft² per ASTM D737; shall be verified by the Frazier Permeability Test.
- 3. Weight: 6.8oz. / yd² per ASTM D3776.
- 4. Shrinkage: Max. 0.5% per DIN EN 26 630.
- 5. Temperature Range: -40°F and +284°F.
- 6. Fire Retardancy: Shall meet the requirements in NFPA 90-A, ICC AC167 and UL 2518.
- 7. Duct Shape: ROUND (coordinate with plans).
- 8. Fabric Color: Provide sample swatch of actual material and color with submittal and coordinate with the architect.

- B. Textile Systems Fabrication Requirements

- 1. Provide system in modular lengths optimized for maintenance, connected by zippers with proper radial securing clips (inlets, endcaps and mid-sections) and top access zippers (if required) for vertical cable safety attachment. Zippers shall provide closure completely around the circumference to prevent leakage. Required number of zippers shall be specified by the manufacturer.
- 2. The system shall be made of permeable fabric. Base permeability of fabric shall be

- reached based on a combination of weave construction and a thermo fixation process in order to prevent permeability degradation after wash. Fabric permeability based on a calendaring process is not acceptable.
3. Inlet connection to metal duct via fabric draw band with anchor patches as supplied by manufacturer. Anchor patches to be secured to metal duct via zip screw fastener – supplied by contractor.
 4. Inlet connection includes zipper for easy removal / maintenance.
 5. Lengths to include required intermediate zippers as specified by manufacturer.
 6. End cap includes zipper for easy maintenance.
 7. Each section of the fabric shall include identification labels documenting order number, section diameter, section length, piece number, code certifications and other pertinent information

C. System Design Parameters

1. Fabric duct system shall be designed from 0.25" water gage minimum to 3" maximum, with 0.5" as the standard.
2. Fabric duct system shall be limited to design temperatures between -40°F and
3. +284°F.
4. Design CFM, diameter, air distribution and delivery devices, static pressure and diffuser length shall be designed or approved by the manufacturer.
5. Do not use fabric diffusers in concealed locations.
6. Use fabric diffusers only for positive pressure air distribution components of the mechanical ventilation system.

D. Air Distribution and Delivery

1. Final air distribution and delivery method shall be integral to the non-metal fabric duct system and furnished as a whole, engineered system
2. Final air distribution and delivery design shall be based on the specific project design parameters for each installation based on the following criteria:
 - a. Total supply air flow for the space or specific branch.
 - b. Supply air branch length.
 - c. Non-metal fabric duct diameter.
 - d. Throw requirements.
 - e. Available main supply Air duct static pressure at the branch connection for the non-metal fabric duct.
 - f. Temperature of supply air and HVAC application; heating only, cooling only, heating and cooling.
3. All final air distribution and delivery methods and devices utilized for each application shall be selected to deliver the required air flow rates with noise criteria (NC) levels not to exceed 30NC.
4. Linear Vents
 - a. Air dispersion accomplished by linear vent and permeable fabric. Linear vents must be sized in 1 CFM per linear foot increments (based on .5" SP), starting a 1 CFM through 90 CFM per linear foot. Linear vent is to consist of an array of open orifices rather than a mesh style vent to reduce maintenance requirements of mesh style vents. Linear vents should also be designed to minimize dusting on fabric surface.
 - b. Size of vent opening and location of linear vents to be specified and approved by manufacturer.
5. Orifices – 2" & 3" SG's (Sewn-in Grommet)

- a. Air dispersion and extended throws are accomplished by reinforced orifices and permeable fabric. Reinforced orifices are to be installed to keep the integrity of opening and withstand laundry processes.
- b. Diameter, capacity, and location of reinforced orifices to be specified and approved by manufacturer.

6. Fixed Nozzles

- a. Air dispersion accomplished by using conical aerodynamic nozzles and permeable fabric. Diameter of nozzles height to be minimum $\frac{1}{2}$ ". Due to exact requirements of throw and maximum level of noise alternative flow models are not acceptable.
- b. Color of nozzles must match color of fabric. Unless otherwise specifically mentioned on drawings or otherwise in this specification, supplier's standard table is used for selection of color.
- c. Location and number of nozzles to be specified and approved by manufacturer.

7. Adjustable Nozzles

- a. Air dispersion accomplished by adjustable ball nozzles and permeable fabric. Adjustable ball nozzles to have multiaxial rotation to redirect airflow to desired area. Adjustable ball nozzles are able to completely close off airflow without adding caps or plugs. Adjustable ball nozzles should lock into place once set, preventing constant adjustment. Adjustable ball nozzle should have inset design to be a condensation resistant product.
- b. Colors of adjustable nozzles are available are white and black. With white material receiving white adjustable nozzles and all other material colors receiving black adjustable nozzles unless otherwise specifically mentioned on drawings or otherwise in the specification.
- c. Quantity and location of adjustable ball nozzles to be specified and approved by manufacturer.

E. Fabric Duct Fittings

1. The non-metal fabric duct manufacturer shall provide duct fittings based on the specific project design parameters and layout for each installation.
2. Fabric duct fittings shall be constructed of the same fabric as the non-metal duct system and shall meet the same requirements and specifications.
3. Fabric duct fittings shall have the same internal metal support structure and external suspension components as the non-metal duct system.
4. Fabric duct fittings shall be provided for:
 - a. Radius elbows in 30°, 40°, 60°, and 90° configurations.
 - b. Duct transitions in increments of 2" duct diameter changes in configurations of center-aligned, top-aligned, and bottom aligned.
 - c. Tee and branch fittings in both matching branch-to-main diameters and non-matching branch-to-main diameters in center-aligned, top-aligned and bottom aligned configuration, single and dual-sided branches.

F. Internal Frame and Fabric Tensioning System

1. System shall cylindrically tension the duct fabric along the entire length of fabric duct, including all fittings.
2. Tensioning system shall be metallic and shall include full 360 degree tensioning and intermediate rings with quick connection spacer tubes concealed inside the fabric system.
3. Interior structure to include multiple mechanically adjustable tension devices. To

- provide proper fabric tensioning, structural and fabric system shall be configured in segments of no more than 45 feet.
4. Fabric components supported solely by metal cylindrical rings.
 5. Each cylindrical ring shall require vertical metal to metal vertical cable safety attachment.
 6. If within a natatorium, all metal structural components shall be able to withstand chlorinated environment and shall not be susceptible to corrosion. Provide necessary coatings and materials.

G. External Hangers, Supports and Suspension

1. Tension Cable System, One row Cable:
 - a. Systems shall be installed 1-1/2" above top-dead-center. Textile system attachment to cable shall be made using gliders spaced every 24 inches. Available for systems less than 32" diameter. Cable suspension hardware to include cable, eye bolts, thimbles, cable clamps, and turnbuckle(s) as required.
 - b. Cable suspension options:
 - Galvanized steel cable
 - Stainless steel cable
 - Impregnated steel cable
 - c. Support lengths available in 5' (standard), 10', 15', & 30'.
2. Tension Cable System, Two Row Cable:
 - a. Systems shall be installed 1-1/2" above the 10 and 2 o'clock locations. Textiles system attachment to cable shall be made using Gliders spaced every 24 inches. Required for systems of 32"-59" diameter. Available for systems less than 32" diameter. Cable suspension hardware to include cable, eye bolts, thimbles, cable clamps, and turnbuckle(s) as required.
 - b. Cable suspension options:
 - Galvanized steel cable
 - Stainless steel cable
 - Impregnated steel cable (required for natatorium applications)
 - c. Support lengths available in 5' (standard), 10' 15', & 30'.
3. Tension Cable System, Three Row Cable:
 - a. Systems shall be installed 1-1/2" above the 10, 12, and 2 o'clock locations. Textile system attachment to cable shall be made using Gliders spaced every 24 inches. Required for systems of 60" diameter and larger. Available for systems less than 60" diameter. Cable suspension hardware to include cable, eye bolts, thimbles, cable clamps, and turnbuckle(s) as required.
 - b. Cable suspension options:
 - Galvanized steel cable
 - Stainless steel cable
 - Impregnated steel cable (required for natatorium applications)
 - c. Support lengths available in 5' (standard), 10' 15', & 30'.

4. U-Track System, One Row U-Track:
 - a. Systems shall be installed 1-1/2" above top-dead-center. Textile system attachment to cable shall be made using Gliders spaced every 24 inches. Available for systems less than 32" diameter. U-Track suspension hardware to include 8' sections of aluminum track, aluminum splice connectors, track endcaps and vertical cable support kits - consisting of a length of cable with cable connectors. Radius aluminum must be included for all horizontal/flat radius sections.
 - b. U-Track suspension options:
 - Galvanized steel cable
 - Stainless steel cable
 - Impregnated steel cable
 - c. Support lengths available in 5' (standard), 10' 15', & 30'.
5. U-Track System, Two Row U-Track:
 - a. Systems shall be installed 1-1/2" above the 10 and 2 o'clock locations. Textile system attachment to cable shall be made using Gliders spaced every 24 inches. Required for systems of 32" - 59" diameter. Available for systems less than 32" diameter. U-Track suspension hardware to include 8' sections of aluminum track, aluminum splice connectors, track endcaps and vertical cable support kits - consisting of a length of cable with cable connectors. Radius aluminum track must be included for all horizontal/flat radius sections.
 - b. U-Track suspension options:
 - Galvanized steel cable
 - Stainless steel cable
 - Impregnated steel cable
 - c. Support lengths available in 5' (standard), 10' 15', & 30'.
6. U-Track System, Three Row U-Track:
 - a. Systems shall be installed 1-1/2" above the 10, 12, and 2 o'clock locations. Textile system attachment to cable shall be made using Gliders spaced every 24 inches. Required for systems of 60" diameter and larger. Available for systems less than 60" diameter. U-Track suspension hardware to include 8' sections of aluminum track, aluminum splice connectors, track endcaps and vertical cable support kits - consisting of a length of cable with cable connectors. Radius aluminum track must be included for all horizontal/flat radius sections.
 - b. U-Track suspension options:
 - Galvanized steel cable
 - Stainless steel cable
 - Impregnated steel cable
 - c. Support lengths available in 5' (standard), 10' 15', & 30'.

PART 3 - INSTALLATION

3.1 INSTALLATION OF FABRIC AIR DISPERSION SYSTEM

- A. Install chosen suspension system with minor noise and fabric motion at start-up in accordance with the requirements of the manufacturer. Instructions for installation shall be provided by the manufacturer with product. Suspension Track and cable within a natatorium shall be able to withstand chlorinated environment and shall not be susceptible to corrosion. Provide necessary coatings and materials.

