

**SPECIFICATIONS
FOR**

**Renovations of
North Angelo Branch Library
Tom Green County**

SAN ANGELO, TEXAS

(TGC RFP #22-023)



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**100% Final CD's Set Issued for
Bidding & Construction 05/06/2022**

Project Manual

PROJECT NO. 292-09-1020

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May 6, 2022

Paul Wilkerson, PE Texas # 50732

Power Systems

Firm #F-6257

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**RENOVATION OF NORTH ANGELO BRANCH LIBRARY
TOM GREEN COUNTY**

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AIA® Document A101® – 2017

Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum

AGREEMENT made as of the _____ day of _____ in the year _____
(In words, indicate day, month and year.)

BETWEEN the Owner:
(Name, legal status, address and other information)

and the Contractor:
(Name, legal status, address and other information)

for the following Project:
(Name, location and detailed description)

The Architect:
(Name, legal status, address and other information)

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

The parties should complete A101®–2017, Exhibit A, Insurance and Bonds, contemporaneously with this Agreement.

AIA Document A201®–2017, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

The Owner and Contractor agree as follows.

TABLE OF ARTICLES

- 1 THE CONTRACT DOCUMENTS
- 2 THE WORK OF THIS CONTRACT
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ARTICLE 1 THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement, and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. An enumeration of the Contract Documents, other than a Modification, appears in Article 9.

ARTICLE 2 THE WORK OF THIS CONTRACT

The Contractor shall fully execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others.

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be:

(Check one of the following boxes.)

- The date of this Agreement.
- A date set forth in a notice to proceed issued by the Owner.
- Established as follows:
(Insert a date or a means to determine the date of commencement of the Work.)

If a date of commencement of the Work is not selected, then the date of commencement shall be the date of this Agreement.

§ 3.2 The Contract Time shall be measured from the date of commencement of the Work.

§ 3.3 Substantial Completion

§ 3.3.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall achieve Substantial Completion of the entire Work:

(Check one of the following boxes and complete the necessary information.)

- Not later than () calendar days from the date of commencement of the Work.

By the following date:

§ 3.3.2 Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work are to be completed prior to Substantial Completion of the entire Work, the Contractor shall achieve Substantial Completion of such portions by the following dates:

Portion of Work	Substantial Completion Date
-----------------	-----------------------------

§ 3.3.3 If the Contractor fails to achieve Substantial Completion as provided in this Section 3.3, liquidated damages, if any, shall be assessed as set forth in Section 4.5.

ARTICLE 4 CONTRACT SUM

§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be (\$), subject to additions and deductions as provided in the Contract Documents.

§ 4.2 Alternates

§ 4.2.1 Alternates, if any, included in the Contract Sum:

Item	Price
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§ 4.2.2 Subject to the conditions noted below, the following alternates may be accepted by the Owner following execution of this Agreement. Upon acceptance, the Owner shall issue a Modification to this Agreement. (Insert below each alternate and the conditions that must be met for the Owner to accept the alternate.)

Item	Price	Conditions for Acceptance
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§ 4.3 Allowances, if any, included in the Contract Sum:
(Identify each allowance.)

Item	Price
------	-------

§ 4.4 Unit prices, if any:
(Identify the item and state the unit price and quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price per Unit (\$0.00)
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§ 4.5 Liquidated damages, if any:
(Insert terms and conditions for liquidated damages, if any.)

§ 4.6 Other:
(Insert provisions for bonus or other incentives, if any, that might result in a change to the Contract Sum.)

ARTICLE 5 PAYMENTS

§ 5.1 Progress Payments

§ 5.1.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

§ 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

§ 5.1.3 Provided that an Application for Payment is received by the Architect not later than the _____ day of a month, the Owner shall make payment of the amount certified to the Contractor not later than the _____ day of the month. If an Application for Payment is received by the Architect after the application date fixed above, payment of the amount certified shall be made by the Owner not later than () days after the Architect receives the Application for Payment.

(Federal, state or local laws may require payment within a certain period of time.)

§ 5.1.4 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form, and supported by such data to substantiate its accuracy, as the Architect may require. This schedule of values shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 5.1.5 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.6 In accordance with AIA Document A201™–2017, General Conditions of the Contract for Construction, and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

§ 5.1.6.1 The amount of each progress payment shall first include:

- .1 That portion of the Contract Sum properly allocable to completed Work;
- .2 That portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction, or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing; and
- .3 That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified.

§ 5.1.6.2 The amount of each progress payment shall then be reduced by:

- .1 The aggregate of any amounts previously paid by the Owner;
- .2 The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A201–2017;
- .3 Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;
- .4 For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A201–2017; and
- .5 Retainage withheld pursuant to Section 5.1.7.

§ 5.1.7 Retainage

§ 5.1.7.1 For each progress payment made prior to Substantial Completion of the Work, the Owner may withhold the following amount, as retainage, from the payment otherwise due:

(Insert a percentage or amount to be withheld as retainage from each Application for Payment. The amount of retainage may be limited by governing law.)

§ 5.1.7.1.1 The following items are not subject to retainage:
(Insert any items not subject to the withholding of retainage, such as general conditions, insurance, etc.)

§ 5.1.7.2 Reduction or limitation of retainage, if any, shall be as follows:
(If the retainage established in Section 5.1.7.1 is to be modified prior to Substantial Completion of the entire Work, including modifications for Substantial Completion of portions of the Work as provided in Section 3.3.2, insert provisions for such modifications.)

§ 5.1.7.3 Except as set forth in this Section 5.1.7.3, upon Substantial Completion of the Work, the Contractor may submit an Application for Payment that includes the retainage withheld from prior Applications for Payment pursuant to this Section 5.1.7. The Application for Payment submitted at Substantial Completion shall not include retainage as follows:
(Insert any other conditions for release of retainage upon Substantial Completion.)

§ 5.1.8 If final completion of the Work is materially delayed through no fault of the Contractor, the Owner shall pay the Contractor any additional amounts in accordance with Article 9 of AIA Document A201–2017.

§ 5.1.9 Except with the Owner’s prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

§ 5.2 Final Payment

§ 5.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

- .1 the Contractor has fully performed the Contract except for the Contractor’s responsibility to correct Work as provided in Article 12 of AIA Document A201–2017, and to satisfy other requirements, if any, which extend beyond final payment; and
- .2 a final Certificate for Payment has been issued by the Architect.

§ 5.2.2 The Owner’s final payment to the Contractor shall be made no later than 30 days after the issuance of the Architect’s final Certificate for Payment, or as follows:

§ 5.3 Interest

Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.
(Insert rate of interest agreed upon, if any.)

_____ % _____

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Initial Decision Maker

The Architect will serve as the Initial Decision Maker pursuant to Article 15 of AIA Document A201–2017, unless the parties appoint below another individual, not a party to this Agreement, to serve as the Initial Decision Maker.
(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

§ 6.2 Binding Dispute Resolution

For any Claim subject to, but not resolved by, mediation pursuant to Article 15 of AIA Document A201–2017, the method of binding dispute resolution shall be as follows:

(Check the appropriate box.)

- Arbitration pursuant to Section 15.4 of AIA Document A201–2017
- Litigation in a court of competent jurisdiction
- Other *(Specify)*

If the Owner and Contractor do not select a method of binding dispute resolution, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A201–2017.

§ 7.1.1 If the Contract is terminated for the Owner’s convenience in accordance with Article 14 of AIA Document A201–2017, then the Owner shall pay the Contractor a termination fee as follows:

(Insert the amount of, or method for determining, the fee, if any, payable to the Contractor following a termination for the Owner’s convenience.)

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201–2017.

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201–2017 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.2 The Owner’s representative:

(Name, address, email address, and other information)

§ 8.3 The Contractor’s representative:

(Name, address, email address, and other information)

§ 8.4 Neither the Owner’s nor the Contractor’s representative shall be changed without ten days’ prior notice to the other party.

§ 8.5 Insurance and Bonds

§ 8.5.1 The Owner and the Contractor shall purchase and maintain insurance as set forth in AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum, Exhibit A, Insurance and Bonds, and elsewhere in the Contract Documents.

§ 8.5.2 The Contractor shall provide bonds as set forth in AIA Document A101™–2017 Exhibit A, and elsewhere in the Contract Documents.

§ 8.6 Notice in electronic format, pursuant to Article 1 of AIA Document A201–2017, may be given in accordance with AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, if completed, or as otherwise set forth below:

(If other than in accordance with AIA Document E203–2013, insert requirements for delivering notice in electronic format such as name, title, and email address of the recipient and whether and how the system will be required to generate a read receipt for the transmission.)

§ 8.7 Other provisions:

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 This Agreement is comprised of the following documents:

- .1 AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor
- .2 AIA Document A101™–2017, Exhibit A, Insurance and Bonds
- .3 AIA Document A201™–2017, General Conditions of the Contract for Construction
- .4 AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:
(Insert the date of the E203-2013 incorporated into this Agreement.)

.5 Drawings

Number	Title	Date
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.6 Specifications

Section	Title	Date	Pages
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.7 Addenda, if any:

Number	Date	Pages
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Portions of Addenda relating to bidding or proposal requirements are not part of the Contract Documents unless the bidding or proposal requirements are also enumerated in this Article 9.

.8 Other Exhibits:

(Check all boxes that apply and include appropriate information identifying the exhibit where required.)

- AIA Document E204™–2017, Sustainable Projects Exhibit, dated as indicated below:
(Insert the date of the E204-2017 incorporated into this Agreement.)

The Sustainability Plan:

Title	Date	Pages
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Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages
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.9 Other documents, if any, listed below:

(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201™-2017 provides that the advertisement or invitation to bid, Instructions to Bidders, sample forms, the Contractor's bid or proposal, portions of Addenda relating to bidding or proposal requirements, and other information furnished by the Owner in anticipation of receiving bids or proposals, are not part of the Contract Documents unless enumerated in this Agreement. Any such documents should be listed here only if intended to be part of the Contract Documents.)

This Agreement entered into as of the day and year first written above.

OWNER (Signature)

(Printed name and title)

CONTRACTOR (Signature)

(Printed name and title)



AIA Document A101[®] – 2017 Exhibit A

Insurance and Bonds

This Insurance and Bonds Exhibit is part of the Agreement, between the Owner and the Contractor, dated the _____ day of _____ in the year _____
(In words, indicate day, month and year.)

for the following **PROJECT**:
(Name and location or address)

THE OWNER:
(Name, legal status and address)

THE CONTRACTOR:
(Name, legal status and address)

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

This document is intended to be used in conjunction with AIA Document A201[®]-2017, General Conditions of the Contract for Construction. Article 11 of A201[®]-2017 contains additional insurance provisions.

TABLE OF ARTICLES

- A.1 GENERAL
- A.2 OWNER'S INSURANCE
- A.3 CONTRACTOR'S INSURANCE AND BONDS
- A.4 SPECIAL TERMS AND CONDITIONS

ARTICLE A.1 GENERAL

The Owner and Contractor shall purchase and maintain insurance, and provide bonds, as set forth in this Exhibit. As used in this Exhibit, the term General Conditions refers to AIA Document A201[™]-2017, General Conditions of the Contract for Construction.

ARTICLE A.2 OWNER'S INSURANCE

§ A.2.1 General

Prior to commencement of the Work, the Owner shall secure the insurance, and provide evidence of the coverage, required under this Article A.2 and, upon the Contractor's request, provide a copy of the property insurance policy or policies required by Section A.2.3. The copy of the policy or policies provided shall contain all applicable conditions, definitions, exclusions, and endorsements.

§ A.2.2 Liability Insurance

The Owner shall be responsible for purchasing and maintaining the Owner's usual general liability insurance.

§ A.2.3 Required Property Insurance

§ A.2.3.1 Unless this obligation is placed on the Contractor pursuant to Section A.3.3.2.1, the Owner shall purchase and maintain, from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located, property insurance written on a builder's risk "all-risks" completed value or equivalent policy form and sufficient to cover the total value of the entire Project on a replacement cost basis. The Owner's

property insurance coverage shall be no less than the amount of the initial Contract Sum, plus the value of subsequent Modifications and labor performed and materials or equipment supplied by others. The property insurance shall be maintained until Substantial Completion and thereafter as provided in Section A.2.3.1.3, unless otherwise provided in the Contract Documents or otherwise agreed in writing by the parties to this Agreement. This insurance shall include the interests of the Owner, Contractor, Subcontractors, and Sub-subcontractors in the Project as insureds. This insurance shall include the interests of mortgagees as loss payees.

§ A.2.3.1.1 Causes of Loss. The insurance required by this Section A.2.3.1 shall provide coverage for direct physical loss or damage, and shall not exclude the risks of fire, explosion, theft, vandalism, malicious mischief, collapse, earthquake, flood, or windstorm. The insurance shall also provide coverage for ensuing loss or resulting damage from error, omission, or deficiency in construction methods, design, specifications, workmanship, or materials. Sub-limits, if any, are as follows:

(Indicate below the cause of loss and any applicable sub-limit.)

Cause of Loss	Sub-Limit
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§ A.2.3.1.2 Specific Required Coverages. The insurance required by this Section A.2.3.1 shall provide coverage for loss or damage to falsework and other temporary structures, and to building systems from testing and startup. The insurance shall also cover debris removal, including demolition occasioned by enforcement of any applicable legal requirements, and reasonable compensation for the Architect's and Contractor's services and expenses required as a result of such insured loss, including claim preparation expenses. Sub-limits, if any, are as follows:

(Indicate below type of coverage and any applicable sub-limit for specific required coverages.)

Coverage	Sub-Limit
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§ A.2.3.1.3 Unless the parties agree otherwise, upon Substantial Completion, the Owner shall continue the insurance required by Section A.2.3.1 or, if necessary, replace the insurance policy required under Section A.2.3.1 with property insurance written for the total value of the Project that shall remain in effect until expiration of the period for correction of the Work set forth in Section 12.2.2 of the General Conditions.