3.2 CLEANING AND PROTECTION

- A. Clean air handling unit and ductwork prior to the fabric air dispersion system unit-by-unit as it is installed. Clean external surfaces of foreign substance which may cause corrosive deterioration of facing.
- B. Temporary Closure: At ends of ducts which are not connected to equipment or distribution devices at time of ductwork installation, cover with polyethylene film or other covering which will keep the system clean until installation is completed.
- C. If fabric dispersion system becomes soiled during installation, it should be removed and cleaned following the manufacturers standard terms of laundry.

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. Back draft dampers.
- F. Air turning devices.
- G. Flexible duct connections.
- H. Duct access doors.
- I. Duct test holes.

1.2 RELATED WORK

- A. Section 23 05 48 - Vibration and Seismic Controls for HVAC Piping and Equipment.
- B. Section 23 31 13 - Metal Ductwork.

1.3 REFERENCES

- A. NFPA 90A - Installation of Air Conditioning and Ventilating Systems.
- B. SMACNA - Low Pressure Duct Construction Standards.
- C. UL 33 - Heat Responsive Links for Fire-Protection Service.
- D. UL 555 - Fire Dampers and Ceiling Dampers.

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 Low Pressure Duct Construction Standards, 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 Low Pressure Duct Construction Standards, and as indicated.
- B. Provide Class I multi-blade damper of parallel blade pattern for all ductwork systems which penetrate the building thermal envelope.
 - 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/ft² of damper surface area at 1.0 in.w.g. and shall be labeled by an approved agency when tested in accordance with AMCA 500D 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 – 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.

2.6 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/ft² where not less than 24 inches in either dimension and 40 cfm/ft² 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 500D for such purpose.

2.7 ACCEPTABLE MANUFACTURERS – AIR TURNING DEVICES

- A. Young Regulator.
- B. Titus.
- C. Tuttle and Bailey.
- D. Substitutions: Under provisions of Division One.

2.8 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.

2.9 ACCEPTABLE MANUFACTURERS – FLEXIBLE DUCT CONNECTIONS

- A. Metaledge.
- B. Ventglass.
- C. Substitutions: Under provisions of Division One.

2.10 FLEXIBLE DUCT CONNECTIONS TO AIR MOVING EQUIPMENT

- A. Fabricate in accordance with SMACNA Low Pressure Duct Construction Standards, 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.

2.11 ACCEPTABLE MANUFACTURERS – DUCT ACCESS DOORS

- A. Greenheck.
- B. American Warming and Vent.
- C. Ruskin.
- D. Titus.
- E. Substitutions: Under provisions of Division One.

2.12 DUCT ACCESS DOORS

- A. Fabricate in accordance with SMACNA Low Pressure Duct Construction Standards 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.

2.13 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, at fire 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 test holes where indicated and required for testing and balancing purposes.

END OF SECTION

SECTION 23 37 13 - AIR DISTRIBUTION DEVICES

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Ceiling air diffusers.
- B. Wall registers and grilles.
- C. Louvers.
- D. Other air devices indicated on drawings and schedules.

1.2 RELATED SECTIONS

- A. Section 23 02 00 – Basic Materials and Methods
- B. Section 23 05 93 – Testing, Adjusting and Balancing
- C. Section 23 31 13 – Metal Ductwork
- D. Section 23 31 16 – Fibrous Glass Ductwork
- E. Section 23 31 19 – Ductwork Accessories

1.3 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of air distribution devices of types and capacities required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Codes and Standards:
 - 1. ARI Compliance: Test and rate air distribution devices in accordance with ARI 650 "Standard for Air Outlets and Inlets".
 - 2. ASHRAE Compliance: Test and rate air distribution devices in accordance with ASHRAE 70 "Method of Testing for Rating the Air Flow Performance of Outlets and Inlets".
 - 3. AMCA Compliance: Test and rate louvers in accordance with AMCA 500 "Test Method for Louvers, Dampers and Shutters".
 - 4. AMCA Seal: Provide louvers bearing AMCA Certified Rating Seal.
 - 5. NFPA Compliance: Install air distribution devices in accordance with NFPA 90A "Standard for the Installation of Air Conditioning and Ventilating Systems".

1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's technical product data for air distribution devices including the following:
 - 1. Schedule of air distribution devices indicating drawing designation, room location, number furnished, model number, size, and accessories furnished.
 - 2. Data sheet for each type of air distribution devices, and accessory furnished; indicating construction, finish, and mounting details.

3. Performance data for each type of air distribution devices furnished, including aspiration ability, temperature and velocity traverses; throw and drop; and noise criteria ratings. Indicate selections on data.
- B. Shop Drawings: Submit manufacturer's assembly-type shop drawing for each type of air distribution devices, indicating materials and methods of assembly of components.
- C. Maintenance Data: Submit maintenance data, including cleaning instructions for finishes, and spare parts lists. Include this data, product data, and shop drawings in maintenance manuals; in accordance with requirements of Division 1.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver air distribution devices wrapped in factory-fabricated fiber-board type containers. Identify on outside of container type of outlet or inlet and location to be installed. Avoid crushing or bending and prevent dirt and debris from entering and settling in devices.
- B. Store air distribution devices in original cartons and protect from weather and construction work traffic. Where possible, store indoors; when necessary to store outdoors, store above grade and enclose with waterproof wrapping.

1.6 WARRANTY

- A. Warrant the installation of the Work specified herein for one year against becoming unserviceable or causing an objectionable appearance resulting from defective or nonconforming workmanship.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Titus Company
- B. Nailor Industries
- C. Krueger
- D. Price

2.2 GENERAL DESCRIPTION

- A. Unless otherwise indicated, provide manufacturer's standard air devices when shown of size, shape, capacity, type and accessories indicated on drawings and schedules, constructed of materials and components as indicated and as required for complete installation and proper air distribution.
- B. Provide air devices that have, as minimum, temperature and velocity traverses, throw and drop, and noise criteria ratings for each size device and listed in manufacturer's current data.
- C. Unless noted otherwise on drawings, the finish shall be #26 white. The finish shall be an anodic acrylic paint, baked at 315°F for 30 minutes. The pencil hardness must be HB to H. The paint must pass a 100 hour ASTM D117 Corrosive Environments Salt Spray Test without creepage, blistering, or deterioration of film. The paint must pass a 250 hour ASTM-870 Water Immersion Test. The paint must also pass the ASTM D-2794 Reverse Impact Cracking Test with a 50 inch pound force applied.

- D. Provide air device with border styles that are compatible with adjacent ceiling or wall system, and that are specially manufactured to fit into the wall construction or ceiling module with accurate fit and adequate support. Refer to architectural construction drawings and specifications for types of wall construction and ceiling systems.
- E. Provide integral volume damper with roll formed steel blades where indicated on drawings or schedules. Dampers shall be opposed blade design with a screw driver slot or a concealed lever operator for adjustment through the face of the air device.
- F. Air devices designated for fire rated systems shall be pre-assembled with UL classified radiation damper and thermal blanket. Fire rated air devices shall be shipped completely assembled; one assembly per carton, Each assembly shall be enclosed in plastic shrink wrap with installation instructions.

2.3 LOUVERS

- A. Except as otherwise indicated, provide manufacturer's standard louvers where shown; of size, shape, capacity and type indicated; constructed of materials and components as indicated, and as required for complete installation.
- B. Provide louvers that have minimum free area, and maximum pressure drop of each type as listed in manufacturer's current data, complying with louver schedule.
- C. Provide louvers with frame and sill styles that are compatible with adjacent substrate, and that are specifically manufactured to fit into construction openings with accurate fit and adequate support, for weatherproof installation. Refer to architectural construction drawings and specifications for types of substrate.
- D. Louvers shall be constructed of aluminum extrusions, ASTM B 221, Alloy 6063-T5. Weld units or use stainless steel fasteners.
- E. Louver Screens: On inside face of exterior louvers, provide 1/2" square mesh anodized aluminum wire bird screens mounted in removable extruded aluminum frames.
- F. Acceptable Manufacturers:
 - 1. Ruskin Manufacturing Company
 - 2. Greenheck Company
 - 3. Louvers and Dampers, Inc.
 - 4. Pottorff
 - 5. Arrow
 - 6. Substitutions under provisions of Division One.

PART 3 – EXECUTION

- 3.1 All interior surfaces of all air devices shall be painted flat black.
- 3.2 See floor plans for type, neck size and CFM of air for all air distribution devices.
- 3.3 Install all air distribution devices as detailed on plans and in accordance with manufacturer's recommendations.

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. The Basic Materials and Methods, Section 23 02 00, are included as a part of this Section as though written in full in this document.

1.2 SCOPE

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.

PART 2 - PRODUCTS

2.1 FILTERS

- A. Air filters shall be medium efficiency ASHRAE pleated panels consisting of cotton and synthetic media, welded wire media support grid, and beverage board enclosing frame, Camfil Farr 30/30, 2-inch thick or approved equal.
- B. APPROVED MANUFACTURERS: The following manufacturers are approved subject to specification compliance.
 - 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 24 inches X 24 inches X 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 cotton fabric 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 inclosing frame to prevent air bypass. Minimum Efficiency Reporting Value of MERV 8 when evaluated under the guidelines of ASHRAE Standard 52.2-2017. Initial resistance shall not exceed 0.23 inches water gauge at 350 FPM face velocity.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install differential pressure switch to activate "Filter Dirty" light when pressure difference across filters reaches 0.5 inch W.G. (adjustable). Locate "filter dirty" lights in mechanical rooms with identifying label

- B. Install and relocate filters in the mechanical or the storage room in accordance with manufacturer's recommendations.
- C. Refer to Section 23 02 00 for additional filter information.

END OF SECTION

SECTION 23 81 36 – GROUND MOUNTED HEATING AND COOLING UNITS ELECTRIC COOLING - ELECTRIC HEAT

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.
- B. The Basic Materials and Methods, Section 230200, 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 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

- A. Section 23 09 63 – Energy Management and Control System

1.4 RELATED SECTIONS

- A. Section 23 02 00 – Basic Materials and Methods
- B. Section 23 05 13 – Common Motor Requirements for HVAC Equipment
- C. Section 23 05 26 – Variable Frequency Motor Speed Control for HVAC Equipment
- D. Section 23 05 48 - Vibration and Seismic Controls for HVAC Piping and Equipment
- E. Section 23 05 93 – Testing, Adjusting, and Balancing
- F. Section 23 09 63 – Energy Management and Control System
- G. Section 23 33 00 - Ductwork Accessories
- H. Section 23 41 00 – Air Filters

1.5 QUALITY ASSURANCE

- A. NFPA 90 A & B - Installation of Air Conditioning and Ventilation Systems and Installation of Warm Air Heating and Air Conditioning Systems.
- B. ANSI/ASHRAE 15 - Safety Code for Mechanical Refrigeration.
- C. AHRI 360 - Commercial and Industrial Unitary Air Conditioning Equipment testing and rating standard.
- D. ANSI/ASHRAE/IES 90 A - Energy Conservation in New Building Design Standard provides performance requirements to improve the utilization of energy in new buildings.
- E. AHRI 410 - Forced Circulation Air-Cooling and Air- Heating Coils Standard for establishing requirements for testing, rating and certification of ratings.

- F. ANSI/UL 465 - Central Cooling Air Conditioners Standard for safety requirements.
- G. AMCA 300 - Reverberant room method for sound testing of fans.
- H. ANS S1.32 - Precision methods for the determination of sound power levels of discrete frequency and narrow band noise sources in reverberation rooms.

1.6 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 valves required for complete system.
- C. Product data shall include rated capacities, weights, specialties and accessories, electrical requirements and wiring diagrams.
- D. Provide fan curves with specified operating point clearly identified.
- E. Submit manufacturer's installation instructions.

1.7 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.

1.8 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.

1.9 WARRANTY

- A. Provide a full parts and labor warranty for one year from start-up or 18 months from shipment, whichever occurs first.
- B. Provide five-year warranty for compressors materials and labor.

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 ROOFTOP UNIT

- A. Rooftop unit shall be packaged and include electric cooling and electric heat with capacity and modulating cooling and heating as shown on the drawings.
- B. Unit shall be factory-charged and tested, shall be UL-labeled and ARI-certified by Standard 210 and 270, and shall be AGA-certified.
- C. Unit casing shall be heavy-gauge galvanized steel or heavy-gauge aluminum with protective coat of baked enamel. Weatherproof access panels shall be provided for access to all parts requiring service.
- D. Compressor(s) shall be hermetic scroll type and shall be resiliently mounted to avoid vibration and noise. Compressor shall be provided with anti-slugging protection, crankcase heater, and time delay on recycling of the compressor. Two internal compressor motor thermal cutouts and a hot gas cutout shall protect the compressor in addition to high-pressure and low-pressure safeties. Standard controls shall permit operation down to 35 deg. F (2 deg. C) and compressor shall be locked out below this temperature.
- E. Condenser fan(s) shall be direct-driven on the shaft of the slow-speed motor, which shall be designed to operate exposed to the weather.
- F. Condenser coils shall have a sub-cooling section.
- G. Refrigerant circuit shall include filter dryer, moisture indicator, sight glass, and gauge ports.
- H. Filter rack shall be provided for filters 2 in. thick and shall filter both outdoor air and return air. See Section 234100 of these Specifications for type of filters and the number of filter changes to be furnished with the equipment.
- I. Evaporator fan shall be quiet-type centrifugal blower, directly connected to an adjustable-speed motor or belt driven with an adjustable-pitch pulley on the motor.
- J. Electric heat section shall be installed in the unit and served by the same power source as the rest of the unit. Only one power feed shall be required for the unit.

2.2 ACCESSORY EQUIPMENT

- A. Unit shall be provided with hot gas reheat option for dehumidification. Hot gas reheat coil shall be located on the leaving air side of the evaporator coil and fully piped and circuited at the factory.

- B. Condenser coil hail guards shall be provided.
- C. A prefabricated heavy gauge galvanized steel, mounting curb shall be provided for field assembly on the concrete slab prior to unit shipment. The curb shall be a full perimeter type with complete perimeter support of the air handling section and condensing section. The curb shall be a minimum of 14" high and include a nominal 2" x 4" wood nailing strip. Gasket shall be provided for field mounting between the unit base and concrete slab.
- D. Provide "power saver" dampers and controls to provide "free cooling" from 0 to 100% outdoor air (OA) when the outside air humidity and temperature are acceptable. Provide OA, return air, and relief air dampers in a factory-provided enclosure. All air shall be filtered and bird screen shall be installed.
- E. A solid state enthalpy changeover control shall determine the capability of the outside air to provide free cooling. The control package shall include a differential enthalpy sensor in the return air duct to compare the enthalpy of the outside air and return air and use the air with the lowest enthalpy for free cooling or assisting the mechanical cooling. The cooling control sequence is as follows:
 - 1. The changeover control determines if the outdoor air is suitable for free cooling.
 - 2. The space thermostat determines if cooling is needed in the building. If so:
 - 3. The actuator modulates the outdoor air and return air dampers to maintain the desired mixed air temperature.
 - 4. The second cooling stage of the space thermostat energizes the compressor to assist the economizer if required.
 - 5. If the outdoor air is not suitable for free cooling, the outdoor air damper remains in the minimum ventilation position and the compressor is energized when space cooling is required.
- F. Provide a warm-up thermostat to prevent the OA dampers from opening if the return air temperature is below the set point (65 deg. F) (18 deg. C).
- G. Provide necessary controls for operation of the compressor below the normal temperature of the compressor cutout. Operation shall be permitted down to temperature specified on drawings.
- H. Provide factory-trained service person to check out the system, calibrate the controls, and see that the RTU is operating properly. The service person making the settings shall make a written report to the engineer and the owner with all set points listed for future reference.
- I. Rooftop units mounted on slabs or other fixed locations shall be provided with adapters for end discharge and return to the unit.
- J. Provide programmable combination thermostat/humidistat and other controls required to produce the control functions called for.
- K. Manufacturer shall provide BACnet interface card for communication with EMCS.

2.3 ACCEPTABLE MANUFACTURERS

- A. Roof top unit shall be the make and model number shown on the schedule on the drawings, or acceptable equivalents are Carrier, Lennox, Trane, York or Daikin.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install the curb as required by the job conditions and as recommended by the manufacturer, and install proper flashing and counterflashing. See details on the drawings.
- B. Set the unit in place, taking care to protect the adjacent roofing, and connect the supply and return ductwork.
- C. Make electrical connections, taking care that these do not block access to any part of the equipment requiring service.
- D. Have the factory service person check out the unit and make a written report. Place the unit in service.
- E. Connect full size condensate drain pipe to roof top unit and extend to nearest drain, pipe shall be schedule 40 galvanized with malleable iron fittings.

3.2 BALANCING AND TEST

- A. Operate the roof top unit and check for proper supply air quantity, noise, and proper operation.
- B. Report the airflow, static pressure, voltage and current draw of each item, refrigerant pressure readings, etc., as required by Section 23 05 93 of these Specifications. This system is not complete until these readings have been made, submitted to the engineer, and accepted.

END OF SECTION

SECTION 26 02 00 - BASIC MATERIALS AND METHODS

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 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. 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:

Distribution Panelboards
Panelboards
Wiring Gutters
Heavy Duty Disconnect Switches
Lighting Fixtures
Lighting Contactors
Time Clocks
Lighting Control System
Photocells
Wiring Devices and Plates
Conduit and Fittings
Wire
Switchboards
General Purpose Dry Type Transformers
Harmonic Mitigating Type Transformers
Emergency Generator
Automatic Transfer Switches
Sound Reinforcing System
Fire Alarm System
Surge Protection Device (SPD)
Lightning Protection

- 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. 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 pipe or duct, locations of all concealed valves, controls and devices 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. When the option described in paragraph F., 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)

1.16 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 labeled 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 All materials and 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 EQUIPMENT PADS

- A. Provide 4-inch-high concrete pads for indoor floor mounted equipment. Pads shall conform to the shape of the equipment with a minimum of 6 inch beyond the equipment. 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 of 6 inch beyond the equipment. 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.
- C. Provide a minimum 6-inch-high, steel reinforced concrete pad for generators. Pads shall be sized 6" larger than the outside perimeter dimensions. Provide a 4-foot monolithic extension to the pad around the equipment for service when mounted on a non-finished area (i.e. landscape, gravel, clay, etc.). Refer to structural details. 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. The generator shall be bolted to the concrete pad per the manufacturers details.

- D. Provide steel reinforced concrete pad for utility transformers. Pads shall comply with Utility Company Standards.

2.5 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.

2.6 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.

2.7 PAINTING

- A. All factory assembled equipment for electrical work, except light fixtures, that normally is delivered with a factory applied finish 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.

2.8 ELECTRICAL SYSTEM IDENTIFICATION

- A. Conduit Systems: Provide adequate marking of major conduit which is exposed or concealed in accessible spaces to distinguish each run as either a power or signal/communication conduit. Except as otherwise indicated, use orange banding with black lettering. Provide self-adhesive or snap-on type plastic markers. Indicate voltage for that raceway. Locate markers at ends of conduit runs, on pull boxes, on junction boxes, near switches and other control devices, near items of equipment served by the conductors, at points where conduit passes through walls or floors, or enters non-accessible construction and at spacings of not more than 50 feet along each run of conduit. Switch-leg conduit and short branches for power connections do not have to be marked, except where conduit is larger than ¾ inch. Branch circuit conduits, junction boxes and pull boxes shall be marked with a permanent marker indicating panel name and branch circuit numbers.
- B. 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.
- C. 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.

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 safety switch, disconnect switch, individual motor starter, enclosed circuit breaker, wireway, and terminal cabinet.
 - a. Identifying nameplates shall have ¼ inch high engraved letters and shall indicate the equipment served.
 - b. An example if 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."

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. 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.
- D. 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 contractors, time clocks, 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.

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 02 01 - COORDINATION DRAWINGS

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. The requirements of the General Conditions 013100 and Supplementary Conditions apply to all Work herein.