§ A.2.3.1.4 Deductibles and Self-Insured Retentions. If the insurance required by this Section A.2.3 is subject to deductibles or self-insured retentions, the Owner shall be responsible for all loss not covered because of such deductibles or retentions.

§ A.2.3.2 Occupancy or Use Prior to Substantial Completion. The Owner's occupancy or use of any completed or partially completed portion of the Work prior to Substantial Completion shall not commence until the insurance company or companies providing the insurance under Section A.2.3.1 have consented in writing to the continuance of coverage. The Owner and the Contractor shall take no action with respect to partial occupancy or use that would cause cancellation, lapse, or reduction of insurance, unless they agree otherwise in writing.

§ A.2.3.3 Insurance for Existing Structures

If the Work involves remodeling an existing structure or constructing an addition to an existing structure, the Owner shall purchase and maintain, until the expiration of the period for correction of Work as set forth in Section 12.2.2 of the General Conditions, "all-risks" property insurance, on a replacement cost basis, protecting the existing structure against direct physical loss or damage from the causes of loss identified in Section A.2.3.1, notwithstanding the undertaking of the Work. The Owner shall be responsible for all co-insurance penalties.

§ A.2.4 Optional Extended Property Insurance.

The Owner shall purchase and maintain the insurance selected and described below.

(Select the types of insurance the Owner is required to purchase and maintain by placing an X in the box(es) next to the description(s) of selected insurance. For each type of insurance selected, indicate applicable limits of coverage or other conditions in the fill point below the selected item.)

- § A.2.4.1 Loss of Use, Business Interruption, and Delay in Completion Insurance**, to reimburse the Owner for loss of use of the Owner's property, or the inability to conduct normal operations due to a covered cause of loss.
- § A.2.4.2 Ordinance or Law Insurance**, for the reasonable and necessary costs to satisfy the minimum requirements of the enforcement of any law or ordinance regulating the demolition, construction, repair, replacement or use of the Project.
- § A.2.4.3 Expediting Cost Insurance**, for the reasonable and necessary costs for the temporary repair of damage to insured property, and to expedite the permanent repair or replacement of the damaged property.
- § A.2.4.4 Extra Expense Insurance**, to provide reimbursement of the reasonable and necessary excess costs incurred during the period of restoration or repair of the damaged property that are over and above the total costs that would normally have been incurred during the same period of time had no loss or damage occurred.
- § A.2.4.5 Civil Authority Insurance**, for losses or costs arising from an order of a civil authority prohibiting access to the Project, provided such order is the direct result of physical damage covered under the required property insurance.
- § A.2.4.6 Ingress/Egress Insurance**, for loss due to the necessary interruption of the insured's business due to physical prevention of ingress to, or egress from, the Project as a direct result of physical damage.
- § A.2.4.7 Soft Costs Insurance**, to reimburse the Owner for costs due to the delay of completion of the Work, arising out of physical loss or damage covered by the required property insurance: including construction loan fees; leasing and marketing expenses; additional fees, including those of architects, engineers, consultants, attorneys and accountants, needed for the completion of the construction, repairs, or reconstruction; and carrying costs such as property taxes, building permits, additional interest on loans, realty taxes, and insurance premiums over and above normal expenses.

§ A.2.5 Other Optional Insurance.

The Owner shall purchase and maintain the insurance selected below.

(Select the types of insurance the Owner is required to purchase and maintain by placing an X in the box(es) next to the description(s) of selected insurance.)

- § A.2.5.1 Cyber Security Insurance** for loss to the Owner due to data security and privacy breach, including costs of investigating a potential or actual breach of confidential or private information. *(Indicate applicable limits of coverage or other conditions in the fill point below.)*

- § A.2.5.2 Other Insurance
(List below any other insurance coverage to be provided by the Owner and any applicable limits.)

Coverage

Limits

ARTICLE A.3 CONTRACTOR'S INSURANCE AND BONDS

§ A.3.1 General

§ A.3.1.1 Certificates of Insurance. The Contractor shall provide certificates of insurance acceptable to the Owner evidencing compliance with the requirements in this Article A.3 at the following times: (1) prior to commencement of the Work; (2) upon renewal or replacement of each required policy of insurance; and (3) upon the Owner's written request. An additional certificate evidencing continuation of commercial liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment and thereafter upon renewal or replacement of such coverage until the expiration of the periods required by Section A.3.2.1 and Section A.3.3.1. The certificates will show the Owner as an additional insured on the Contractor's Commercial General Liability and excess or umbrella liability policy or policies.

§ A.3.1.2 Deductibles and Self-Insured Retentions. The Contractor shall disclose to the Owner any deductible or self-insured retentions applicable to any insurance required to be provided by the Contractor.

§ A.3.1.3 Additional Insured Obligations. To the fullest extent permitted by law, the Contractor shall cause the commercial general liability coverage to include (1) the Owner, the Architect, and the Architect's consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions for which loss occurs during completed operations. The additional insured coverage shall be primary and non-contributory to any of the Owner's general liability insurance policies and shall apply to both ongoing and completed operations. To the extent commercially available, the additional insured coverage shall be no less than that provided by Insurance Services Office, Inc. (ISO) forms CG 20 10 07 04, CG 20 37 07 04, and, with respect to the Architect and the Architect's consultants, CG 20 32 07 04.

§ A.3.2 Contractor's Required Insurance Coverage

§ A.3.2.1 The Contractor shall purchase and maintain the following types and limits of insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Contractor shall maintain the required insurance until the expiration of the period for correction of Work as set forth in Section 12.2.2 of the General Conditions, unless a different duration is stated below:

(If the Contractor is required to maintain insurance for a duration other than the expiration of the period for correction of Work, state the duration.)

§ A.3.2.2 Commercial General Liability

§ A.3.2.2.1 Commercial General Liability insurance for the Project written on an occurrence form with policy limits of not less than _____ (\$) each occurrence, _____ (\$) general aggregate, and _____ (\$) aggregate for products-completed operations hazard, providing coverage for claims including

- .1 damages because of bodily injury, sickness or disease, including occupational sickness or disease, and death of any person;
- .2 personal injury and advertising injury;
- .3 damages because of physical damage to, or destruction of, tangible property, including the loss of use of such property;
- .4 bodily injury or property damage arising out of completed operations; and
- .5 the Contractor's indemnity obligations under Section 3.18 of the General Conditions.

§ A.3.2.2 The Contractor's Commercial General Liability policy under this Section A.3.2.2 shall not contain an exclusion or restriction of coverage for the following:

- .1 Claims by one insured against another insured, if the exclusion or restriction is based solely on the fact that the claimant is an insured, and there would otherwise be coverage for the claim.
- .2 Claims for property damage to the Contractor's Work arising out of the products-completed operations hazard where the damaged Work or the Work out of which the damage arises was performed by a Subcontractor.
- .3 Claims for bodily injury other than to employees of the insured.
- .4 Claims for indemnity under Section 3.18 of the General Conditions arising out of injury to employees of the insured
- .5 Claims or loss excluded under a prior work endorsement or other similar exclusionary language.
- .6 Claims or loss due to physical damage under a prior injury endorsement or similar exclusionary language.
- .7 Claims related to residential, multi-family, or other habitational projects, if the Work is to be performed on such a project.
- .8 Claims related to roofing, if the Work involves roofing.
- .9 Claims related to exterior insulation finish systems (EIFS), synthetic stucco or similar exterior coatings or surfaces, if the Work involves such coatings or surfaces.
- .10 Claims related to earth subsidence or movement, where the work involves such hazards.
- .11 Claims related to explosion, collapse, and underground hazards, where the Work involves such hazards.

§ A.3.2.3 Automobile Liability covering vehicles owned, and non-owned vehicles used, by the Contractor, with policy limits of not less than _____ (\$__) per accident, for bodily injury, death of any person, and property damage arising out of the ownership, maintenance and use of those motor vehicles along with any other statutorily required automobile coverage.

§ A.3.2.4 The Contractor may achieve the required limits and coverage for Commercial General Liability and Automobile Liability through a combination of primary and excess or umbrella liability insurance, provided such primary and excess or umbrella insurance policies result in the same or greater coverage as the coverages required under Section A.3.2.2 and A.3.2.3, and in no event shall any excess or umbrella liability insurance provide narrower coverage than the primary policy. The excess policy shall not require the exhaustion of the underlying limits only through the actual payment by the underlying insurers.

§ A.3.2.5 Workers' Compensation at statutory limits.

§ A.3.2.6 Employers' Liability with policy limits not less than _____ (\$__) each accident, _____ (\$__) each employee, and _____ (\$__) policy limit.

§ A.3.2.7 Jones Act, and the Longshore & Harbor Workers' Compensation Act, as required, if the Work involves hazards arising from work on or near navigable waterways, including vessels and docks

§ A.3.2.8 If the Contractor is required to furnish professional services as part of the Work, the Contractor shall procure Professional Liability insurance covering performance of the professional services, with policy limits of not less than _____ (\$__) per claim and _____ (\$__) in the aggregate.

§ A.3.2.9 If the Work involves the transport, dissemination, use, or release of pollutants, the Contractor shall procure Pollution Liability insurance, with policy limits of not less than _____ (\$__) per claim and _____ (\$__) in the aggregate.

§ A.3.2.10 Coverage under Sections A.3.2.8 and A.3.2.9 may be procured through a Combined Professional Liability and Pollution Liability insurance policy, with combined policy limits of not less than _____ (\$__) per claim and _____ (\$__) in the aggregate.

§ A.3.2.11 Insurance for maritime liability risks associated with the operation of a vessel, if the Work requires such activities, with policy limits of not less than _____ (\$__) per claim and _____ (\$__) in the aggregate.

§ A.3.2.12 Insurance for the use or operation of manned or unmanned aircraft, if the Work requires such activities, with policy limits of not less than _____ (\$__) per claim and _____ (\$__) in the aggregate.

§ A.3.3 Contractor's Other Insurance Coverage

§ A.3.3.1 Insurance selected and described in this Section A.3.3 shall be purchased from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Contractor shall maintain the required insurance until the expiration of the period for correction of Work as set forth in Section 12.2.2 of the General Conditions, unless a different duration is stated below:

(If the Contractor is required to maintain any of the types of insurance selected below for a duration other than the expiration of the period for correction of Work, state the duration.)

§ A.3.3.2 The Contractor shall purchase and maintain the following types and limits of insurance in accordance with Section A.3.3.1.

(Select the types of insurance the Contractor is required to purchase and maintain by placing an X in the box(es) next to the description(s) of selected insurance. Where policy limits are provided, include the policy limit in the appropriate fill point.)

- § A.3.3.2.1** Property insurance of the same type and scope satisfying the requirements identified in Section A.2.3, which, if selected in this section A.3.3.2.1, relieves the Owner of the responsibility to purchase and maintain such insurance except insurance required by Section A.2.3.1.3 and Section A.2.3.3. The Contractor shall comply with all obligations of the Owner under Section A.2.3 except to the extent provided below. The Contractor shall disclose to the Owner the amount of any deductible, and the Owner shall be responsible for losses within the deductible. Upon request, the Contractor shall provide the Owner with a copy of the property insurance policy or policies required. The Owner shall adjust and settle the loss with the insurer and be the trustee of the proceeds of the property insurance in accordance with Article 11 of the General Conditions unless otherwise set forth below.

(Where the Contractor's obligation to provide property insurance differs from the Owner's obligations as described under Section A.2.3, indicate such differences in the space below.

Additionally, if a party other than the Owner will be responsible for adjusting and settling a loss with the insurer and acting as the trustee of the proceeds of property insurance in accordance with Article 11 of the General Conditions, indicate the responsible party below.)

- § A.3.3.2.2 Railroad Protective Liability Insurance**, with policy limits of not less than _____ (\$__) per claim and _____ (\$__) in the aggregate, for Work within fifty (50) feet of railroad property.
- § A.3.3.2.3 Asbestos Abatement Liability Insurance**, with policy limits of not less than _____ (\$__) per claim and _____ (\$__) in the aggregate, for liability arising from the encapsulation, removal, handling, storage, transportation, and disposal of asbestos-containing materials.
- § A.3.3.2.4** Insurance for physical damage to property while it is in storage and in transit to the construction site on an "all-risks" completed value form.
- § A.3.3.2.5** Property insurance on an "all-risks" completed value form, covering property owned by the Contractor and used on the Project, including scaffolding and other equipment.
- § A.3.3.2.6 Other Insurance**
(List below any other insurance coverage to be provided by the Contractor and any applicable limits.)

Coverage

Limits

§ A.3.4 Performance Bond and Payment Bond

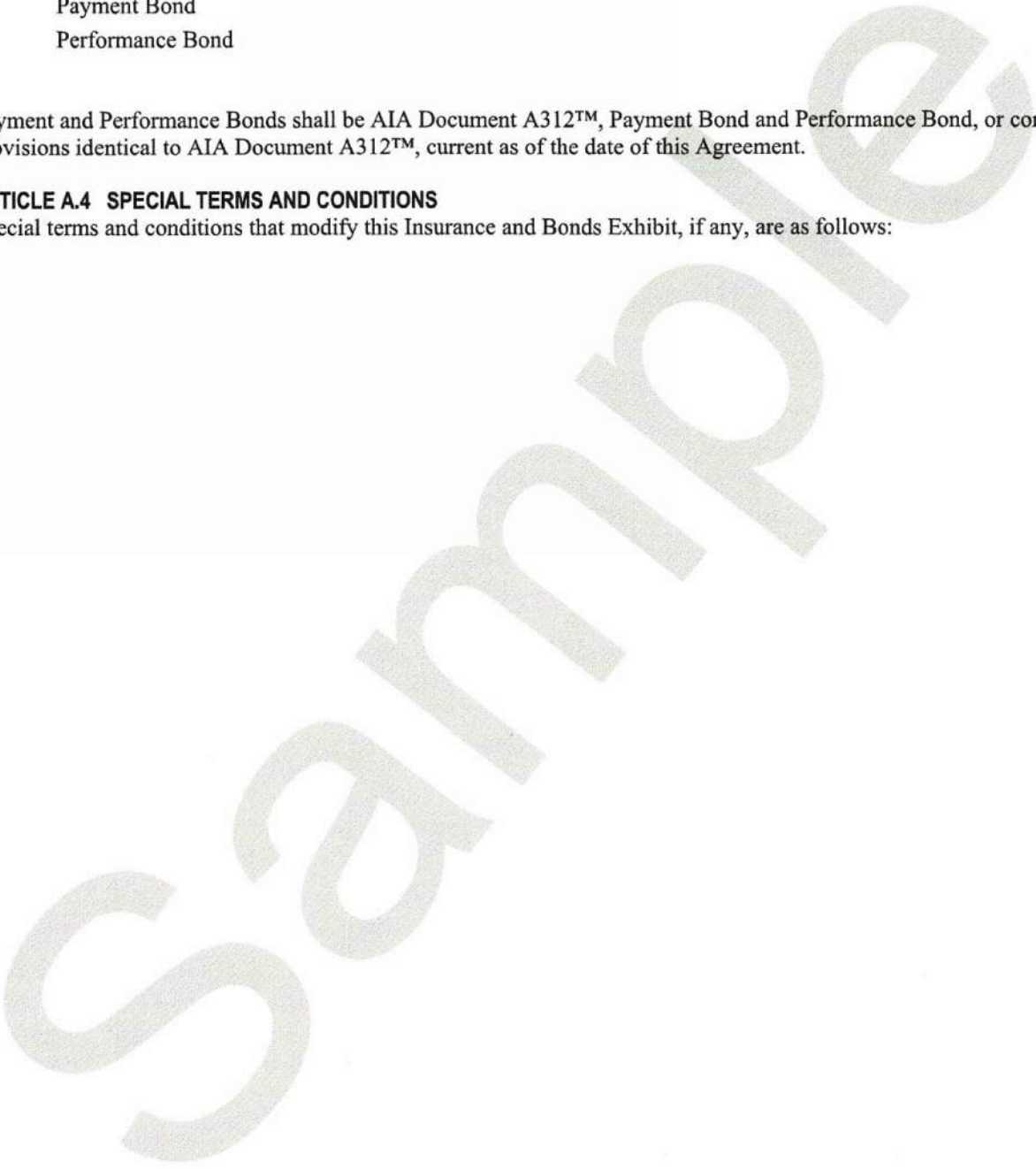
The Contractor shall provide surety bonds, from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located, as follows:
(Specify type and penal sum of bonds.)

Type	Penal Sum (\$0.00)
Payment Bond	
Performance Bond	

Payment and Performance Bonds shall be AIA Document A312™, Payment Bond and Performance Bond, or contain provisions identical to AIA Document A312™, current as of the date of this Agreement.

ARTICLE A.4 SPECIAL TERMS AND CONDITIONS

Special terms and conditions that modify this Insurance and Bonds Exhibit, if any, are as follows:



SECTION 01 1001

FINISH SCHEDULE

EXTERIOR:

1. Existing brick signage element (south side of canopy): Remain as is, clean. No paint.
2. Storefront entrance mullions & windows: "Dark Bronze" Anodized Aluminum (refer to specifications). Spandrel bottom panels shall be "Black" in color.
3. Storefront door at main entry: Kawneer Permacoat powder coat finish: "Summer Yellow" in color
4. Steel Structure / metal arches / canopy / canopy deck: Painted, Color: SW 7048 "Urbane Bronze"
5. Entire building (brick on building, concrete block, panels above, flashing, etc.) will be painted: Color SW 7044 "Amazing Gray"
6. Prefinished sheet metal trim, fascia, etc. to match Building SW 7048 "Urbane Bronze" paint color as close as possible.
7. Metal privacy fence panels shall be "Galvalume Plus" in color with galvanized support structure and trim.
8. Parking lot striping and tire stops: "Safety Yellow" in color.

INTERIOR: (Refer to Finish Schedule on drawings for exact location of finishes.)

1. Luxury Vinyl Tile / LVT (at entry, north side & where scheduled): Armstrong, Luxury Vinyl Flooring, 18"x 36", glue down, running bond pattern. Color Series: Biome Series. Color: ST285 "Boreal-Bergen-Bergen". Contact: Angela Ditmore, T: 469-978-4058 E: acditmore@armstrongflooring.com
2. Carpet Tile Floor (south side): Shaw Carpet Tile, Color Shift Hexagon, 5T161, "Aerial" 59327, laying pattern as selected at a later date.
3. Field Wall Base
 - a. Allstate or Approved Equal
 - b. 4" Resilient Rubber Base
 - c. Color: "A-47"
4. Accent Wall Color at East Wall of Children's Area 103: SW 6690 "Gambol Gold"
5. Typical Wall Color and Typical Deck and Structure Color: SW 7105 "Paperwhite"
6. Hollow Metal Frames (as sched.): Sherwin Williams, SW 7105 "Paperwhite"
7. Wood Doors (as sched.):
 - a. Marshfield Door Systems
 - b. Wood veneer: White Maple
 - c. Finish: "Clear" D-95
8. Cab Front Laminate:
 - a. Wilsonart, Mission "Maple" 7990-38
9. Cab Solid Surface Countertops:
 - a. Corian "Sun" in color
10. Window Sills: Sills shall be constructed out of 1x hardwood, painted to match adjacent wall color
11. Ceiling Mounted Acoustical Panels: Surface shall be field painted SW7105 "Paperwhite"
12. Door Finish Hardware: US10B (613) "dark anodized, satin bronze, oil rubbed"
13. Roller Shades: Hunter Douglas Hospitality "White/White" in color

TYPICAL RESTROOMS:

1. Floor tile: Daltile, mosaic tile, Keystones 2"x 2" "Ocean Blue" D159 with dark grout to match
2. Field wall tile: Daltile, glazed ceramic tile, running bond pattern, "White" 0100, white grout to match
3. Ceiling: Drywall ceilings will be Sherwin Williams SW 7105 "Paperwhite"
4. Hollow Metal Frames: Sherwin Williams, SW 7105 "Paperwhite"
5. Wood Doors:
 - a. Marshfield Door Systems
 - b. Wood veneer: White Maple
 - c. Finish: "Clear" D-95
6. Schluter Trim System at Walls and Floors: "Brushed Aluminum"

SECTION 01 1100
PROJECT SUMMARY

PART 1 GENERAL

1.01 PROJECT

- A. Project Name: Renovations of North Angelo Branch Library
- B. Owner's Name: Tom Green County
- C. Architect's Name: KFW Architects AIA
- D. Work for this Project is described as a renovation to the building interior, exterior refinish (~4,246 sf conditioned square feet) and site facilities update. Interior walls will be metal stud with painted drywall. The roof will be primarily a single-ply pvc membrane system, flat. All Structural, and MEP engineering will be part of the project. By submitting a bid, each bidder agrees to waive any claims it has or may have against the Owner, the Engineer, the Architect, and their respective employees and offices, arising out of or in connection with the administration, evaluation, or recommendation of any bid; waiver of any requirements under the Bid Documents; or the Contract Documents; acceptance or rejection of any bids; and award of the Contract. By submitting a bid, each bidder agrees to exhaust its administrative remedies under Owner's (Tom Green County) Policy or the Dispute Clause of any resulting contract before seeking judicial relief of any type in connection with any matter related to this solicitation, the award of any contract, and any dispute under any resulting contract.

1.02 CONTRACT DESCRIPTION

- A. Contract Type: A single prime contract based on a Stipulated Price.

1.03 WORK BY OWNER

- A. Owner will provide the following:
 - 1. Asbestos abatement.

1.04 OWNER OCCUPANCY

- A. Owner intends to occupy the Project upon Substantial Completion.
- B. Cooperate with Owner to minimize conflict and to facilitate Owner's operations. Note that the Library will not be operational during construction and that all necessary safety precautions to protect property shall be taken.
- C. Schedule the Work to accommodate Owner occupancy.

1.05 CONTRACTOR USE OF SITE AND PREMISES

- A. Construction Operations: Limited to areas noted on Drawings.
- B. Arrange use of site and premises to allow:
 - 1. Work by Others.
 - 2. Work by Owner.
- C. Provide access to and from site as required by law and by Owner:
 - 1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
 - 2. Do not obstruct roadways, sidewalks, or other public ways without permit.
- D. Utility Outages and Shutdown:
 - 1. Prevent accidental disruption of utility services to other facilities.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 2000
PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Procedures for preparation and submittal of applications for progress payments.
- B. Documentation of changes in Contract Sum and Contract Time.
- C. Change procedures.
- D. Correlation of Contractor submittals based on changes.
- E. Procedures for preparation and submittal of application for final payment.

1.02 RELATED SECTIONS

- A. Contract Documents issued by the Architect.

1.03 SCHEDULE OF VALUES

- A. Submit a printed schedule on AIA Form G703 - Application and Certificate for Payment Continuation Sheet. Contractor's standard form or electronic media printout will be considered.
- B. Submit Schedule of Values in duplicate within 15 days after date of Owner-Contractor Agreement.
- C. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the specification Section. Identify site mobilization.
- D. Include in each line item, the amount of Allowances specified in this section.
- E. Include separately from each line item, a direct proportional amount of Contractor's overhead and profit.
- F. Revise schedule to list approved Change Orders, with each Application for Payment.

1.04 APPLICATIONS FOR PROGRESS PAYMENTS

- A. Payment Period: Submit to the Architect at monthly intervals.

- B. Present required information in typewritten form.
- C. Form: AIA G702 Application and Certificate for Payment and AIA G703 - Continuation Sheet including continuation sheets when required.
- D. For each item, provide a column for listing each of the following:
 - 1. Item Number.
 - 2. Description of work.
 - 3. Scheduled Values.
 - 4. Previous Applications.
 - 5. Work in Place and Stored Materials under this Application.
 - 6. Authorized Change Orders.
 - 7. Total Completed and Stored to Date of Application.
 - 8. Percentage of Completion.
 - 9. Balance to Finish.
 - 10. Retainage.
- E. Execute certification by signature of authorized officer.
- F. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored Products.
- G. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of Work.
- H. Submit three copies of each Application for Payment or email Pay Application with Items "I" below to brooks@kinneyfranke.com.
- I. Include the following with the application:
 - 1. Transmittal letter as specified for Submittals in Section 01 3000.
 - 2. Construction progress schedule, revised and current as specified in Section 01 3000.
 - 3. Partial release of liens from major Subcontractors and vendors.
- J. When Architect requires substantiating information, submit data justifying dollar amounts in question. Provide one copy of data with cover letter for each copy of submittal. Show application number and date, and line item by number and description.

1.05 MODIFICATION PROCEDURES

- A. Architect will advise of minor changes in the Work not involving an adjustment to Contract Sum or Contract Time as authorized by the Conditions of the Contract by issuing supplemental instructions on AIA Form G710, or other documents.
- B. Construction Change Directive: Architect may issue a document, signed by Owner, instructing Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
 - 1. The document will describe changes in the Work, and will designate method of determining any change in Contract Sum or Contract Time.
 - 2. Promptly execute the change in Work.
- C. Proposal Request: Architect may issue a document which includes a detailed description of a proposed change with supplementary or revised Drawings and specifications, a change in Contract Time for executing the change. Contractor shall prepare and submit a fixed price quotation within 7 calendar days.
- D. Contractor may propose a change by submitting a request for change to Architect, describing the proposed change and its full effect on the Work, with a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation and a statement describing the effect on Work by separate or other contractors. Document any requested substitutions in accordance with Section 01 6000.
- E. Computation of Change in Contract Amount:
 - 1. For change requested by Architect for work falling under a fixed price contract, the amount will be based on Contractor's price quotation.
 - 2. For change requested by Contractor, the amount will be based on the Contractor's request for a Change Order as approved by Architect.
 - 3. For change ordered by Architect without a quotation from Contractor, the amount will be determined by Architect based on the Contractor's substantiation of costs as specified for Time and Material work.
- F. Substantiation of Costs: Provide full information required for evaluation.
 - 1. On request, provide following data:
 - a. Quantities of products, labor, and equipment.
 - b. Taxes, insurance, and bonds.
 - c. Overhead and profit.
 - d. Justification for any change in Contract Time.
 - e. Credit for deletions from Contract, similarly documented.

2. Support each claim for additional costs with additional information:
 - a. Origin and date of claim.
 - b. Dates and times work was performed, and by whom.
 - c. Time records and wage rates paid.
 - d. Invoices and receipts for products, equipment, and subcontracts, similarly documented.
 3. For Time and Material work, submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract.
- G. Execution of Change Orders: Architect will issue Change Orders for signatures of parties as provided in the Conditions of the Contract on AIA G701.
- H. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum.
- I. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.
- J. Promptly enter changes in Project Record Documents.

1.06 APPLICATION FOR FINAL PAYMENT

- A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due. Submit to Architect.
- B. Application for Final Payment will not be considered until the following have been accomplished:
 1. All closeout procedures specified in Section 01 7000.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 2200

ALLOWANCES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Cash allowances.
 - 2. Contingency allowance.
- B. Related Sections
 - 1. Section 01 2000 – Price and Payment Procedures.
 - 2. Section 01 3000 – Administrative Requirements.
- C. Include in Contract Sum cash allowances scheduled at end of Section and contingency allowance specified in this Section.
- D. Designate in Construction Progress Schedule specified in delivery dates for products under each allowance.
- E. Designate in Schedule of Values specified in quantities of materials under unit cost allowances.