1.2 COORDINATION DRAWINGS

- A. The Contractor shall take the lead in coordinating the Mechanical, Electrical, Plumbing, Communications, Electronic Safety/Security and Fire Protection systems within the building.
- B. The Contractor shall coordinate a three-dimensional (3D) model of the building which includes the Mechanical, Electrical, Plumbing, and Fire Protection systems. The Mechanical, Electrical, Plumbing, and Fire Protection Contractors shall prepare their work and generate 3D models which will be given to the Contractor for coordination. The Contractor will be provided with the REVIT model that was used to generate the contract documents, this file may be used as the background file. The Contractor shall replace the systems drawn with the actual shop drawing models. The Contractor is not limited to using REVIT, but may use any 3-D software in generating and combining the coordination model.
- C. Submitting the contract drawings as coordination drawings will not be acceptable.
- D. The model shall include detailed and accurate representations of all equipment to be installed based upon the reviewed equipment submittals.
- E. The Contractor shall hold a 3-D coordination meeting with all sub-contractors present to review the model and discuss coordination of the installation of the building systems.
- F. Upon completion of the coordination meeting, the Contractor shall submit the 3-D model and 1/4" scale drawings for review.
- G. The model shall detail major elements, components, and systems 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.
- H. Sequence of Coordination
- 1. Below is hierarchy of model elements and the sequencing by which the models will be coordinated:
 - a. Structural and Architectural model
 - b. Miscellaneous steel
 - c. Perform preliminary space allocation
 - d. Identify hard constraints (locations of access panels, lights, A/V space requirements, etc.)
 - e. Main and medium pressure ducts from the shaft out
 - f. Main graded plumbing lines and vents
 - g. Sprinkler mains and branches
 - h. Cold and hot water mains and branches
 - i. Lighting fixtures and plumbing fixtures
 - j. Smaller sized ducts and flex ducts
 - k. Smaller size cold water and hot water piping, flex ducts, etc.
 - I. The Contractor shall not install any item until the coordination has been completed and reviewed by the Construction Manager, Owner, and A/E team.
 - J. 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.
 - K. 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.

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 and power.
 - 2. Automatic Control Wiring.
 - 3. Connection of equipment shown.
- C. **WORK SPECIFIED ELSEWHERE:**
 - 1. Heating, ventilating, and air conditioning equipment.
 - 2. Structured cabling system.
 - 3. Coaxial cables

1.2 STANDARDS

- A. UL83
- B. ASTM B-3
- C. All wire cable and connectors shall be UL approved.

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

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 fluorescent 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.

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 No. 12, unless otherwise shown on Drawings or required by Code.

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

2.2 GROUNDING

Permanently connect all conduit work, motors, starters, and other electrical equipment to grounding system in accordance with the National Electrical Code.

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

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 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 manufacture.

3.4 CABLE SUPPORTS

- A. Provide cable supports in all vertical raceways in accordance with Article 300-19 of the

NEC.

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

- A. **GENERAL:** 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. SERVICE ENTRANCE GROUNDING SYSTEM: Provide a main bonding jumper between the neutral and ground bus of each switchboard. Route a separate grounding electrode conductor in conduit from each main distribution panel to the ground rod grid, incoming cold water piping system. Provide a bonding jumper around water meter. The grounding electrode conductor shall be stranded copper, 98% conductivity and shall be run continuous without splices or joints and installed at least 12" below grade.
- C. BUILDING STEEL AND PIPING SYSTEM: Install a bonding jumper between building steel and metallic piping systems to bond them to the electrical grounding system.
- D. NEUTRAL: The neutral shall be grounded only at the service entrance and other separately derived systems. The neutral shall be kept separate from the grounding system and shall not be used as a ground.
- E. GROUNDING SEPARATELY DERIVED ALTERNATING CURRENT SYSTEM
 - 1. TRANSFORMERS: The center point (neutral) of each wye connected transformer shall be bonded to the case and a grounding electrode conductor shall be connected to a ground rod or building steel.
 - 2. STANDBY EMERGENCY GENERATOR: The generator neutral shall be bonded to the generator when a 4 pole switched neutral automatic transfer switch is specified.
- F. 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.
- G. 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.
- H. MOTORS: The frame of all motors shall be grounded.
- I. SPECIAL GROUNDING: Provide a #6 AWG copper grounding conductor for each telephone board, television system, etc. Terminate the grounding conductor on ground bus and to the building electrical grounding system. Refer to 800-40(d) and 820-40(d) of the NEC.
- J. REMOTE PANELBOARDS: Provide a grounding electrode conductor all remote panels as required by the NEC and shown on drawings.
- K. 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.

- L. RECEPTACLES: All receptacles shall be grounded using the branch circuit grounding conductor. Receptacles shall use an approved grounding yoke.
- 3.2 TESTING: 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 of the NEC or the most current edition 250-56). 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
 - 8. Rigid Aluminum Conduit (RAC)

1.2 STANDARDS

- A. ANSI, C80.1 & C80.3
- B. NEMA FB-1
- C. NEMA TC3
- D. UL, 6, 797 & 1242

1.3 ACCEPTABLE MANUFACTURERS

- A. Raceways
 - 1. Allied
 - 2. Republic
 - 3. Prime Conduit (Carlon)
 - 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. Racco, 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. National Electrical Code.
- B. Local, municipal, or state codes that have jurisdiction.

PART 2 – PRODUCTS

2.1 CONDUIT AND FITTINGS:

A. Rigid Galvanized Steel Conduit.

1. Hot-dip galvanized rigid steel conduit, galvanized after fabrication. Products shall comply with UL6 and ANSI C80.1. All threads shall be galvanized after cutting. A uniform zinc coating shall be applied to the inner and outer walls.

2. Fittings shall be threaded and shipped with thread protectors.
- B. Aluminum Rigid Conduit
1. Rigid aluminum (alloy 6063-T1) conduit shall be manufactured using 606 3 Alloy in temper designation T-1. Products shall comply with UL6A and ANSI 680.5
 2. Fittings for rigid aluminum conduit shall be threaded aluminum shipped with thread protectors.
- C. PVC Coated Rigid Galvanized Steel Conduit.
1. Conduit shall be same as rigid metal conduit with a factory-applied 40-mil-thick covering of polyvinyl chloride (PVC) bonded to the metal.
 2. Fittings shall be the same as rigid metal conduit fittings with a factory-applied, 40-mil-thick covering of polyvinyl chloride (PVC) bonded to the metal
- D. Intermediate Metal Conduit (IMC).
1. Conduit shall be similar to rigid steel conduit except thinner wall.
 2. Fittings shall be threaded hot-dipped galvanized and shipped with thread protectors.
- E. Electrical Metallic Tubing (EMT).
1. 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.
- F. Rigid Nonmetallic Conduit (PVC).
1. Conduit shall be schedule 40 or 80 polyvinyl chloride (PVC), UV stabilized, rated for 90°C conductors.
 2. Fittings shall be solvent weld socket type.
- G. Flexible Metal Conduit (Greenfield).
1. Spirally wound continuously interlocked zinc coated strip steel.
 2. Fittings shall be one screw for smaller than 1-1/2-inch, two screw for 1-1/2-inch and larger, double clamp steel or malleable iron, either cadmium plated or hot-dip galvanized.
- H. Liquid-Tight Flexible Steel Conduit (Seal Tite).
1. Spirally wound continuously interlocked zinc coated strip steel with a UV stabilized polyvinyl chloride (PVC) outer jacket bonded to the conduit.
 2. Fittings shall be compression type, malleable iron, with insulated throat, either cadmium plated or hot-dip galvanized.

2.2 PULL BOXES

- A. Exterior in-ground pull boxes shall be concrete or polymer as manufactured by Brooks, Dalworth, Hubbell Quazite, or approved equivalent. Covers shall include identification of systems contained.

2.3 WIREWAYS

- A. Wireways shall be made of not less than 16-gauge sheet steel for 4 inch and 6 inch square sizes and 14 gauge steel for 8 inch and 12 inch square sizes. Couplings end plates, and knockouts shall be furnished as required. Each section of wireways shall be rigidly supported.
- B. The finish shall be ANSI-49 gray epoxy paint applied by a cathodic electrode position paint process over a corrosion resistant phosphate preparation for NEMA 1 wireways. Provide galvanized steel for NEMA 3R wireways. NEMA 3R wireways and auxiliary gutters are for horizontal mounting only.

2.4 FITTINGS

- A. Couplings for rigid steel or intermediate conduit shall be hot dipped galvanized steel. Set screw type is not acceptable.
- B. Steel or malleable iron fittings shall be used on all other raceway types except for PVC. Die-cast fittings are not allowed.
- C. Couplings for aluminum raceways shall be threaded aluminum.
- D. EMT systems shall utilize steel insulated throat, threadless, water tight compression type connectors and threadless steel water tight compression type couplings.
- E. Coupling and connectors accessories and fittings for PVC coated rigid galvanized steel shall be PVC coated.
- F. Provide nylon bushing on end of all low voltage cabling system conduits (sleeves, rough-ins, etc.).

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. Except as noted or otherwise specified, all wiring shall be installed in galvanized rigid steel, rigid aluminum conduit or electrical steel tube (EMT) of the proper size to contain the number of conductors required in accordance with the latest edition of the N.E.C. Where conduit sizes are shown on the drawings, these shall take preference. Contractor shall epoxy coat galvanized rigid steel conduit for use in natatoriums.
- C. 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.
- D. 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.)

- E. PVC coated rigid galvanized steel shall be used for all penetrations of slab on grade.
- F. Rigid galvanized steel where embedded in concrete or masonry construction, mechanical yard or in exterior/interior applications where subject to damage.
- G. Rigid aluminum shall be used in exterior applications. (i.e. roof, top of canopies)
- H. PVC schedule 40 and 80 may be utilized underground, in or below slab where shown on the construction documents.
- I. MINIMUM SIZE: 3/4 inch. All homeruns shall be 3/4" minimum.
- J. PVC coated rigid galvanized steel conduit shall be coated inside and outside.
- K. PVC coated rigid galvanized steel conduit shall be used at cooling towers, corrosive areas and pool pump rooms.
- L. Fixture whips: Refer to 26 51 00 for additional information.
- M. Flexible metal shall be used for connecting rotating equipment installed in conditioned spaces.
- N. Liquidtight Flexible Metal Conduit (LFMC) shall be used for connecting rotating equipment installed in non-conditioned spaces and outside.
- O. Of such size, and so installed that conductors may be drawn in without injury or excessive strain.
- P. 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.
- Q. Have Red seal type VCC or approved equal cable supports in risers, as required by N.E.C.
- R. Have ends reamed after cutting and application of die.
- S. Keep conduit corked and dry during construction, and swab out before conductors are pulled.
- T. Have bends and offsets made with approved tools. Bends or offsets in which the pipe is crushed or deformed shall not be installed.
- U. Where not embedded in concrete or masonry, be firmly secured by approved clamps, half-straps or hangers.
- V. Have O.Z. Gedney or approved equal expansion fittings where crossing building expansion joints.
- W. Except in the mechanical equipment rooms, run conduit concealed, and by the shortest practicable route between outlets. Install risers, drops, and offsets necessary to avoid conflict with ductwork, piping, structural members, and similar items.
- X. Install exposed conduit in mechanical rooms, and elsewhere as indicated, parallel to horizontal and vertical lines of walls, ceilings, and floors.

- Y. 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").
- Z. Outlet boxes in partitions shall never be set back to back. They shall be offset to prevent undue noise transmission from room to room.
- AA. Concealed conduit shall run in as direct manner as possible using long bends. Exposed conduit shall be run parallel with or at right angles to the lines of the building; and all bends shall be made with standard conduit elbows or conduit benders. Not more than equivalent of four quarter bends shall be used in any run between terminals and cabinet, of between outlet or junction boxes. Approved condulets shall be used in lieu of conduit elbows where ease of installation and appearance warrants their use and approved by the engineer. Conduit joints shall be made with approved couplings and unions.
- BB. Conduits shall be continuous from outlet to outlet and from outlets to cabinets, junction or pull boxes and shall be electrically continuous throughout. Terminals of all conduits shall be provided with double lock nuts and bushing or terminated on conduit hubs. Use of running threads is prohibited.
- CC. 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.
- DD. 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.
- EE. 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.
- FF. 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.
- GG. Provide #30 nylon pulling line in all conduits in which permanent wiring is not installed.
- HH. 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.
- II. When PVC conduit is routed underground, all stub-up's and bends 15° and greater shall be PVC coated rigid galvanized steel. Use PVC coated rigid galvanized steel when penetrating concrete on grade.
- JJ. Flexible and liquid-tight flexible steel conduit shall be used for final connections to utilization equipment. Liquid-tight flexible steel conduit shall be used for all exterior locations and all interior locations subject to moisture, vibrations, rotating equipment and dry-type transformers. Refer to Section 26 02 00 for additional information concerning flexible steel

conduit.

- KK. Contact the Architect and Engineer for an installation review before covering any below grade or above grade conduit.
- LL. 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.
- MM. Contractor shall not penetrate water proof barriers without using proper fitting to maintain barriers. This shall include exterior walls and slabs. Coordinate with Architect for proper methods.

3.2 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. Contractor may use 3M corrosive protective tap on rigid galvanized conduit in lieu of PVC coated rigid galvanized conduit.
- C. Conduit installed in the air gap between the water resistant barrier and finish brick shall not exceed 2ft in length.

3.3 EXPANSION JOINTS

- A. Install approved expansion fitting in all conduit runs in excess of 150 feet or when crossing building expansion joints.

3.4 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.

3.5 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.

3.6 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 NEC 314.28.
- 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.

3.7 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.

3.8 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 of 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 06 34 - LOW VOLTAGE RACEWAY SYSTEM

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

1.2 WORK INCLUDED

- A. Furnish and install a complete raceway system for telephone system, consisting of cabinets, conduit, junction boxes, etc. This shall include by not limited to fire alarm, access control, structured cabling, audio-video, intercommunications, sound reinforcing, intrusion detection, telephone.

1.3 WORK SPECIFIED ELSEWHERE

- A. Section 26 02 00 - Basic Materials and Methods.
- B. Section 26 05 33 - Raceways.
- C. Section 26 05 19 - Wire, Cable and Related Materials.

1.4 WORK NOT INCLUDED

- A. Cabling.
- B. Equipment.
- C. Division 27
- D. Division 28

PART 2 - PRODUCTS

2.1 COMPONENTS

- A. Conduit - Refer to Section 26 05 33.
- B. Backboards - 3/4" X 4' X 8' fire rated plywood painted white.
- C. Outlet Boxes - Refer to Section 26 05 33.
- D. Pull and junction boxes - Refer to Section 26 05 33.
- E. Floor Boxes - Refer to Section 26 05 33.
- F. Cabinets - Consult low voltage system installer/supplier.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Refer to Section 26 05 33 for underground service entrance.

- B. Provide pull boxes in telephone conduit runs spaced not greater than 100 ft. apart, and on backboard side of runs with more than two right angle bends.
- C. Place telephone label on pull and junction boxes.
- D. Provide pull wire in each telephone run.
- E. Provide plywood backboards and duplex receptacle in the telephone equipment room. Confirm location on jobsite prior to installation.
- F. All terminal cabinets/backboards and conduit shall be sized per the recommendations of the telephone system installer.

END OF SECTION

SECTION 26 24 16 - PANELBOARDS

PART 1 - GENERAL

1.1 SCOPE

- A. Provide panelboards as shown, scheduled and as specified herein.
- B. The types of panelboards include:
 - 1. Panelboards.
 - 2. Power distribution panelboards.

1.2 STANDARDS

- A. Products shall be designed, manufactured, tested and installed in compliance with applicable standards.
- B. Products shall conform to all applicable UL standards and shall be UL-labeled.

1.3 ACCEPTABLE MANUFACTURERS

- A. Provide one of the following manufacturers:
 - 1. General Electric Company/ABB
 - 2. Square D Company
 - 3. Siemens
 - 4. Eaton

1.4 SUBMITTALS

- A. Shop drawings shall include, but not be limited to:
 - 1. Cutsheets of all enclosures, circuit breakers, fusible switches, bussing, rating, schedules and all accessories clearly labeled.

1.5 REQUIREMENTS OF REGULATORY AGENCIES

- A. WORK IN ACCORDANCE WITH:
 - 1. National Electrical Code.
 - 2. Local, municipal, or state codes that have jurisdiction.

PART 2 - PRODUCTS

2.1 MATERIALS AND COMPONENTS

- A. General

Provide power distribution and panelboards as indicated in the panelboard schedule and as shown on the plans. Power distribution panelboards shall be equipped with fusible

switches or circuit breakers as shown on the schedule. Panelboards shall be equipped with thermal-magnetic, molded case circuit breakers of frame and trip ratings as shown on the schedule.

B. Busing Assembly and Temperature Rise

Panelboard bus structure and main lugs or main breaker shall have current ratings as shown on the panelboard schedule. Such ratings shall be established by heat rise tests with maximum hot spot temperature on any connector or bus bar not to exceed 50°C. rise above 40°C ambient. Heat rise test shall be conducted in accordance with Underwriters Laboratories Standard UL 67. The use of conductor dimensions will not be accepted in lieu of actual heat tests. All current carrying parts of the bus shall be tin or silver plated copper.

1. Bus structure shall be isolated. Bus bar connections to the branch circuit breakers shall be distributed phase or phase sequence type and shall accept bolt-on circuit breakers for lighting and appliance panelboards.
2. The lugs for terminating conductors shall be rated at 75° C on all panel boards and circuit breakers.

Provide an extruded bare copper ground bus. Provide an isolated ground copper bus in each panel serving isolated ground circuits. Provide a full size copper neutral bus in each panelboard enclosure. Provide a double size neutral buss when served by a harmonic mitigating transformer.

C. Distribution Panelboards

Circuit breakers shall be equipped with individually insulated, braced and protected connectors. The front faces of all circuit breakers shall be flush with each other. Large, permanent, individual circuit numbers shall be affixed to each breaker in a uniform position. Tripped indication shall be clearly shown by the breaker handle taking a position between "ON" and "OFF". Provisions for additional breakers shall be such that no additional connectors will be required to add breakers. Circuit breakers shall be of the frame size, trip setting and interrupting capacity as indicated on the drawings. Circuit breakers shall be rated 65,000 AIC unless otherwise noted on plans.

1. Provide arc energy reduction switch for each breaker rated 1200 amps or larger to comply with 240.87 of the NEC. Switch shall be equipped with a pad lockable cover with a blue LED pilot light that illuminates when system is activated. Locate switch and cover recessed mounted adjacent to the breaker it serves or remote as indicated on the plans. Provide label and all required hardware. Remote switch(es) shall be flush mounted in wall near entry to the room.

2. Fusible Switches

All fusible switches shall be quick-make, quick-break with visible blades and dual horsepower ratings. Switch handles shall physically indicate "ON" and "OFF" positions. Switches shall be lockable only in the "OFF" position and accept three industrial type heavy duty padlocks. Switch covers and handles shall be interlocked to prevent opening in the "ON" position. A means shall be provided to permit authorized personnel to release the interlock for inspection purposes. Switches shall include positive pressure rejection type fuse clips for use with UL Class R fuses and be UL labeled for 200,000 AIC.

D. 480/277 Volt Panelboards

Main breakers shall be vertically mounted. Horizontally mounted main breakers are not acceptable.

Circuit breakers shall be bolt-on thermal-magnetic, molded case circuit breakers. Breakers shall be 1, 2 or 3 pole with an integral crossbar to assure simultaneous opening of all poles in multiple circuit breakers. Breaker shall have an over-center, trip-free, toggle-type operating mechanism with quick-make, quick-break action and positive handle indication. Handles shall have "ON", "OFF" and "TRIPPED" positions. Circuit breakers shall be UL listed in accordance with UL Standard 489 and shall be rated 277 volt ac (single pole, 15-30 amperes) or 480Y/277 volts ac (2 and 3 pole) with continuous current ratings as noted on the plan. Interrupting ratings shall be a minimum of 18,000 rms symmetrical amperes at 277 volts ac (single pole) or 480Y/277 volts ac (2 and 3 pole). Single pole, 15 and 20 ampere circuit breakers intended to switch fluorescent lighting loads on a regular basis shall carry the SWD marking. Circuit breakers shall be rated at a minimum of 18,000 AIC unless otherwise noted on plans.

E. 240 Volt Panelboards

Main breakers shall be vertically mounted. Horizontally mounted main breakers are not acceptable.

Circuit breakers shall be bolt-on thermal-magnetic, molded case circuit breakers. Breakers shall be 1, 2, or 3 pole with an integral crossbar to assure simultaneous opening of all poles in multiple circuit breakers. Breakers shall have an overcenter, trip-free, toggle-type operating mechanism with quick-make, quick-break action and positive handle indication. Handles shall have "ON", "OFF" and "TRIPPED" positions.

Circuit breakers shall be UL listed in accordance with UL standard 489 and shall be rated 240 volts ac maximum with continuous current rating as noted on the plans.

Branch circuit breakers feeding convenience outlets shall have sensitive instantaneous trip settings of not more than 10 times the trip settings of the breaker to prevent repeated arcing short resulting from frayed appliance cords. Single pole 15 and 20 ampere circuit breakers shall be UL listed as "Switching Breakers" at 120V ac and carry the SWD marking.