1.2 CASH ALLOWANCES

- A. General:
 - 1. Purchase products under each allowance as directed by Architect.
 - 2. Amount of allowance includes:
 - a. Net cost of product, less any applicable trade discounts.
 - b. Delivery to site.
 - c. Applicable taxes.
 - d. Labor required under allowance, only when labor is specified to be included in allowance.
 - 3. In addition to amounts of allowances, include in Contract Sum, General Contractor's costs for:
 - a. Handling at site, including unloading, uncrating, and storing.
 - b. Protection from elements and from damage.
 - c. Labor required for installation and finishing, except where installation is specified to be part of allowance.
 - d. Other expenses required to complete installation.
 - 4. General Contractor's overhead and profit shall be included in the Contract Sum itself, including on any allowances as noted. At the conclusion of the Project, Construction Manager shall return any unused portion of allowances back to the Owner and the reduction of the General Contractor's overhead and profit should be reflected on the final payment for this reduction in construction cost.
 - 5. At closeout of Contract, funds remaining in Allowances will be credited to Owner by Change Order showing final construction cost.
- B. Selection of Products:
 - 1. Architect's Duties:
 - a. Consult with General Contractor in consideration of products and suppliers.
 - b. Make selection; designate products to be used.
 - 2. General Contractor's Duties:
 - a. Assist Architect in determining:
 - 1) Supplier or installer, as applicable. Cost, delivered and unloaded at site.
 - b. Obtain proposals from suppliers when requested by Architect.

- c. Notify Architect of any effect anticipated by selection of product or supplier under consideration on construction schedule or contract sum.
- d. On notification of selection, enter into purchase agreement with designated supplier.

C. Delivery:

- 1. General Contractor's Duties:
 - a. Arrange for delivery and unloading.
 - b. Promptly inspect products for damage or defects.
 - c. Submit any claims for transportation damage.

D. Installation: Comply with requirements of referenced specification section.

E. Adjustment of Costs:

- 1. Should actual purchase cost be more or less than specified amount of allowance, Contract Sum will be adjusted by Change Order equal to amount of difference.
- 2. Amount of Change Order will recognize any changes in handling costs at site, labor, installation costs, overhead, profit, and other expenses caused by selection under allowance.
- 3. For products specified under unit cost allowance, unit cost shall apply to quantity listed in Schedule of Values.
- 4. Submit invoices or other data to substantiate quantity actually used.
- 5. Submit any claims for additional costs at site or other expenses caused by selection under allowances, prior to execution of work. Failure to do so will constitute waiver of claims for additional costs.

1.3 **CONTINGENCY ALLOWANCES:**

Include in Contract Sum a stipulated sum of **Twenty Thousand Dollars (\$20,000) for General Contractor Contingency & Seventy Thousand Dollars (\$70,000) for Owner Contingency** for use upon Owner's instruction.

- 1. General Contractor's costs for products, delivery, installation, equipment and labor will be included in "Field Request for Owner's Contingency" (FROC) forms authorizing expenditure of funds from this Contingency Allowance. Both Contingency Allowances shall be required to have signed authorization of the Owner, Architect and General Contractor.
- 2. Funds will be drawn from Contingency Allowance only by FROC, signed by Owner, Architect and General Contractor.
- 3. General Contractor's overhead and profit shall be included in the Contract Sum itself, including on the contingency and any allowances as noted. At the conclusion of the Project, General Contractor shall return any unused portion of the contingency or allowances back to the Owner and the reduction of the General Contractor's overhead and profit should be reflected on the final payment for this reduction in construction cost.
- 4. At Closeout of Contract, funds remaining in Contingency Allowance will be credited to Owner by Change Order showing final construction cost.

1.4 **DATA, TECHNOLOGY AND SECURITY ALLOWANCE:**

Twenty Thousand Dollars (\$20,000). Refer to MEP for related information.

1.5 **INTERIOR SIGNAGE ALLOWANCE:**

Seven Hundred Dollars (\$700). Refer to Spec. Section 10 1423 for related information.

1.6 **FINISH HARDWARE ALLOWANCE:**

Nine Thousand dollars (9,000). Refer to Spec. Section 08 7100 for related information.

SECTION 01 2300

ALTERNATES

PART 1 GENERAL

1.1 SUMMARY:

- A. Section Includes
 - 1. Documentation of changes to Contract Sum and Contract Time.
- B. Contract Documents contain pertinent requirements for materials and methods to accomplish work described herein.
- C. Provide alternate costs for inclusion in Contract Sum if accepted by Owner.

1.2 RELATED REQUIREMENTS:

- A. Owner/General Contractor Agreement: Alternates accepted by Owner for incorporation into Work.
- B. Individual specification sections identified.

1.3 PROCEDURES:

- A. Alternates will be exercised at the option of Owner.
- B. Coordinate related work and modify surrounding work as required to complete the work, including changes under each Alternate, when acceptance is designated in Owner/General Contractor Agreement.

1.4 DESCRIPTION OF ALTERNATES:

GENERAL BID ALTERNATE NOTES:

Under "Deduct" Bid Alternates - Contractor shall include all work shown on related drawings & specifications under project's base bid proposal. Then, Contractor shall furnish credit or deduct costs for material & labor to not perform the work listed under the specific Deduct Bid Alternate.

Under "Add" Bid Alternates - Contractor shall not include the materials & labor in project's base bid proposal. Then, Contractor shall furnish additional costs to perform the listed work under the specific Add Bid Alternate.

ADD BID ALTERNATE NO. 1:

Contractor shall submit additional pricing to perform work as listed below.

- 1A. Demolish all existing asphalt paving on site (bid qty. approx. 10,533 sq/ft) & install new asphalt paving as described in note 1B.
- 1B. Furnish & install new 2" thick heavy-duty asphalt paving on new 8.5" thick compacted base on 6" thick min. compacted existing subgrade. New paving shall flush with existing adjoining paving along the north property line, top of perimeter curbing at streets, new conc. drive & new conc. drive approach. Paving Contractor shall determine slope contours of new paving to provide proper surface water drainage with no ponding.
- 1C. Provide credit costs for material & labor for items already included in or not required from base bid proposal. These items consist of seal coating of existing asphalt paving, (3) parking spaces with painted tire stops, striping & conc. separation curbing.
- 1D. Contractor shall protect all existing conc. curbing, driveways, walks, power poles, fire hydrants, bus stop structure, adjacent property, etc. during demolition phase and new asphalt construction phase.
- 1E. Sawcut existing asphalt paving along northern property line as shown.
- 1F. Refer to base bid site plan for new grades along south side of building.
- 1G. Reduce east side of existing curb cut to form new 12'-0" wide conc. approach, drive & dumpster pad with pipe bollards.

ADD BID ALTERNATE NO. 2:

Contractor shall submit additional pricing to perform work as listed below.

- 2A. Install new asphalt paving as described in note 2B, in existing planting fill area (bid qty. approx. 1,930 sq/ft).
- 2B. Furnish & install new 2" thick heavy-duty asphalt paving on new 8.5" thick compacted base on 6" thick min. compacted existing subgrade. New paving shall flush with existing adjoining paving along the north property line, top of perimeter curbing at streets, new conc. drive & new conc. drive approach. Paving Contractor shall determine slope contours of new paving to provide proper surface water drainage with no ponding.
- 2C. Install (5) new parking spaces complete with painted conc. tire stops & striping. Corner of new tire stops shall line up with edge of south property line.
- 2D. Contractor shall protect all existing conc. curbing, driveways, walks, power poles, adjacent property, etc. during demolition phase and new asphalt construction phase.
- 2E. Contractor shall remove (2) existing trees including stumps.
- 2F. Refer to base bid site plan for new grades along south side of existing building.

DEDUCT BID ALTERNATE NO. 3:

Contractor shall submit credit pricing to delete the below listed items.

- 3A. Delete new building front signage & related lighting, ref: 4/A1.00 of Dwgs.
- 3B. Delete new parking lot light pole, heads & related underground utilities including work for existing pole mounted sign located out at Chad St.

DEDUCT BID ALTERNATE NO. 4:

Contractor shall submit credit pricing to delete the below listed items.

- 4A. Delete new 4'-0" wide conc. sidewalks located on the south & west sides of the existing building.
- 4B. Delete new 5'-0" wide conc. sidewalks and new ADA curb ramp on Chadbourne St. & 30th. St.
- 4C. Delete demolition of existing southeast conc. driveway & related existing curbing along 30th. St.
- 4D. Delete installation of new southeast conc. driveway approach & related new curbing along 30th. St.

DEDUCT BID ALTERNATE NO. 5:

Contractor shall submit credit pricing to delete the below listed items.

- 5A. Delete exterior wall mounted roof access metal ladder assembly as per specification section 05 5133.

DEDUCT BID ALTERNATE NO. 6:

Contractor shall submit credit pricing to delete the below listed items.

- 6A. Delete demolition of existing west chainlink fencing & shrubbery overgrowth.
- 6B. Delete new 6'-0" high metal panel privacy fencing located on west property line as per specification section 32 3200.

DEDUCT BID ALTERNATE NO. 7:

Contractor shall submit credit pricing to delete the below listed items.

- 7A. Delete all exterior building repainting of existing walls & finishes.

DEDUCT BID ALTERNATE NO. 8:

Contractor shall submit credit pricing to delete the below listed items.

- 8A. Clean & prepare existing conc. floors for finish material.
- 8B. Furnish & install clear sealed finish over existing conc. floors in lieu of LVT flooring tile as originally scheduled in Breakroom 108, Janitor 111, IT/Stor. 112 & Storage 113.

DEDUCT BID ALTERNATE NO. 9:

Contractor shall submit credit pricing to delete the below listed items.

- 9A. Furnish & install plastic laminate countertops, edges & splashes in lieu of solid surfacing at all counters. This includes Info/Circulation 104, Staff Workroom 105 & Breakroom 108.

END OF SECTION

SECTION 01 2500

SUBSTITUTION PROCEDURES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Product Substitution Procedures.

1.2 GENERAL

- A. Definition: Proposal by Contractor to use manufacturer, product, material, or system different from one required in Contract Documents.
- B. Do not substitute Products unless a substitution request has been approved by Architect.
- C. Substitutions during Bidding: Refer to Instructions to Bidders.
- D. Architect will consider substitution requests within 30 days after award of Contract. After initial 30 day period, substitutions requests will be considered only due to non-availability of a specified Product through no fault of Contractor.
- E. In case of non-availability of a specified Product notify Architect in writing as soon as non-availability becomes apparent.

1.3 SUBSTITUTION REQUESTS

- A. Submit substitution requests on form provided in Project Manual
- B. Document specified product and proposed substitution with complete data, including:
 - 1. Product identification, including name and address of manufacturer.
 - 2. Product description, performance and test data, and reference standards.
 - 3. Sample, if requested.
 - 4. Description of any anticipated effect that acceptance of proposed substitution will have on Progress Schedule, construction methods, or other items of Work.
 - 5. Description of any differences between specified product and proposed substitution.
 - 6. Difference in cost between specified product and proposed substitution.
- C. Burden of proof for substantiating compliance of proposed substitution with Contract Document requirements remains with Contractor.
- D. A request constitutes a representation that the Contractor:
 - 1. Has investigated the 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 that may be required for the Work to be complete with no additional cost to Owner.
 - 4. Waives claims for additional costs or time extension that may subsequently become apparent.
 - 5. Will reimburse Owner for design services associated with re-approval by authorities or revisions to Contract Documents to accommodate the substitution.
- E. Substitutions will not be considered if:
 - 1. They are indicated or implied on Shop Drawings or other submittals without submittal of a substitution request.
 - 2. Approval will require substantial revision of Contract Documents without additional compensation to Architect.

F. Submit electronically in Adobe PDF format.

G. Architect will notify Contractor of approval or rejection of each Substitution Request.

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

END OF SECTION

DOCUMENT 01 2519

SUBSTITUTION REQUEST FORM

DATE: _____

TO: _____

ATTENTION: _____

PROJECT: _____

We submit for your consideration the following product as a substitution for the specified product:

Section No.	Paragraph	Specified Product
_____	_____	_____

Proposed Substitution: _____

Reason for Substitution: _____

Product Data:

Attach complete technical data for both the specified product and the proposed substitution. Include information on changes to Contract Documents that the proposed substitution will require for its proper installation.

Samples:

Attached Will be furnished upon request

Does the substitution affect dimensions shown on Drawings?

No Yes (explain) _____

Effects of proposed substitution on other Work:

Differences between proposed substitution and specified Product:

Manufacturer's warranties of the proposed substitution are:

Same Different (explain) _____

Maintenance service and spare parts are available for proposed substitution from:

Previous installations where proposed substitution may be seen:

Project: _____ Project: _____
Owner: _____ Owner: _____
Architect: _____ Architect: _____
Date Installed: _____ Date Installed: _____

Cost savings to be realized by Owner, if proposed substitution is approved:

Change to Contract Time, if proposed substitution is approved:

No Change Add _____ days Deduct _____ days

Submittal constitutes a representation that Contractor has read and agrees to the provisions of Section 01 2500.

Submitted by Contractor:

Signature

Firm

For Use by Architect:

Based on the information supplied by the [Contractor,] [Construction Manager,] the Architect has reviewed the proposed substitution on the basis of design concept of the Work and conformance with information given in Contract Documents.

Approved Approved as Noted Rejected

Submit Additional Information: _____

By: _____ Date: _____

SECTION 01 2900

PAYMENT PROCEDURES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Schedule of Values.
 - 2. Applications for Payment.
- B. Related Sections:
 - 1. Section 01 7700 - Closeout Procedures.