UL Class A 5mA ground fault circuit protection shall be provided on all receptacle circuits serving wet areas and on all 120V ac branch circuits as specified on the plans or panelboard schedule. This protection shall be an integral part of the branch circuit breaker which also provides overload and short circuit protection for branch circuit wiring. Tripping of a branch circuit breaker containing ground fault circuit interruption shall not disturb the feeder circuit to the panelboard. A single pole circuit breaker with integral ground fault circuit interruption shall require no more panelboard branch circuit space than a conventional circuit breaker.

UL Class B 30mA ground fault circuit protection (GFEP) shall be provided on all equipment circuits requiring ground fault protection. This protection shall be an integral part of the branch circuit breaker which also provides overload and short circuit protection for branch circuit wiring.

Provide Shunt Trip Breakers including control power for circuits under cooking hoods and other equipment having this requirement.

Provide Breaker with Switched Neutral circuits with common trip for gasoline pumps and other equipment having this requirement.

Circuit breakers shall be rated 22,000 AIC at 240V unless otherwise noted on plans.

Provide double sized neutral bus with panels served from a non-linear transformer or when indicated on drawings. This shall be a UL approved assembly.

F. Cabinets and Fronts

The panelboard bus assembly shall be enclosed in a steel cabinet. The rigidity and gauge of steel to be as specified in UL Standard 50 for cabinets. Wiring gutter space shall be in accordance with UL Standard 67 for panelboards. The box shall be fabricated from galvanized steel or equivalent rust resistant steel. All panelboard lock shall be keyed alike. Circuit breaker and fusible distribution panels shall have four-piece trims. A welded circuit directory frame and card with a clear plastic covering shall be provided on the inside of the door. Provide NEMA 1 enclosure where installed indoors unless otherwise noted. Provide NEMA 3R enclosure where installed outside or in a sprinkled area.

G. Safety Barrier

The distribution panelboard interior assembly shall be dead front with panelboard cover removed. Main lugs or main breakers shall have barriers on five sides. The barrier in front of the main lugs shall be hinged to a fixed part of the interior. The end of the bus structure opposite the mains shall have barriers.

H. Integrated Equipment Short Circuit Rating

Each panelboard, as a complete unit, shall have a short circuit current rating equal to or greater than the integrated equipment rating shown on the panelboard schedule or on the plans. This rating shall be established by testing with the over-current devices mounted in the panelboard. The short circuit tests on the over-current devices and on the panelboard structure shall be made simultaneously by connecting the fault to each over-current device with the panelboard connected to its rated voltage source. Method of testing shall be per Underwriters Laboratories Standard UL 67. The source shall be capable of supplying the specified panelboard short circuit current or greater. Testing of panelboard over-current devices for short circuit rating only while individually mounted is not acceptable. Also, testing of the bus structure alone is not acceptable. Panelboards shall be marked with their maximum short circuit current rating at the supply voltage and shall be UL listed.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install panelboards, including electrical connections, in accordance with manufacturers written instructions, NEC and recognized industry practices.
- B. Housekeeping Pads: Mount floor mounted panelboards on 4 inch high concrete housekeeping pads.
- C. Fuses: Install fuses of the rating and class as shown in each fusible distribution panel scheduled on drawings.
- D. Conduits: Stub up three one inch conduits to an accessible location above the ceiling for each recessed panelboard.

3.2 IDENTIFICATION

- A. Nameplate: Each panelboard shall have an engraved bakelite nameplate. Nameplates

shall be white with black letters and show panel designation. Nameplates shall be attached with stainless steel screws. Refer to Section 26 02 00, paragraph 2.8(C).

- B. Directory Card: Cardholders and directory cards shall be furnished for circuit identification in panelboards. Cardholder shall be located on inside of panel door and shall be in a metal frame with clear plastic front. Circuit lists shall be typewritten. Circuit descriptions shall include location and name of each item of equipment served. Spares and spaces shall be written in erasable pencil for future use. Circuit directory shall show the room served by each circuit. The final graphs/signage room numbers shall be used. Do not use Architectural numbering on plans.
- C. Replacement Components: Nameplate shall identify replacement components.

END OF SECTION

SECTION 26 27 26 – WIRING DEVICES

PART 1 – GENERAL

1.1 SCOPE

- A. Provide wiring devices as shown; scheduled, required and as specified.
- B. The types of wiring devices required include:
 - 1. Receptacles
 - 2. Switches
 - 3. Coverplates

1.2 STANDARDS

- A. NEMAWD-1
- B. NEMA WD-5
- C. UL
- D. Federal Spec WC-596-F and WS-896

1.3 ACCEPTABLE MANUFACTURERS

- A. Hubbell
- B. Leviton
- C. Pass & Seymour

1.4 SUBMITTALS

- A. Shop drawings shall include but not be limited to:
 - 1. Cut sheets of all devices indicating NEMA configuration, rating, materials, color, and all accessories.
 - 2. Cut sheets of all coverplates indicating materials, color and any engraving specified on drawing or in the specifications.

1.5 REQUIREMENTS OF REGULATORY AGENCIES WORK IN ACCORDANCE WITH:

- A. National Electric Code.
- B. Local, municipal, or state codes that have jurisdiction.

PART 2 – PRODUCTS

2.1 MATERIALS AND COMPONENTS

- A. GENERAL

1. Provide factory assemble wiring devices with the rating type and color as required and specified for the service indicated.
2. Provide matching one-piece multiple gang plates where switches are ganged.
3. Provide wall plates for each receptacle furnished.
4. Architect reserves the right to select wiring device styles and colors to match wall finish.
5. Wall plates shall be of same manufacturer as devices.

2.2 SWITCHES

- A. Provide specification grade Ivory toggle switches where indicated on the Drawings. Provide "Red" switches for switching emergency lighting circuits where switching is indicated. Coordinate exact locations with architect.
- B. Wall switches shall be 20 amp, 120-277 volt and shall be Hubbell, Leviton or P&S as follows:
 1. SINGLE POLE SWITCHES: Hubbell HBL1221, Leviton 1221-2, P&S PS20AC1
 2. DOUBLE POLE SWITCHES: Hubbell HBL1222, Leviton 1222-2, P&S PS20AC2
 3. THREE WAY SWITCHES: Hubbell HBL1223, Leviton 1223-2, P&S PS20AC3
 4. FOUR WAY SWITCHES: Hubbell HBL1224, Leviton 1224-2, P&S PS20AC4
 5. MOMENTARY CONTACT SWITCHES: Hubbell HBL1557, Leviton 1257, P&S 1251
 6. THREE POSITION, TWO CIRCUIT MAINTAINED CONTACT SWITCHES: Leviton 1285, Hubbell HBL1385, P&S 1225
 7. KEY TYPE LOCKABLE BARREL KEY OR CORBIN STYLE: Leviton 1221-2KL with 2KL key or P&S PS20AC1-KL with 4609 key for each switch, Hubbell #HBL 1221-RKL.
 8. Dwelling units shall use Hubbell CS115I and CS120I.
- C. Dimmers: Provide Lutron DIVA or as shown on drawings. Wall box dimmers shall be sized to handle the load. Where fluorescent dimming ballasts are to be used, coordinate wall box dimmer with ballast manufacturer.
- D. Light Handle Switches: Provide Leviton 1221-LHC, Hubbell HBL1221-II, P&S PS20AC1-ISI lighted handles to switch emergency lights were noted on the drawings.

2.3 RECEPTACLES

- A. Provide specification grade Ivory receptacles where indicated on the drawings. Provide "Red" receptacles for receptacles on emergency power. Coordinate exact location with architect.
- B. Receptacles shall be Hubbell, Leviton or Pass & Seymour as follows:
1. Duplex 20A-125V-self grounding: with Brass mounting yoke (NEMA configuration 5-20R):
Hubbell HBL5352, Leviton 5362, P&S 5362A
 2. Simplex 20A-125V-Self Grounding with Brass mounting yoke (NEMA configuration 5-20R):
Hubbell HBL5361, Leviton 5361, P&S 5361 with Brass mounting yoke.
 3. Isolated ground duplex, 20A-125V: (Orange, NEMA configuration 5-20R)
Hubbell IG5352, Leviton 5362IG , P&S IG5362.
 4. Clock hanger receptacle 15A-125V: (Brown with stainless steel plate with hanger, NEMA configuration 5-15R):
Leviton 5361-CH, Hubbell 5235, P&S S3733-SS
 5. Ground fault circuit interrupter (GFCI) receptacle 20A-125V; (NEMA Configuration 5-20R, shall incorporate self-test, auto monitoring technology and features which will lock-out or render the device incapable of being reset if ground fault protection is compromised, with "Feed through" connectors capable of protecting connected downstream receptacles on a single circuit, and of being installed in a 2-3/4" deep outlet box without adapter, Hubbell GFRST20, Leviton GFNT2 or P & S 2097.
Install Hubbell GFTRST20, Leviton GFTR2 or P&S 2097TR Tamper Resistant type for locations requiring Tamper Resistant installations
Install Hubbell GFTWRST20, Leviton GFWR2 or P&S 2097TRWR Weather Resistant type for installations in damp or wet locations
 6. Tamper resistant receptacles 20A-125V (NEMA configuration 5-20R):
 7. Hubbell HBL8300SGA, Leviton 8300-SG, P&S TR63-H.
 8. Surge Protection Duplex Receptacles 20A-125V, (NEMA 5-20R) Hospital grade to include LED light and audible alarm:
Hubbell HBL8362SA, Leviton 8380, P&S 8300SP
 9. Equipment receptacles shall be coordinated with owner/manufacture requirements and the correct and appropriate receptacle and coverplate shall be installed.
 10. Receptacles for dwelling units shall be Hubbell CR15TR and CR20TR tamper resistant receptacles.
 11. USB Charger types receptacles shall be Hubbell, 20A, 125V AC Hospital Grade, Tamper Resistant, with two USB Type 2.0 Ports 5.0 Amp, 5V DC, Decorator Type duplex receptacle. Hubbell USB8300A5 or equal by other approved wiring device manufacturers.
 12. Plug load controlled receptacles shall be Hubbell DR20C2WHI, white, two controlled faces or equal by Leviton or P&S.
 13. ARC Fault circuit interrupter receptacles shall be Hubbell AFR20TR.
 14. Ground fault circuit interrupter/ARC Fault dual function receptacles shall be

Hubbell AFGF20TR.