1.2 SCHEDULE OF VALUES

- A. General:
 - 1. Submit a Schedule of Values to Architect at least 20 days prior to submitting first Application for Payment.
 - 2. Upon request of Architect, furnish additional data to support values given that will substantiate their correctness.
 - 3. Approved Schedule of Values will be used as basis for reviewing Contractor's Applications for Payment.
- B. Form and Content:
 - 1. Format: AIA Document G703 - Continuation Sheet of Application and Certification for Payment
 - 2. Use Table of Contents of Project Manual as basis of format for listing costs of Work.
 - 3. List installed value of component parts of Work in sufficient detail to serve as basis for computing values for progress payments.
 - 4. Include separate line items for:
 - a. Site mobilization.
 - b. Bonds and insurance.
 - c. Contractor's overhead and profit.
 - 5. For items on which payment will be requested for stored materials, break down value into:
 - a. Cost of materials, delivered and unloaded, with taxes paid.
 - b. Total installed value.
 - 6. For each line item that has a value of more than \$25,000.00, break down costs to list major products or operations under each item.
 - 7. Total of costs listed in Schedule shall equal Contract Sum.
- C. Submit electronic copy via Adobe PDF.
- D. Review and Resubmittal:
 - 1. After initial review by Architect, revise and resubmit if required.
 - 2. Revise and resubmit along with next Application for Payment when a Change Order is issued. List each Change Order as a new line item.

1.3 APPLICATIONS FOR PAYMENT

- A. Preparation:
 - 1. Format: AIA Document G702 - Application and Certification for Payment, supported by AIA Document G703 - Continuation Sheet.
 - 2. Prepare required information in typewritten format or on electronic media format.
 - 3. Use data from reviewed Schedule of Values. Provide dollar value in each column for each line item representing portion of work performed.

4. List each authorized Change Order as a separate line item, listing Change Order number and dollar value.
 5. Prepare Application for Final Payment as specified in Section 01 7700.
- B. Waivers of Lien:
1. Along with each Application for Payment, submit waivers of lien from Contractor and each Subcontractor or Sub-subcontractor included on the current month's Application for Payment.
 2. Submit partial waivers on each item for amount requested, prior to deduction of retainage.
 3. For completed items, submit full or final waiver.
- C. Substantiating Data:
1. When Architect requires substantiating information, submit data justifying dollar amounts in question.
 2. Provide one copy of data with cover letter showing Application number and date, and line item number and description.
- D. Submittal:
1. Submit 5 copies of each Application for Payment.
 2. Payment period: Submit at intervals stipulated in Owner/Contractor Agreement.

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

END OF SECTION

SECTION 01 3100

PROJECT MANAGEMENT AND COORDINATION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Project coordination.
 - 2. Coordination drawings.
 - 3. Project meetings.
- B. Related Sections:
 - 1. Section 01 7700 - Contract Closeout.

1.2 PROJECT COORDINATION

- A. Coordinate scheduling, submittals, and work of various Sections of specifications to assure efficient and orderly sequence of installation of interdependent construction elements.
- B. Verify that utility requirement 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 and installation of mechanical and electrical items that are indicated diagrammatically on Drawings.
 - 1. Follow routing shown as closely as practical; place runs parallel with building lines.
 - 2. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- D. In finished areas, conceal pipes, ducts, and wiring within 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.
- F. After Owner occupancy, 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 COORDINATION

- A. Hold coordination meetings with trades providing mechanical, plumbing, fire protection, and electrical work.
- B. Resolve conflicts between trades, prepare composite coordination drawings and obtain signatures on original composite coordination Drawings.
- C. When conflicts cannot be resolved:
 - 1. Cease work in areas of conflict and request clarification prior to proceeding.
 - 2. Prepare drawings to define and to indicate proposed solution.
 - 3. Submit drawings for approval when actual measurements and analysis of Drawings and Project Manual indicate that various systems cannot be installed without significant deviation from intent of Contract Documents.

- D. Submit original composite coordination drawings as part of Project Record Documents specified in Section 01 7700.

1.4 PROJECT MEETINGS

- A. Schedule and administer preconstruction conference, progress meetings, and pre-installation conferences
- B. Make physical arrangements for meetings; notify involved parties at least 4 days in advance.
- C. Record significant proceedings and decisions at each meeting; reproduce and distribute copies to parties in attendance and others affected by proceedings and decisions made.

1.5 PRECONSTRUCTION CONFERENCE

- A. Schedule within 15 days after date of Notice to Proceed at Contractor's central site convenient to all parties.
- B. Attendance:
 - 1. Contractor.
 - 2. Owner.
 - 3. Architect and principal consultants.
 - 4. Major subcontractors and suppliers as Contractor deems appropriate.
- C. Review and Discuss:
 - 1. Relation and coordination of various parties, and responsible personnel for each party.
 - 2. Use of premises, including office and storage areas, temporary controls, and security procedures.
 - 3. Construction schedule and critical work sequencing.
 - 4. Processing of:
 - a. Contract modifications.
 - b. Shop Drawings, Product Data, and Samples.
 - c. Applications for Payment.
 - d. Substitutions.
 - e. Requests for Information.
 - f. Other required submittals.
 - 5. Adequacy of distribution of Contract Documents.
 - 6. Procedures for maintaining contract closeout submittals.
 - 7. Installation and removal of temporary facilities.
 - 8. Notification procedures and extent of testing and inspection services.

1.6 PROGRESS MEETINGS

- A. Schedule bi-weekly progress meetings.
- B. Location: Contractor's Project field office.
- C. Attendance:
 - 1. Contractor.
 - 2. Owner.
 - 3. Architect and consultants as appropriate to agenda.
 - 4. Subcontractors and suppliers as appropriate to agenda.
 - 5. Others as appropriate to agenda.
- D. Review and Discuss:

1. Work progress since previous meeting, including:
 - a. Field observations, deficiencies, conflicts, and problems.
 - b. Progress and completion date.
 - c. Corrective measures needed to maintain quality standards, progress, and completion date.
2. Status of:
 - a. Requests for information.
 - b. Submittals.
 - c. Contract modifications.
3. Coordination between various elements of Work.
4. Maintenance of Project Record Documents.

1.7 PRE-INSTALLATION CONFERENCES

- A. Where required in individual specification Section, convene a pre-installation conference at project site or other designated location.
- B. Require attendance of parties directly affecting or affected by work of the specific Section.
- C. Review conditions of installation, preparation and installation procedures, and coordination with related work.

END OF SECTION

SECTION 01 3216

CONSTRUCTION PROGRESS SCHEDULES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Construction progress schedule.
- B. Related Sections:
 - 1. Section 01 1100 - Summary of Work:
 - 2. Section 01 2900 - Payment Procedures.

1.2 FORMAT

- A. Prepare Progress Schedule as a horizontal bar chart with separate bar for each major portion of Work or operation, identifying first work day of each week.
- B. Sequence of Listings: The chronological order of the start of each item of Work.
- C. Scale and Spacing: To provide space for notations and revisions.
- D. Sheet Size: Multiples of 8-1/2 x 11 inches.

1.3 CONTENT

- A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.
- B. Identify each item by specification Section number.
- C. Identify work of logically grouped activities.
- D. Provide subschedules to define critical portions of the entire Progress Schedule.
- E. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.
- F. Provide separate schedule of submittal dates for Shop Drawings, Product Data, and Samples, including:
 - 1. Dates reviewed submittals will be required from Architect.
 - 2. Decision dates for selection of finishes.
 - 3. Delivery dates for [Owner furnished products] [and] [Products identified under Allowance].
- G. Coordinate content with Schedule of Values specified in Section 01 2900.
- H. Revisions:
 - 1. Indicate progress of each activity to date of submittal, and projected completion date of each activity.
 - 2. Identify activities modified since previous submittal, major changes in scope, and other identifiable changes.
- I. Provide narrative report to define problem areas, anticipated delays, and impact on Progress Schedule. Report corrective action taken, or proposed, and its effect.

1.4 SUBMITTAL

- A. Submit initial Progress Schedule within 15 days after date of Notice to Proceed. After review, resubmit required revised data within 10 days.
- B. Submit revised Progress Schedule with each Application for Payment.
- C. Submit one copy.

1.5 DISTRIBUTION

- A. Distribute copies of approved Progress Schedule to project site file, Subcontractors, suppliers, and other concerned parties.
- B. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in Progress Schedule.

END OF SECTION

SECTION 01 3300
SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Submittal procedures.
 - 2. Proposed Products list.
 - 3. Submittal schedule.
 - 4. Shop Drawings.
 - 5. Product Data.
 - 6. Samples.
 - 7. Quality control submittals.

- B. Related Sections:
 - 1. Section 01 4000 - Quality Requirements.

1.2 SUBMITTAL PROCEDURES

- A. Number each submittal with Project Manual section number and a sequential number within each section. Number resubmittals with original number and an alphabetic suffix.

- B. Identify Project, Contractor, Subcontractor or supplier, pertinent Drawing sheet and detail numbers, and specification Section number, as appropriate.

- C. Submit all submittals listed under "Submittals for Review" simultaneously for each Product or Specification Section.

- D. Where multiple products functions as an assembly, group submittals for all related Products into single submittal.

- E. Architect will not review incomplete submittals.

- F. Apply Contractor's stamp, signed or initialed certifying that:
 - 1. Submittal was reviewed.
 - 2. Products, field dimensions, and adjacent construction have been verified.
 - 3. Information has been coordinated with requirements of Work and Contract Documents.

- G. Schedule submittals to expedite the Project, and deliver to Architect. Coordinate submittal of related items.

- H. For each submittal, allow 14 days for Architect's review, excluding delivery time to and from Contractor.

- I. Identify variations from Contract Documents and Product or system limitations that may be detrimental to successful performance of completed Work.

- J. Revise and resubmit submittals when required; identify all changes made since previous submittal.

- K. Distribute copies of reviewed submittals to concerned parties and to Project Record Documents file. Instruct parties to promptly report any inability to comply with provisions.

1.3 PROPOSED PRODUCTS LIST

- A. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.
- B. Submit electronically in Adobe PDF format.

1.4 SUBMITTAL SCHEDULE

- A. Within 15 days after date of Notice to Proceed, submit a submittal schedule showing all submittals proposed for project, including submittals listed as:
 - 1. Submittals for Review.
 - 2. Quality Control Submittals.
 - 3. Closeout Submittals.
- B. Include for each submittal:
 - 1. Specification section number.
 - 2. Description of submittal.
 - 3. Type of submittal.
 - 4. Anticipated submittal date.
 - 5. For submittals requiring Architect's review, date reviewed submittal will be required from Architect.
- C. Submit electronically in Adobe PDF format.

1.5 SHOP DRAWINGS

- A. Present information in clear and thorough manner.
- B. Identify details by reference to sheet and detail numbers or room number shown on Drawings.
- C. Reproductions of details contained in Contract Documents are not acceptable.
- D. Submit electronically in Adobe PDF format.

1.6 PRODUCT DATA

- A. Mark each copy to identify applicable products, models, options, and other data.
- B. Supplement manufacturers' standard data to provide information unique to this Project.
- C. Submit electronically in Adobe PDF format.

1.7 SAMPLES

- A. Submit samples to illustrate functional and aesthetic characteristics of Products, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
- B. Where so indicated, submit samples of finishes from the full range of manufacturers' standard colors, textures, and patterns for Architect's selection.
- C. Include identification on each sample, with full Project information.
- D. Unless otherwise specified in individual specifications, submit two of each sample.
- E. Architect will notify Contractor of approval or rejection of samples, or of selection of color, texture, or pattern if full range is submitted.

1.8 QUALITY CONTROL SUBMITTALS

- A. Quality control submittals specified in Section 01 4000 are for information and do not require Architect's responsive action except to require resubmission of incomplete or incorrect information.

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

END OF SECTION

SECTION 01 4000
QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. References and standards.
- B. Quality assurance submittals.
- C. Mock-ups.
- D. Control of installation.
- E. Tolerances.
- F. Testing and inspection services.
- G. Manufacturers' field services.

1.02 RELATED SECTIONS

- A. Document 00700 - General Conditions: Inspections and approvals required by public authorities.
- B. Section 01 3000 - Administrative Requirements: Submittal procedures.
- C. Section 01 6000 - Product Requirements: Requirements for material and product quality.

1.03 REFERENCES

- A. ASTM C 1021 - Standard Practice for Laboratories Engaged in Testing of Building Sealants; 1997.
- B. ASTM E 329 - Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction; 2000b.
- C. ASTM E 543 - Standard Practice for Agencies Performing Nondestructive Testing; 1999.
- D. ASTM E 548 - Standard Guide for General Criteria used for Evaluating Laboratory Competence; 1994.

1.04 SUBMITTALS

- A. Testing Agency Qualifications:
 - 1. Prior to start of Work, submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.
 - 2. Submit copy of report of laboratory facilities inspection made by Materials Reference Laboratory of National Bureau of Standards during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
- B. Design Data: Submit for Architect's knowledge as contract administrator or for the Owner, for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.
- C. Test Reports: After each test/inspection, promptly submit two copies of report to Architect and to Contractor.

1. Include:
 - a. Date issued.
 - b. Project title and number.
 - c. Name of inspector.
 - d. Date and time of sampling or inspection.
 - e. Identification of product and specifications section.
 - f. Location in the Project.
 - g. Type of test/inspection.
 - h. Date of test/inspection.
 - i. Results of test/inspection.
 - j. Conformance with Contract Documents.
 - k. When requested by Architect, provide interpretation of results.
 2. Test reports are submitted for Architect's knowledge as contract administrator or for the Owner, for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.
- D. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Architect, in quantities specified for Product Data.
1. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
 2. Certificates may be recent or previous test results on material or product, but must be acceptable to Architect.
- E. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.
- F. Manufacturer's Field Reports: Submit reports for Architect's benefit as contract administrator or for Owner.
1. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

1.05 REFERENCES AND STANDARDS

- A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference 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 of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.
- C. Obtain copies of standards where required by product specification sections.

- D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.
- E. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.
- F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Architect shall be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.06 TESTING AND INSPECTION AGENCIES

- A. Owner will employ services of an independent testing agency to perform certain specified testing.
- B. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 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 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. Have Work performed 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, and disfigurement.

3.02 MOCK-UPS

- 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 and is specified in product specification sections to be removed, remove mock-up and clear area when directed to do so.

3.03 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 before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

3.04 TESTING AND INSPECTION

- A. See individual specification sections for testing required.
- B. Testing Agency Duties:
 - 1. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
 - 2. Perform specified sampling and testing of products in accordance with specified standards.
 - 3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
 - 4. Promptly notify Architect and Contractor of observed irregularities or non-conformance of Work or products.
 - 5. Perform additional tests and inspections required by Architect.
 - 6. Submit reports of all tests/inspections specified.
- C. Limits on Testing/Inspection Agency Authority:
 - 1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
 - 2. Agency may not approve or accept any portion of the Work.
 - 3. Agency may not assume any duties of Contractor.
 - 4. Agency has no authority to stop the Work.
- D. Contractor Responsibilities:
 - 1. Deliver to agency at designated location, adequate samples of materials proposed to be used which require testing, along with proposed mix designs.
 - 2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
 - 3. Provide incidental labor and facilities:
 - a. To provide access to Work to be tested/inspected.
 - b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
 - c. To facilitate tests/inspections.
 - d. To provide storage and curing of test samples.
 - 4. Notify Architect and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
 - 5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
- E. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Architect. Payment for re testing will be charged to the Contractor by deducting testing charges from the Contract Price.

3.05 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 30 days in advance of required observations.
- C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

3.06 DEFECT ASSESSMENT

- A. Replace Work or portions of the Work not conforming to specified requirements.
- B. If, in the opinion of Architect, it is not practical to remove and replace the Work, Architect will direct an appropriate remedy or adjust payment.

END OF SECTION

SECTION 01 4100
TESTING LABORATORY SERVICES

PART 1 GENERAL

1.01 GENERAL

- A. Owner shall employ and pay for services of an independent Testing Laboratory to perform specified services and testing.
 - 1. Employment of laboratory shall in no way relieve Contractor's obligations to perform Work of Contract.
- B. Related Requirements Specified Elsewhere:
 - 1. Inspections and testing required by laws, ordinances, rules, regulations, orders or approvals of public authorities: Conditions of the Contract.
 - 2. Individual specifications sections reference herein.
- C. Where terms "Inspector" and "Testing Laboratory" are used, they mean and refer respectively to an officially designated and accredited inspector of testing laboratory.

1.02 QUALIFICATION OF LABORATORY

- A. Meet "Recommended Requirements for Independent Laboratory Qualification", published by American Council of Independent Laboratories.
- B. Meet basic requirements of ASTM E329, "Standards of Recommended Practice for Inspection and Testing Agencies for Concrete and Steel as Used in Construction".
- C. Authorized to operate in State in which Project is located.
- D. Testing Equipment:
 - 1. Calibrated as reasonable intervals by devices of accuracy traceable to either:
 - a. National Bureau of Standards.
 - b. Accepted values of natural physical constants.

1.03 LABORATORY DUTIES

- A. Cooperate with Engineer and Contractor; provide qualified personnel after due notice.
- B. Perform specified inspections, sampling and testing of materials and methods of construction:
 - 1. Comply with specified standards.
 - 2. Ascertain compliance of materials with requirements of Contract Documents.

- C. Promptly notify Engineer and Contractor of observed irregularities or deficiencies of work or products.
- D. Promptly submit written report of each test and inspection; one copy each to Structural Engineer, Owner, Contractor, and one copy to Record Documents File. Each report shall include:
 - 1. Date issued.
 - 2. Project title and number.
 - 3. Testing laboratory name, address and telephone number.
 - 4. Name and signature of laboratory inspector.
 - 5. Date and time of sampling or inspection.
 - 6. Record of temperature and weather conditions.
 - 7. Date of test
 - 8. Identification of product and specification section.
 - 9. Location of sample or test in Project.
 - 10. Type of inspection or test.
 - 11. Results of tests and compliance or non-compliance with Contract Documents.
 - 12. Interpretation of test results, when requested by Engineer.
- E. Perform additional tests as required by Engineer.

1.04 LIMITATIONS OF AUTHORITY OF TESTING LABORATORY

- A. Laboratory is not authorized to:
 - 1. Release, revoke, alter or enlarge on requirement of Contract Documents.
 - 2. Approve or accept any portion of work.
 - 3. Perform any duties of Contractor.

1.05 CONTRACTOR'S RESPONSIBILITIES

- A. Cooperate with laboratory personnel; provide access to Work, and to Manufacturer's Operations.
- B. Secure and deliver to laboratory adequate quantities of representative samples of materials proposed to be used, and which require testing.
- C. Furnish copies of products test reports as required.
- D. Furnish incidental labor and facilities:

1. To provide access to Work to be tested.
 2. To obtain and handle samples at site or at source of the product to be tested.
 3. To facilitate inspections and tests.
 4. For storage and curing of test samples.
- E. Notify laboratory sufficiently in advance of operations to allow for laboratory assignment of personnel and scheduling of tests.
1. Items indicated to be inspected or tested shall not be constructed until a laboratory representative is present at the site.
 2. Make arrangements with laboratory and pay for additional samples and tests required for Contractor's convenience.

1.06 SPECIFIC TESTS, INSPECTIONS AND METHODS REQUIRED

- A. Testing of Earthwork:
1. Select Fill: Perform tests on proposed select fill materials prior to use to determine compliance with specified requirements.
 2. Establish moisture density relationship for soil type.
 3. Sub-Grade Density testing:
 - a. Establish moisture-density relationship for soil type.
 - b. Perform field in-place density relationship as follows:
 - (1) Building subgrade: One test for each 2500 sq. ft. or fraction thereof.
 4. Testing of Select Fill in place:
 - a. Perform one (1) field in-place density test for each 2500 sq. ft. or fraction thereof per lift
- B. Control and Testing of Concrete:
1. Mix Design, Trial Mixes and Advance Tests:
 - a. Design concrete mixes for each type concrete specified in accordance with ACI 318.
 - b. For each concrete mix type required, make trial mix using aggregate proposed.
 - c. Make advance tests of trial mixes with proposed materials. Test four cylinders in accordance with ASTM C-39 (2 at 7 days and 2 at 28 days). Do not place concrete on project until laboratory reports and breaks on confirmation cylinders indicate that proposed mixes will develop required strength.
 - d. Check mix designs and revise if necessary wherever changes are made in aggregates or in surface water content of aggregate or workability or concrete. Slump shall be minimum to produce workable mix. Laboratory will prescribe maximum quantity of water.

2. Test Cylinders: During progress of Work, make test cylinders for each different mix placed in any one day. For every concrete placement of 100 cubic yards or fraction thereof over 10 cubic yards, make three compression test cylinders of samples taken during pour. Test cylinders in accordance with ASTM C-39 (1 at 7 days and 2 at 28 days). Make additional sets of cylinders for concrete placements from 100 yards to 200 yards and third set for pours exceeding 200 yards.
3. Slump Tests: Make slump tests on each load of concrete placed on this project. Laboratory shall immediately inform Contractor when slump exceeds limits specified.

END OF SECTION

SECTION 01 5000
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

Note: General Contractor will require a superintendent, dedicated to this project to be on the job full time.

1.01 SECTION INCLUDES

- A. Temporary utilities.
- B. Temporary telephone service.
- C. Temporary sanitary facilities.
- D. Temporary Controls: Barriers, enclosures, and fencing.
- E. Security requirements.
- F. Vehicular access and parking.
- G. Waste removal facilities and services.
- H. Field offices

1.02 TEMPORARY UTILITIES

- A. Provide for all electrical power, lighting, water, heating and cooling, and ventilation required for construction purposes.
- B. Existing utilities may be used.
- C. New permanent facilities may be used.
- D. Use trigger-operated nozzles for water hoses, to avoid waste of water.

1.03 TELEPHONE SERVICE

- A. Provide and maintain a mobile phone with voice mail or an answering service. Mobile phone shall be accessible during normal business hours during mobilization and for the duration of the project.

1.04 TEMPORARY SANITARY FACILITIES

- A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.
- B. Use of existing facilities is not permitted.
- C. Maintain daily in clean and sanitary condition.

1.05 BARRIERS

- A. Provide barriers to prevent unauthorized entry to construction areas, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.
- B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.
- C. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.06 FENCING

- A. Provide barriers to prevent unauthorized entry to construction areas, to allow for Owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition. This can be chain link fencing – no PVC orange fencing.

1.07 EXTERIOR ENCLOSURES

- A. Provide temporary insulated weather tight closure of exterior openings to accommodate acceptable working conditions and protection for Products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual specification sections, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.

1.08 INTERIOR ENCLOSURES

- A. Provide temporary partitions and ceilings extending from floor to structure above to separate work areas from completed areas, to prevent penetration of dust and moisture, and to prevent damage to existing materials and equipment.
- B. Construction: Framing and reinforced polyethylene sheet materials with closed joints and sealed edges at intersections with existing surfaces:
 - 1. Maximum flame spread rating of 75 in accordance with ASTM E 84.

1.09 SECURITY

- A. Provide security and facilities to protect Work, existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.

1.10 VEHICULAR ACCESS AND PARKING

- A. Coordinate access and haul routes with governing authorities and TGC.
- B. Provide and maintain access to fire hydrants, free of obstructions.
- C. Provide temporary parking areas to accommodate construction personnel. When site space is not adequate, provide additional off-site parking.

1.11 WASTE REMOVAL

- A. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.
- B. Provide containers with lids. Remove trash from site as required by TGC.
- C. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.

1.13 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary utilities, equipment, facilities, materials, prior to Substantial Completion inspection.
- B. Clean and repair damage caused by installation or use of temporary work.
- C. Restore existing facilities used during construction to original condition.

END OF SECTION

SECTION 01 5800
PROJECT IDENTIFICATION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Project identification sign.
 - 2. Maintenance and removal.

1.2 QUALITY ASSURANCE

- A. Project Sign:
 - 1. Design sign and structure to withstand 50 MPH wind velocity.
 - 2. Sign Maker: Experienced as a professional for minimum 3 years.
 - 3. Finishes: Adequate to withstand weathering, fading, and chipping for duration of construction.
- B. Do not erect other signs at site without Owner's approval, except those required by governing authorities.

1.3 SUBMITTALS

- A. Submittals for Review:
 - 1. Shop Drawings: Show content, layout, lettering, colors, structure, sizes, and grades of members.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Structure and Framing: New lumber, structurally adequate.
- B. Sign Surfaces: Exterior grade plywood with medium density overlay, nominally 3/4 inch thick, standard large sizes to minimize joints.
- C. Rough Hardware: Galvanized steel or aluminum.
- D. Paints: Latex type, exterior quality, satin sheen.

2.2 FABRICATION

- A. Provide one sign.

1. Area: 32 square feet.
2. Bottom edge of sign: 6 feet above ground.
3. Content:
 - a. Project title and logo.
 - b. Owner's name.
 - c. Names and titles of Architect and Consultants.
 - d. Name of Construction Manager.
4. Graphic design, colors, and lettering style: As designated by Architect.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install project identification sign within 30 days after date of Notice to Proceed.
- B. Erect at designated location.
- C. Erect supports and framing on secure foundation, rigidly braced and framed to resist wind loadings.
- D. Install sign surface plumb and level, with butt joints. Anchor securely.
- E. Paint exposed surfaces of sign, supports, and framing.

3.2 MAINTENANCE

- A. Maintain signs and supports clean. Repair deterioration and damage.

3.3 REMOVAL

- A. Remove signs, framing, supports, and foundations at completion of Project and restore the area.

END OF SECTION

SECTION 01 6000
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General product requirements.
- B. Re-use of existing products.
- C. Transportation, handling, storage and protection.
- D. Product option requirements.
- E. Substitution limitations and procedures.
- F. Procedures for Owner-supplied products.
- G. Spare parts and maintenance materials.

1.02 RELATED SECTIONS

- A. Section 01 4000 - Quality Requirements: Product quality monitoring.

1.03 SUBMITTALS

- A. Proposed Products List: Submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
 - 1. Submit within 15 days after date of Agreement.
 - 2. For products specified only by reference standards, list applicable reference standards.
- B. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- C. Shop Drawing Submittals: Prepared specifically for this Project.
- D. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
 - 1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.
- E. Indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

PART 2 PRODUCTS

2.01 EXISTING PRODUCTS

- A. Unforeseen historic items encountered remain the property of the Owner; notify Owner promptly upon discovery; protect, remove, handle, and store as directed by Owner.

2.02 NEW PRODUCTS

- A. Provide new products unless specifically required or permitted by the Contract Documents.
- B. Do not use products having any of the following characteristics:
 - 1. Made using or containing ACM's, CFC's or HCFC's.
- C. Provide interchangeable components from the same manufacturer for components being replaced.
- D. Motors: Refer to Division 16 sections, NEMA MG 1 Type. Specific motor type is specified in individual specification sections.
- E. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Size terminal lugs to NFPA 70, include lugs for terminal box.
- F. 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.

2.03 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers: Use a product of one of the 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.

2.04 SPARE PARTS AND MAINTENANCE PRODUCTS

- A. Provide spare parts, maintenance, and extra products of types and in quantities specified in individual specification sections.
- B. Deliver to Project site; obtain receipt prior to final payment.