2.4 OCCUPANCY SENSORS

- A. Provide white dual technology wall mounted sensors, provide one of the following:
1. Single Pole:
 - Wattstopper #DSW301
 - Lutron #MSA102
 2. Double Pole:
 - Wattstopper # DSW302
 - Lutron #MSA202
 3. Dimmer:
 - Wattstopper #DW311
 - Lutron #MSZ101
- B. Provide dual technology ceiling sensor with low voltage controlling switch and power pack.
- A. Single Button:
- Wattstopper # DT300 Sensor, BZ150 Power Pack and LVSW101 Digital Switch
 - Lutron; LOSCDT-2000 Sensor, PP-DV-M Power Pack and NTRCS-1 Digital Switch
- C. Provide Ultra Sonic Ceiling sensor for restrooms.
- a. Wattstopper #UT3000, BZ150 Power Pack
 - b. Lutron #LOS-CUT-2000, PP-DV-M Power Pack

2.5 DIGITAL TIMER SWITCHES

- A. Provide wattstopper TS-400-G digital timer. Locate in mechanical, electrical, MDF, and IDF Rooms.
- B. The time switch shall provide audible notification and visual notification (blink the room lights) prior to turning lights off.
- C. The time switch shall have a 12 hour manual over ride setting.

2.6 PLATES

- A. Furnish and install plates on all outlet boxes. Oversize (Jumbo) plates are not acceptable.
- B. Plates shall be smooth nylon.
- C. Provide Hubbell WP Series, Bell, Carlon or Leviton NEMA 3R weatherproof coverplates on all exterior wiring devices. Enclosure shall be suitable for wet locations when in use.
- D. Plates shall be Hubbell SS Series, Leviton, Pass & Seymour 302/304 smooth stainless steel on all receptacles 30 amps and larger.
- E. Stainless steel device plates shall be provided at locations with tile or stone walls.

- 2.7 Floor boxes with surface activation shall be cast iron as manufactured by Hubbell or equal by Wiremold and as indicated below:

- A. Slab at grade (dual level, fully adjustable type 1).
 - 1. Single gang: #B-2436 w/#SB-3083 carpet flange.
 - 2. Two gang: #B-4233 w/#SB-3084 carpet flange.
 - 3. Three gang: #B-4333 w/#SB-3085 carpet flange.
- B. Slab above grade (shallow, fully-adjustable, type II)
 - 1. Single gang: #B-2421 w/#SB-3083 carpet flange.
 - 2. Two gang: #B-2422 w/#SB-3084 carpet flange.
 - 3. Three gang: #B-2423 w/#SB-3085 carpet flange.
- C. Cover plates shall have brass finish as follows:
 - 1. #S-3825 for duplex flap for duplex receptacles.
 - 2. #S-3826 for data/communications.

2.8 PVC floor boxes manufactured by Hubbell or equal shall be as follows:

- A. Provide CFBS1R4CFB dual service cast iron body floor box with PVC riser. Provide CFBS1R4CUP adjustable mounting cup, S1R4SP2X2DUPLEX sub-plate for (1) Duplex and (2) RJ-45 Keystone jacks OR S1R4SP2X2STYLE for (1) GFCI duplex, USB or Surge Device & (2) Keystone jacks, OR S1R4SPQUAD sub-plate with (4) 20A simplex receptacles, single and dual circuit wiring capability. Provide with CFBS1R4CVR cover, Color to be chosen by Architect.
 NOTE TO SPECIFIER: Minimum depth of pour 5-inches, Maximum is 6-inches
 Maximum finished floor thickness (above top of box collar) with maximum adjustability is 1-1/2-inches at 5-inch, At 6-inches maximum adjustability is 1/2".

2.9 Floor boxes, recessed activation type, meet UL 514A scrub water requirements, shall be stamped steel with corrosion resistant finish, UL Listed for slab-on-grade installations, or stamped steel for above-grade installations as manufactured by Hubbell or equal by Wiremold and as indicated below:

- A. Recessed Activation Slab at grade:
 - 1. Two gang: #CFB2G30CR or CFB2G30RCR (provisions for round cover), capable of up to 2" entry per gang. Flush flange, Surface flange and Furniture Feed cover availability. Surface Type Covers shall not exceed 0.15" rise. Covers with provisions for cable egress, when in use, shall not exceed/extend past 0.15" rise
 - 2. Four Gang: #CFB4G30CR or CFB4G30RCR (provisions for round cover), capable of up to 2" entry per gang. Flush flange, Surface flange availability. Cover shall not exceed 0.15" rise. Surface Type Covers shall not exceed 0.15" rise. Covers with provisions for cable egress, when in use, shall not exceed/extend past the 0.15" rise.
 - 3. Six Gang: #CFB6G30CR or CFB6G30RCR (provisions for round cover), capable of up to 2" entry per gang. Flush flange, Surface flange availability. Surface Type Covers shall not exceed 0.15" rise. Covers with provisions for cable egress, when in use, shall maintain the 0.15" rise. Covers with provisions for cable

egress, when in use, shall not exceed/extend past the 0.15" rise.

4. Ten Gang AV: #CFB10G55CR or CFB10G55RCR (provisions for round cover), with minimum (2) 2" KO's, multiple front and back $\frac{3}{4}$ " to 1-1/2" concentric KO's.. Flush flange, Surface flange availability. Cover shall not exceed 0.15" rise. Covers with provisions for cable egress, when in use, shall not exceed/extend past the 0.15" rise.

B. Recessed Activation Slab above grade

1. Two Gang: #CFB2G30 or CFB2G30R (provisions for round cover), capable of up to 2" entry per gang. Flush flange, Surface flange and Furniture Feed cover availability. Surface Type Covers shall not exceed 0.15" rise. Covers with provisions for cable egress, when in use, shall not exceed/extend past the 0.15" rise.
2. Four Gang: #CFB4G30 or CFB4G30R (provisions for round cover), capable of up to 2" entry per gang. Flush flange, Surface flange availability. Cover shall not exceed 0.15" rise. Surface Type Covers shall not exceed 0.15" rise. Covers with provisions for cable egress, when in use, shall not exceed/extend past 0.15" rise.
3. Six Gang: #CFB6G30 or CFB6G30R (provisions for round cover), capable of up to 2" entry per gang. Flush flange, Surface flange availability. Surface Type Covers shall not exceed 0.15" rise. Covers with provisions for cable egress, when in use, shall maintain the 0.15" rise. Covers with provisions for cable egress, when in use, shall not exceed/extend past the 0.15" rise
4. Ten Gang AV: #CFB10G55 or CFB10G55R (provisions for round cover), with minimum (2) 2" KO's, multiple front and back $\frac{3}{4}$ " to 1-1/2" concentric KO's. Flush flange, Surface flange availability. Cover shall not exceed 0.15" rise. Covers with provisions for cable egress, when in use, shall not exceed/extend past the 0.15" rise.

C. Service Fittings

1. Surface Style Rectangular for use with carpet, tile, VCT and other engineered floors, available with or without carpet insert and offer system's furniture feed type cover providing (1) 1-inch and (1) 2-inch threaded openings
2. Flush Style Rectangular for use with tile, finished concrete or Terrazzo floors, available with or without carpet insert and offer system's furniture feed type cover providing (1) 1-inch and (1) 2-inch threaded openings
- D. Rectangular covers shall be powder coated in variety of common finishes, Aluminum, Black, Brass, Bronze and Satin Nickel
4. Round Covers for use with all floor types. Shall provide cable egress doors and systems furniture feed type cover providing (1) $\frac{3}{4}$ -inch and (1) 2-inch threaded openings. Round covers shall be plated metal in variety of finishes except Black (powder coated). Brushed Aluminum, Brass Plated, Bronze Plated, Satin Nickel Plated.

2.10 Fire rated poke through devices shall be as follows:

- A. Installations requiring 4-inch cored openings, poke thru devices shall be manufactured

by Hubbell or approved equal, Hubbell S1R4PTFIT Recessed Activation poke thru with either S1R4SP2X2STYLE or S1R4SP2X2DUPLEX sub-plate for (1) 20A Duplex, GFCI OR USB 2 Port Duplex with (2) openings for (2) RJ-45 Jacks with S1R4CVR – color to be chosen by Architect.

- B. Installations requiring 6-inch cored openings, with duplex power, shall be manufactured by Hubbell or approved equal, Hubbell S1R6PTWZ-XXX Recessed Activation poke thru which includes S1R6SPW and S1R6SPZ sub plates and S1R6CVR cover, where XXX is finish. Color to be chosen by Architect. This includes (1) pre-wired 20A, 125 V duplex receptacle and (2) NEMA configured rectangular Decorator openings for telephone, signal or up to (12) Category 5e/Cat 6 RJ-45 Jacks.
- C. Installations requiring 6-inch cored openings, with quad power, shall be manufactured by Hubbell or approved equal, Hubbell S1R6PTDEH-XXX Recessed Activation poke thru which includes S1R6SPH and S1R6SPE sub-plates and S1R6CVR cover where XXX is finish. Color to be chosen by Architect. This includes (2) pre-wired 20A, 125 V duplex receptacles (quad) single, dual circuit capable and (1) NEMA configured rectangular Decorator opening for telephone, signal or up to (6) Category 5e/Cat 6 RJ-45 Jacks plus (2) additional Keystone openings for a total of (8) Category 5e/Cat 6 RJ-45 Jacks for this sub-plate
- D. Installations requiring 8-inch cored openings, shall be manufactured by Hubbell or approved equal, Hubbell S1R8PTFIT3 Recessed Activation poke thru offering (2) perimeter (outer) sub-plate locations and (3) standard NEMA configured openings in center sub-plate location allowing multiple combinations for power, data and A/V connectivity devices including acceptance for third party AV devices such as Crestron, FSR, Extron.
- E. Poke thru devices with above floor service fittings shall be Hubbell PT7XC Series or approved equal for 3-inch cored openings with FR280BKA Pedestal Service Fitting for (1) 20A, 125V duplex receptacle and (1) NEMA configured Decorator opening for telephone, signal or Cat 5e/Cat 6 data cables with RJ-45 jacks.
- F. Poke Thru devices for furniture feed applications shall be Hubbell S1R6PTFF-XXX or approved equal where XXX is finish, to be chosen by Architect. Provides (1) $\frac{3}{4}$ " threaded entry for Power feed and (1) 2-0" threaded opening for Data/AV Cables. Installed in 6-inch cored openings.
- G. Poke Thru devices for furniture feed applications shall be Hubbell S1PTFF-XX or approved equal where XX is finish, to be chosen by Architect. Provides (1) $\frac{3}{4}$ " threaded entry for Power feed and (1) 1-1/2" threaded opening for Data/AV Cables. Installed in 4-inch cored openings.