PART 3 EXECUTION

3.01 SUBSTITUTION PROCEDURES

- A. Instructions to Bidders specify time restrictions for submitting requests for substitutions during the bidding period. Comply with requirements specified in this section.
- B. Architect will consider requests for substitutions only within 30 days after date of Agreement.
- C. Substitutions may be considered when a product becomes unavailable through no fault of the Contractor.
- D. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.
- E. A request for substitution constitutes a representation that the submitter:
 - 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 for review or redesign services associated with re-approval by authorities.
- F. 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.
- G. Substitution Submittal Procedure:
1. Submit three copies of request for substitution for consideration using the substitution request forms included at the end of this section. 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 will notify Contractor in writing of decision to accept or reject request.

3.02 OWNER-SUPPLIED PRODUCTS

- A. Owner's Responsibilities:
1. Arrange for and deliver Owner reviewed shop drawings, product data, and samples, to Contractor.
 2. Arrange and pay for product delivery to site.
 3. On delivery, inspect products jointly with Contractor.
 4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
 5. Arrange for manufacturers' warranties, inspections, and service.
- B. Contractor's Responsibilities:
1. Review Owner reviewed shop drawings, product data, and samples.
 2. Receive and unload products at site; inspect for completeness or damage jointly with Owner.
 3. Handle, store, install and finish products.
 4. Repair or replace items damaged after receipt.

3.03 TRANSPORTATION AND HANDLING

- A. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.
- B. Transport and handle products in accordance with manufacturer's instructions.
- C. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.

- D. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
- E. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.
- F. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.04 STORAGE AND PROTECTION

- A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.
- B. Store and protect products in accordance with manufacturers' instructions.
- C. Store with seals and labels intact and legible.
- D. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.
- E. For exterior storage of fabricated products, place on sloped supports above ground.
- F. Provide bonded off-site storage and protection when site does not permit on-site storage or protection.
- G. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- I. Prevent contact with material that may cause corrosion, discoloration, or staining.
- J. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- K. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

SECTION 01 7000
EXECUTION REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Examination, preparation, and general installation procedures.
- B. Requirements for alterations work, including selective demolition.
- C. Pre-installation meetings.
- D. Cutting and patching.
- E. Cleaning and protection.
- F. Starting of systems and equipment.
- G. Demonstration and instruction of Owner personnel.
- H. Closeout procedures, except payment procedures.

1.02 RELATED SECTIONS

- A. Section 01 1100 - Summary: Work sequence.
- B. Section 01 3000 - Administrative Requirements: Submittals procedures.
- C. Section 01 4000 - Quality Requirements: Testing and inspection procedures.
- D. Section 01 5000 - Temporary Facilities and Controls: Temporary interior partitions.
- E. Section 01 7800 - Closeout Submittals: Project record documents, operation and maintenance data, warranties and bonds.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Project Record Documents: Accurately record actual locations of capped and active utilities.

1.04 PROJECT CONDITIONS

- A. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
- B. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere.
- C. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.
- D. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations.

1.05 COORDINATION

- 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.

- B. Notify affected utility companies and comply with their requirements.
- C. Verify that utility requirements and characteristics of new 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.
- D. 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.
- E. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
- F. Coordinate completion and clean-up of work of separate sections.
- G. 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.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of 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. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or mis-fabrication.
- E. Verify that utility services are available, of the correct characteristics, and in the correct locations.

3.02 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.

3.03 PREINSTALLATION MEETINGS

- 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 four 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, Owner, participants, and those affected by decisions made.

3.04 GENERAL INSTALLATION REQUIREMENTS

- A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.
- B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
- C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.
- D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
- E. Make neat transitions between different surfaces, maintaining texture and appearance.

3.05 CUTTING AND PATCHING

- A. Execute cutting and patching to complete the work, to uncover work in order to install improperly sequenced work, to remove and replace defective or non-conforming work, to remove samples of installed work for testing when requested, to provide openings in the work for penetration of mechanical and electrical work, to execute patching to complement adjacent work, and to fit products together to integrate with other work.
- B. Execute work by methods to avoid damage to other work, and which will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.
- C. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
- D. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
- E. Restore work with new products in accordance with requirements of Contract Documents.
- F. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- G. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 07 8400, to full thickness of the penetrated element.
- H. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
- I. Make neat transitions. Patch work to match adjacent work in texture and appearance. Where new work abuts or aligns with existing, perform a smooth and even transition.
- J. Patch or replace surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. Repair substrate prior to patching finish. Finish patches to produce uniform finish and texture over entire area. When finish cannot be matched, refinish entire surface to nearest intersections.

3.06 PROGRESS CLEANING

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.

- C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
- D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do no burn or bury.

3.07 PROTECTION OF INSTALLED WORK

- A. Protect installed work from damage by construction operations.
- B. Provide special protection where specified in individual specification sections.
- C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is req'd., obtain recommendations for protection from waterproofing or roofing material manufacturer.
- G. Remove protective coverings when no longer needed; reuse or recycle plastic coverings if possible.

3.08 STARTING SYSTEMS

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions which may cause damage.
- C. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- D. Verify that wiring and support components for equipment are complete and tested.
- E. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.
- F. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.09 DEMONSTRATION AND INSTRUCTION

- A. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled time, at equipment location.
- B. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
- C. Provide a qualified person who is knowledgeable about the Project to perform demonstration and instruction of owner personnel.
- D. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.

3.10 ADJUSTING

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.

3.11 FINAL CLEANING

- A. Execute final cleaning prior to final project assessment.
- B. Use cleaning materials that are not hazardous.
- C. Clean int. and ext. glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
- D. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
- E. Clean filters of operating equipment.
- F. Clean debris from roofs, gutters, downspouts, and drainage systems.
- G. Clean site; sweep paved areas, rake clean landscaped surfaces.
- H. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.
- I. General Contractor shall be responsible for providing an approved and reputable janitorial contractor to perform all necessary classroom/building cleaning services prior to TGC taking occupancy of such areas.

General clean up provided by the Contractor shall consists of sweeping and mopping of all non-carpeted areas; vacuuming of all carpeted areas, and to include spot cleaning of carpet stains; scrubbing and waxing of vinyl tile areas; cleaning of all light fixtures, exit lights, HVAC vents, grills and registers; counter tops, sink/lavs; restroom fixtures, faucets and flush valves; toilet partitions; walls, windows, blinds; doors and door knobs; mirrors. General cleaning may also include any other cleaning as may be deemed necessary by the TGC.

General contractor shall be responsible for notifying the County's specified representative upon completion of cleaning services. TGC will set up and perform inspection of the area(s). Contractor shall be held responsible for any additional touch up or potential "redo" of any or all of a designated area.

3.12 CLOSEOUT PROCEDURES

- A. Make submittals that are required by governing or other authorities.
- B. Notify Architect when work is considered ready for Substantial Completion.
- C. Submit written certification that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect's review.
- D. Correct items of work listed in executed Certificates of Substantial Completion and comply with requirements for access to Owner-occupied areas.
- E. Notify Architect when work is considered finally complete.
- F. Complete items of work determined by Architect's final inspection.

3.13 ONE YEAR WALKTHROUGH

- A. Schedule a walkthrough of the project, with the Architect and Owner approximately eleven months subsequent to Substantial Completion. This walkthrough will determine any corrective issues that need to occur to the work since Substantial Completion.

END OF SECTION

SECTION 01 7123
FIELD ENGINEERING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Survey and field engineering.
 - 2. Submittals.
 - 3. Records.
- B. Provide and pay for field engineering services required for Project:
 - 1. Survey work required in execution of Work.
 - 2. Other professional engineering services specified or required to execute Construction Manager's construction methods.

1.2 QUALIFICATIONS

- A. Surveyor: Qualified land surveyor, licensed in State in which project is located.

1.3 SUBMITTALS

- A. Submit documentation to verify accuracy of field engineering work upon Architect's request.
- B. Submit certification that elevations and locations of improvements are in conformance with Contract Documents.

1.4 SURVEY REFERENCE POINTS

- A. Existing horizontal and vertical control points for project are those designated on Drawings.
- B. Locate, verify, and protect control points prior to beginning Work; preserve permanent reference points during construction.

1.5 PROJECT SURVEY REQUIREMENTS

- A. Establish minimum of two permanent bench marks on site, referenced to survey control points. Record locations on Project Record Documents.
- B. Establish lines and levels, locate and lay out, by instrumentation:
 - 1. Site improvements:
 - a. Stakes for grading, fill, and topsoil placement.
 - b. Utility slopes and invert elevations.
 - 2. Building foundation and column locations, floor elevations, and other controlling dimensions.
 - 3. Controlling lines and levels required for mechanical and electrical trades.

- C. Verify property corners, easements, building setbacks, and horizontal control dimensions with information contained in Contract Documents.
- D. Promptly notify Architect of any errors or discrepancies noted; await instructions prior to proceeding with Work.

1.6 RECORDS

- A. Maintain accurate log of control and survey work.

END OF SECTION

SECTION 01 7800
CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Project Record Documents.
- B. Operation and Maintenance Data.
- C. Warranties and bonds.

1.02 RELATED SECTIONS

- A. Conditions of the Contract: Performance bond and labor and material payment bonds, warranty, and correction of work.
- B. Section 01 3000 - Administrative Requirements: Submittal procedures, shop drawings, product data, and samples.
- C. Section 01 7000 - Execution Requirements: Contract closeout procedures.
- D. Individual Product Sections: Specific requirements for operation and maintenance data.
- E. Individual Product Sections: Warranties required for specific products or Work.

1.03 SUBMITTALS

- A. Project Record Documents: Submit documents to Architect with claim for final Application for Payment.
- B. Operation and Maintenance Data:
 - 1. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Architect will review draft and return one copy with comments.
 - 2. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
 - 3. Submit 1 copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect comments. Revise content of all document sets as required prior to final submission.
 - 4. Submit two sets of revised final documents in final form within 10 days after final inspection.
- C. Warranties and Bonds:
 - 1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within ten days after acceptance.
 - 2. Make other submittals within ten days after Date of Substantial Completion, prior to final Application for Payment.
 - 3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within ten days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PROJECT RECORD DOCUMENTS

- A. Maintain on site one set of the following record documents; record actual revisions to the Work:
 - 1. Drawings.
 - 2. Specifications.
 - 3. Addenda.
 - 4. Change Orders and other modifications to the Contract.
 - 5. Reviewed shop drawings, product data, and samples.
 - 6. Manufacturer's instruction for assembly, installation, and adjusting.
- B. Ensure entries are complete and accurate, enabling future reference by Owner.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress.
- E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
 - 1. Manufacturer's name and product model and number.
 - 2. Product substitutions or alternates utilized.
 - 3. Changes made by Addenda and modifications.
- F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
 - 1. Measured depths of foundations in relation to finish first floor datum.
 - 2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - 3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
 - 4. Field changes of dimension and detail.
 - 5. Details not on original Contract drawings.
- G. All project record documents will be issued to architect upon completion of project.

3.02 OPERATION AND MAINTENANCE DATA

- A. For Each Product or System: List names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.
- B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
- C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.
- D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.03 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

- A. For Each Product, Applied Material, and Finish:
 - 1. Product data, with catalog number, size, composition, and color and texture designations.
 - 2. Information for re-ordering custom manufactured products.

- B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.
- C. Moisture protection and weather-exposed products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.
- D. Additional information as specified in individual product specification sections.
- E. Provide a listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

3.04 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

- A. For Each Item of Equipment and Each System:
 1. Description of unit or system, and component parts.
 2. Identify function, normal operating characteristics, and limiting conditions.
 3. Include performance curves, with engineering data and tests.
 4. Complete nomenclature and model number of replaceable parts.
- B. Panel board Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.
- C. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
- D. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and troubleshooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- E. Provide servicing and lubrication schedule, and list of lubricants required.
- F. Include manufacturer's printed operation and maintenance instructions.
- G. Include sequence of operation by controls manufacturer.
- H. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- I. Provide control diagrams by controls manufacturer as installed.
- J. Include test and balancing reports.
- K. Additional Requirements: As specified in individual product specification sections.

3.05 OPERATION AND MAINTENANCE MANUALS

- A. Prepare instructions and data by personnel experienced in maintenance and operation of described products.
- B. Prepare data in the form of an instructional manual.
- C. Binders: Commercial quality, 8-1/2" x 11" three D side ring binders with durable plastic covers; 2" maximum ring size. When multiple binders are used, correlate data into related consistent groupings.
- D. Provide tabbed dividers for each separate product and system, with typed description of product and major component parts of equipment.

- E. Text: Manufacturer's printed data, or typewritten data on 24 pound paper.
- F. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- G. Arrange content by systems under section numbers and sequence of Table of Contents of this Project Manual.
- H. Contents: Prepare a Table of Contents for each volume, with each product or system description identified, in three parts as follows:
 - 1. Part 1: Directory, listing names, addresses, and telephone numbers of Architect, Contractor, Subcontractors, and major equipment suppliers.
 - 2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
 - a. Significant design criteria.
 - b. List of equipment.
 - c. Parts list for each component.
 - d. Operating instructions.
 - e. Maintenance instructions for equipment and systems.
 - f. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
 - 3. Part 3: Project documents and certificates, including the following:
 - a. Shop drawings and product data.
 - b. Air and water balance reports.
 - c. Certificates.
 - d. Photocopies of warranties and bonds.

3.06 WARRANTIES AND BONDS

- A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within ten days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until the Date of Substantial completion is determined.
- B. Verify that documents are in proper form, contain full information, and are notarized.
- C. Co-execute submittals when required.
- D. Retain warranties and bonds until time specified for submittal.
- E. Include originals of each in operation and maintenance manuals, indexed separately on Table of Contents.