PART 3 – EXECUTION

3.1 WIRING DEVICE MOUNTING HEIGHTS

- A. Unless noted to the contrary on plans, or directed otherwise during the progress of the Work, wiring devices shall be set as follows:
 - 1. Switches 42" above finished floor.
 - 2. Wall mounted receptacles shall be installed vertically at 15 inches to the bottom outlet above finished floor unless otherwise noted or as required by local codes.
 - 3. Wall telephone outlets shall be mounted 15 inches to the bottom above finished floor unless otherwise noted. Mount even with wall mounted receptacles.

4. At locations above counters, set devices at 6 inches above to the centerline counter tops, verify exact mounting height with the architect.

3.2 INSTALLATION (Refer to 26 05 33 for outlet box specifications).

- A. Wall switches shall be set in a suitable steel box and shall be installed on the strike side of the door as finally hung, whether so indicated on the Drawings or not.
- B. Receptacles shall be installed in a suitable steel box.
- C. The Architect reserves the right to relocate wiring device up to a distance of 5 feet from the location shown, before rough-in, without additional cost.
- D. Provide multi-gang device covers at locations where devices gang together.
- E. Device locations are indicated schematically on the drawings along with the type and mounting height. Final locations and mounting heights shall be coordinated with the Architect on the jobsite, and with shop drawings of equipment; including equipment to be furnished and installed by the Owner. Devices installed in walls covered with vinyl, fabric wallpaper or other special finishes shall be coordinated and verified with the Architect on the job-site.
- F. Stranded wire termination to switches, receptacles, devices and miscellaneous control devices shall be with an approved solderless terminal if clamp type securing is not possible (i.e. Sta-Con crimp on fork tongue connectors; Burndy Type TP-F).
- G. Provide keyed switches in all common areas not monitored by the faculty (i.e. gym, corridors, cafeteria, commons natatoriums).
- H. Tamper-resistant type receptacles shall be installed in all classrooms, cafeterias, corridors, special education, ALE, computer labs, special use classroom and all spaces where children 7 years and younger may occupy. In Child-Care facilities, tamper resistant receptacles shall be provided for all spaces with exception to back-of-house spaces, such as kitchens, custodial closets, electrical and mechanical rooms.
- I. All 20A, 120V receptacles in food service areas shall be GFCI.
- J. All circuit breaker serving electric drinking fountains shall be GFCI.
- K. Provide ARC Fault circuit interrupters (AFCI) as required to comply with 210.12 of the N.E.C. This shall include but not limited to dwelling units and dormitory's. AFCI breakers may be used.
- L. Provide ground fault circuit interrupter (GFCI)/ARC Fault circuit interrupter (AFCI) dual function receptacles to comply with 210.8, 210.12 and 406.4 of the N.E.C.

END OF SECTION

SECTION 26 28 16 - SAFETY AND DISCONNECT SWITCHES

PART 1 - GENERAL

1.1 SCOPE

- A. Provide safety and disconnect switches as shown, scheduled and as specified herein.

1.2 STANDARDS

- A. Products shall be designed, manufactured, tested and installed in compliance with applicable standards.
 - 1. NEMA KS1 - Enclosed switches
 - 2. Federal specification W-S-865C-Heavy duty switches
- B. Products shall conform all applicable UL standards, including UL98 (standard for safety, enclosed and dead front switches) and shall be UL-labeled.

1.3 ACCEPTABLE MANUFACTURERS

- A. Provide one of the following manufacturers:
 - 1. General Electric Company
 - 2. Square D Company
 - 3. Siemens
 - 4. Eaton

1.4 SUBMITTALS

- A. Shop drawings shall include, but not be limited to:
 - 1. Cutsheets of switches with ratings, physical dimensions and all accessories clearly labeled.

1.5 REQUIREMENTS OF REGULATORY AGENCIES

- A. WORK IN ACCORDANCE WITH:
 - 1. National Electrical Code.
 - 2. Local, municipal, or state codes that have jurisdiction.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Furnish and install heavy duty type safety switches with the number of switched poles as indicated on the plans and specifications. All safety switches shall be NEMA Heavy Duty Type HD, and Underwriters Laboratories listed.

2.2 MATERIALS AND COMPONENTS

A. Switch Interior

All switches shall have switch blades that are fully visible in the "OFF" position when the door is open. Switches shall have removable arc suppressor where necessary, to permit easy access to line side lugs. Lugs shall be front removable and UL listed for 60°C and 75°C copper or aluminum cables. All switches blades and contacts shall be plated copper. Adjust fuse block to accept Class J fuses.

B. Switch Mechanism

Switches shall have a quick-make and quick-break operating handle and mechanism, which shall be an integral part of the box, not the cover. Padlocking provisions shall be provided for locking in the "OFF" position with at least three padlocks. Switches shall have a dual cover interlock to prevent unauthorized opening of the switch door when the handle is in the "ON" position, and to prevent closing of the switch mechanism with the door open. A means shall be provided to permit authorized personnel to release the interlock for inspection purposes. Handle position shall indicate if switch is "ON" or "OFF".

C. Neutral

Provide a solid neutral with the safety switch where a neutral is present in the circuit.

D. Ratings

Switches shall be horsepower rated for ac and/or dc as indicated by the plans. The fused switches shall have Class R rejection fuse clips or adjusted for Class J fuses. UL listed short circuit ratings of the switches, when equipped with Class R fuses, shall be 200,000 symmetrical amperes.

E. Enclosures

1. Indoor switches shall be furnished in NEMA 1 enclosures.
2. Outdoor switches, switches located in wet areas or sprinkled areas shall be furnished in NEMA 3R enclosures.
3. Switches installed in wet areas such as cooling tower areas shall be NEMA 4X stainless steel or fiberglass reinforced polyester.
4. Switches installed in kitchens shall be stainless steel.
5. Switches installed in areas of a corrosive nature and subjected to salt air shall be NEMA 4X stainless steel or fiberglass reinforced polyester.

F. Electrical Interlock Contacts

Provide electrical interlock contacts on all disconnect switches serving motors in which remote VFDs are serving the motor. Provide conductors from contacts to the safe circuit inside the VFD. De-energizing the disconnect switch shall signal VFD to stop.

G. Service Entrance

Switch shall be suitable for use as service entrance equipment when installed in accordance with the National Electrical Code.

PART 3 - EXECUTION

3.1 GENERAL

- A. Install safety and disconnect switches, including electrical connections, and fuses in accordance with manufacturer's written instructions, NEC and recognized industry practices.
- B. Location: Install switches within sight of controllers.
- C. Hubs: Provide bolt-on hubs for rainproof or wet area applications.

3.2 IDENTIFICATION

- A. Nameplate: Each disconnect switch shall have an engraved bakelite nameplate. Nameplates shall be white with black letters and show equipment served. Nameplates shall be attached with stainless steel screws.

END OF SECTION

SECTION 26 51 00. 13 - LIGHTING FIXTURES- LIGHT EMITTING DIODE (LED)

PART 1 - GENERAL

1.1 SCOPE

- A. Furnish and install 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 STANDARDS

- 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 fluorescent ballast shall comply with certified ballast manufacture (CBM) standard and CBM labeled.
- C. NFPA 101
- D. ANSI C82.1
- E. NEMA-LE
- F. IEEE Publication 587 Category "A" (Electronic Ballast)
- G. All LED drivers shall be UL recognized Class 2 per UL1310 or non-Class 2 per UL 1012 as applicable.
- H. All LED drivers shall comply with applicable requirements of the Federal Communications Commission (FCC) rules and regulations, Title 47 CFR part 15, for Non-Consumer Equipment.
- I. All LED drivers shall be RoHS compliant.
- J. TM-21
- K. LM-80
- L. LM-79
- M. L70
- N. DLC
- O. UL 1008

1.3 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

1.4 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. Furnish air handling and heat removal data for light fixtures specified with these requirements.

1.5 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:

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 μ 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 μ s, 2 ohm combination wave).
2. Exit signs
- a. Exit signs shall meet all federal, state and local codes.
 - b. Provide fire alarm interface relay when required to flash exit signs.
 - c. Provide battery packs for emergency operation when not connected to emergency generator power.

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 410 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.

2.4 EMERGENCY LED BATTERY BACKUP

- A. Provide Bodine #BSL310M for emergency light fixtures in 9 or 10-foot ceiling.
- B. Provide Bodine #BSL20 for emergency LED driver for emergency light fixtures in ceiling heights greater than 12 feet.
- C. Provide Bodine #BSL17-C2 for emergency LED driver for LED downlights.
- D. Provide unswitched hot leg. Hot leg shall originate from the same branch circuit as required in NEC article 700.12 (F).

2.5 BRANCH CIRCUIT EMERGENCY TRANSFER SWITCH (BCELT)

- A. Provide 20 amp, 120-277 Volt, UL1008 listed Branch Circuit Emergency Transfer Switch to control emergency light fixtures transferring from normal to emergency branch circuits. Provide Bodine GTD 20A or ETC. SC 1008. UL 924 Devices are not acceptable.

2.6 AUTOMATIC LOAD CONTROL RELAY (ALCR)

- A. Provide 3 amp, 120-277 volt UL 924 listed. Relay to bypass switching controlling emergency branch circuit light fixtures Provide Bodine GTD or Wattstopper ELCU.

2.7 SPARE LAMPS

- B. Provide 5% spare lamps, minimum of 3 of each type.
- C. Ship lamps to the Owner in original cartons (loose lamps are not acceptable).

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.
4. Provide secondary support wires from all four (4) corners of the lay-in fixtures to the structure above. Do not support fixtures from ceiling grid wire supports, piping, conduit, side walls, or mechanical equipment. Ceiling specifications do not supersede this requirement.

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 an accessible ceiling is not permitted. Fixture whips shall not lay-on ceiling tile or grid. Provide caddy clips to provide additional support.

E. Fire Rated Ceiling

1. Provide fire rated canopy or enclosure for all fixtures recessed in a fire rated ceiling. The fire rated canopy or enclosure shall be as required by the UL design number listed in the UL fire resistance directory. Refer to architectural drawing for the UL design number. Coordinate with ceiling installer and manufacturer. Provide proper rated ballast/drivers for lighting fixtures installed within these rated enclosures.

F. Air Handling Fixtures

1. Install all air handling light fixtures with return air slot in the open position, if it is to be as an air handling fixture. Coordinate with mechanical contractor.

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