END OF SECTION

SECTION 02 4116

STRUCTURE DEMOLITION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Demolition of designated structures.
 - 2. Demolition of foundations.
 - 3. Disconnection and removal of utilities.
 - 4. Demolition of walks, paving, curbs, gutters, and site improvements.
 - 5. Removal of materials from site.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.
 - 2. Section 31 2300- Excavation and Fill.

1.2 SUBMITTALS

- A. Submittals for Review:
 - 1. Demolition procedures and operational sequence.
- B. Quality Control Submittals: Submit prior to beginning demolition:
 - 1. Permits authorizing building demolition.
 - 2. Certificates of severance of utility services.
 - 3. Permit for transportation and disposal of debris.

1.3 QUALITY ASSURANCE

- A. Comply with applicable codes, ordinances, rules, and regulations, including those for demolition, transportation, and disposal of debris.
- B. Arrange for, obtain permits and certificates for, and pay fees required for:
 - 1. Transportation and disposal of debris.
 - 2. Demolition.
 - 3. Utility severance or relocation, including removing meters and capping lines.
 - 4. Use or closing of streets, sidewalks, or other public places.

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

3.1 PREPARATION

- A. Prior to beginning demolition, verify that:
 - 1. Structures are unoccupied and removed from service.
 - 2. Temporary controls and devices are in place and operational.
 - 3. Utilities are temporarily or permanently disconnected or relocated as required.
 - 4. Items salvaged for Owner are removed and stored in designated area.

3.2 DEMOLITION

- A. Demolish structures in accordance with demolition procedures approved by Architect.
- B. Sprinkle debris, and use temporary closures as necessary to limit dust to lowest practical level.
- C. Do not use water to extent causing flooding, contaminated runoff, or icing.
- D. Begin demolition at top of building and proceed to lowest level, not using explosives.
- E. Demolish structure above each floor level before damaging supporting members on lower levels.
- F. Break concrete and masonry into sections less than 3 feet in any dimension.
- G. Remove slabs and foundations to full depth.
- H. Remove below grade wood and metal.
- I. Remove walks, paving, curbs, gutters, and site improvements.
- J. Remove underground utilities back to locations indicated. Flag and identify underground utilities to remain.
- K. Backfill excavations in accordance with requirements of Section 31 2300.
- L. Uniformly grade areas to smooth surface. Adjust contours to eliminate water ponding and provide positive drainage. Make grade changes gradually and blend slopes into level areas.

3.3 MATERIAL DISPOSAL

- A. Salvage: Remove, protect, and relocate materials designated to remain property of Owner.
- B. Disposal:
 - 1. Materials, equipment, and debris resulting from demolition operations becomes property of the General Contractor. Remove debris as soon as practical.
 - 2. Cover debris in trucks to prevent spillage during transportation.
 - 3. Do not store or burn materials on site.
 - 4. Transport debris to off site disposal area and legally dispose of.

3.4 ASBESTOS SURVEY

- A. Contractor shall note that the Project's existing interior finishes contain asbestos materials in areas of existing drywall compound/texture, floor tile mastic below carpet and CMU wall block sealer.
- B. Tom Green County shall have the Project completely abated under a separate contract (not included in GC contract) prior to start of Project demolition.
- C. Copy of current asbestos survey shall be supplied to the COSA Permit Dept. and Project's General Contractor prior to issuance of building permit.

END OF SECTION

SECTION 03 1000

CONCRETE FORMING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Forms for cast-in-place concrete, with shoring, bracing, and anchorage.
 - 2. Form accessories.
 - 3. Stripping of forms.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.

1.2 REFERENCES

- A. American Concrete Institute (ACI):
 - 1. 301 - Specifications for Structural Concrete for Buildings.
 - 2. 347 - Recommended Practice for Concrete Formwork.
- B. American Society of Mechanical Engineers (ASME) A17.1 - Safety Code for Elevators and Escalators.
- C. Engineered Wood Association (APA) PRP-108 - Performance Standards and Qualification Policy for Structural-Use Panels.

1.3 SUBMITTALS

- A. Submittals for Review:
 - 1. Shop Drawings: Diagram of proposed construction joints not indicated on Drawings.

1.4 QUALITY ASSURANCE

- A. Design formwork in accordance with ACI 301 and 347 [under supervision of Professional Structural Engineer licensed in State in which project is located].

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers - Architectural Form Liners:
 - 1. Dayton Superior. (www.daytonsuperior.com)
 - 2. Fitzgerald Formliners.
 - 3. Greenstreak, Inc.
- B. Acceptable Manufacturers - Form Accessories:
 - 1. Dayton Superior. (www.daytonsuperior.com)
 - 2. Greenstreak, Inc.
 - 3. Meadow Burke. (www.meadowburke.com)
 - 4. Nox-Crete Products Group.
- C. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Forms:
 - 1. Wood:
 - a. Concealed surfaces:
 - 1) Lumber, No. 2 Common or better, dressed to smooth contact surfaces, or:
 - 2) APA Rated Plyform Class I or II with HDO faces.
 - b. Exposed surfaces: Non absorptive medium density overlay plywood.
 - 2. Metal: Minimum 16 gage steel, tight fitting, stiffened to support concrete.
- B. Tubular Forms:
 - 1. Round, spirally wound laminated fiberboard, surface treated with release agent, non reusable.

2.3 ACCESSORIES

- A. Form Release Agent: Nonstaining, colorless mineral oil that will not absorb moisture, stain concrete, or impair adhesion of coatings to be applied to concrete.
- B. Construction Joints Forms: Formed galvanized steel, minimum 18 gage, with keyway.
- C. Anchors and Fasteners: Size as required, sufficient strength to maintain forms in place while concrete is placed.

PART 3 EXECUTION

3.1 CONSTRUCTION

- A. Construct formwork, shoring, and bracing to produce concrete of required shape, line, and dimension.
- B. Arrange and assemble formwork with minimum joints, located to allow dismantling without damage to concrete.
- C. Make joints watertight.
- D. Provide chamfer strips in corners of forms to produce beveled external corners.
- E. Camber formwork to compensate for deflection during concrete placement.
- F. Adjust supports to take up settlement caused by concrete placement.
- G. Provide temporary openings in formwork to allow cleaning and observation; locate at bottom of forms. Close with tight fitting panels flush with face of forms.
- H. Construct forms for beams and girders so that sides may be removed without disturbing bottom of form or its support.
- I. Clean contact and screed surfaces prior to concrete placement.
- J. Construction Joints:
 - 1. Unless otherwise indicated on drawings, each unit of construction is a single unit; place concrete continuously to provide monolithic construction.
 - 2. Obtain Architect's approval of construction joint locations not indicated on Drawings.
 - 3. Provide keys and dowels in joints.
 - 4. Use construction joint form for joints in floor slabs. Set screed edge at required elevation. Secure to prevent movement.
- K. Form Release Agent:

1. Apply form release agent to formwork prior to placing reinforcing, anchoring devices, and embedded items; follow manufacturer's instructions.
 2. Do not allow agent to puddle in forms or to contact hardened concrete against which fresh concrete is to be placed.
- L. Inserts and Embedded Parts:
1. Before concrete is placed, install inserts, anchor slots, anchor bolts, and embedded parts required for attachment of work.
 2. Provide formed openings where required for pipes, conduits, sleeves, and other work passing through concrete members.
 3. Maintain in position during concrete placement.
- M. Form Removal:
1. Do not remove formwork until concrete has attained sufficient strength to resist dead loads plus applied live loads.
 2. Remove formwork in manner that will not damage surfaces of concrete; patch work damaged during form removal operations.
 3. Provide shoring, reshoring, and bracing as required.
- N. Installation Tolerances:
1. Construct formwork to maintain tolerances required by ACI 301.

END OF SECTION

SECTION 03 2000
CONCRETE REINFORCING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Reinforcing bars, wire fabric, and accessories for cast-in-place concrete.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.

1.2 REFERENCES

- A. American Concrete Institute (ACI) 301 - Specifications for Structural Concrete for Buildings.
- B. ASTM International (ASTM):
 - 1. A185/A185M - Standard Specification for Welded Steel Wire Reinforcement, Plain, for Concrete.
 - 2. A615/A 615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
 - 3. A767 - Standard Specification for Zinc-Coated (Galvanized) Bars for Concrete Reinforcement.
 - 4. D3963 - Standard Specification for Fabrication and Jobsite Handling of Epoxy-Coated Reinforcing Steel.
- C. American Welding Society (AWS) D1.4 - Structural Welding Code - Reinforcing Steel.
- D. Concrete Reinforcing Steel Institute (CRSI):
 - 1. Manual of Practice.
 - 2. Publication 63 - Recommended Practice for Placing Reinforcing Bars.
 - 3. Publication 65 - Recommended Practice for Placing Bar Supports, Specifications and Nomenclature.

1.3 SUBMITTALS

- A. Submittals for Review:
 - 1. Shop Drawings:
 - a. Include bar sizes, spacings, laps, locations, and quantities of reinforcing bars, wire fabric, and accessories.
 - b. Provide bending and cutting schedules.
 - c. Show complete layout plan for each layer of reinforcing.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Deliver reinforcing to project site in bundles marked with tags indicating bar size, length, and mark.
- B. Store reinforcing above ground in dry, well drained area; protect from corrosion.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Reinforcing Bars:
 - 1. ASTM A615/A615M, deformed billet steel as indicated on Drawings.

- B. Welded Wire Fabric:
 - 1. ASTM A185/A185M. Furnish in flat sheets.

2.2 ACCESSORIES

- A. Spacers, Chairs, Bolsters, and Bar Supports:
 - 1. Sized and shaped for strength and support of reinforcement during concrete placement.
 - 2. Galvanized or plastic coated steel for surfaces exposed to weather.
- B. Tie Wire: Annealed steel, minimum 16 gage.

2.3 FABRICATION

- A. Fabricate in accordance with ACI 301 and CRSI Manual.
- B. Bend bars cold; do not heat or bend by makeshift methods. Discard damaged bars.
- C. Welding: AWS D1.4.
- D. Fabrication Tolerances:
 - 1. Sheared length: Plus or minus 1 inch.
 - 2. Bends in stirrups and ties: Plus or minus 1/2 inch.
 - 3. All other bends: Plus or minus 1 inch.

PART 3 EXECUTION

3.1 PREPARATION

- A. Before placing in work, thoroughly clean reinforcing of loose rust, mill scale, dirt, oil, and other materials that could reduce bonding.
- B. Inspect reinforcing left protruding for future bonding or following delay in work, and clean if necessary.

3.2 INSTALLATION

- A. Install reinforcing in accordance with ACI 301, and CRSI Manual and Publications 63 and 65.
- B. Accurately position reinforcing; securely tie at intersections.
- C. Welding: AWS D1.4.
- D. Install wire fabric reinforcing in longest practical lengths. Offset end laps in adjacent widths to prevent continuous lap.
- E. Do not displace or damage vapor retarder.
- F. Locate splices not indicated on Drawings at points of minimum stress.
- G. Clean and reprotect [galvanized] [epoxy coated] surfaces cut or damaged during installation.

END OF SECTION

SECTION 03 3000

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Cast-in-place concrete for slabs on grade.
 - 2. Equipment pads.
 - 3. Bases for lighting fixtures.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.

1.2 REFERENCES

- A. American Concrete Institute (ACI):
 - 1. 301 - Structural Concrete for Buildings.
 - 2. 305R - Hot Weather Concreting.
 - 3. 306R - Cold Weather Concreting.
 - 4. 308 - Standard Practice for Curing Concrete.
 - 5. 318 - Building Code Requirements for Structural Concrete.
- B. ASTM International (ASTM):
 - 1. C31 - Standard Test Method for Method of Making and Curing Concrete Test Specimens in the Field.
 - 2. C33 - Standard Specification for Concrete Aggregates.
 - 3. C39 - Standard Test Method for Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 - 4. C94 - Standard Specification for Ready-Mixed Concrete.
 - 5. C143 - Standard Test Method for Slump of Portland Cement Concrete.
 - 6. C150 - Standard Specification for Portland Cement.
 - 7. C171 - Standard Specification for Sheet Materials for Curing Concrete.
 - 8. C172 - Standard Test Method for Method of Sampling Freshly Mixed Concrete.
 - 9. C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
 - 10. C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
 - 11. C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - 12. C330 - Standard Specification for Lightweight Aggregates for Structural Concrete.
 - 13. C494 - Standard Specification for Chemical Admixtures for Concrete.
 - 14. C618 - Standard Specification for Fly Ash and Raw or Calcined Natural Pozzolans for Use as a Mineral Admixture in Portland Cement Concrete.
 - 15. C1116/1116M - Standard Specification for Fiber-Reinforced Concrete and Shotcrete.
 - 16. D1752 - Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.

1.3 SUBMITTALS

- A. Submittals for Review:
 - 1. Concrete Mix Designs: Include:
 - a. Proportions of cement, fine and coarse aggregates, [fibrous reinforcing where scheduled,] and water.
 - b. Combined aggregate gradation.
 - c. Aggregate specific gravities and gradations.
 - d. Water/cement ratio, design strength, slump, and air content.

- e. Type of cement and aggregates.
- f. Air dry density and split cylinder ratio for lightweight concrete.
- g. Type and proportion of admixtures.
- h. Special requirements for pumping.
- i. Range of ambient temperature and humidity for which design is valid.
- j. Special characteristics of mix requiring precautions in mixing, placing, or finishing techniques to achieve finished product.

1.4 QUALITY ASSURANCE

- A. Concrete Mix Design: In accordance with ACI 301, Method 1 or 2.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Mix and deliver concrete to project ready mixed in accordance with ASTM C94.
- B. Schedule delivery so that pours will not be interrupted for over 15 minutes.
- C. Place concrete on site within 90 minutes after proportioning materials at batch plant.

1.6 PROJECT CONDITIONS

- A. Cold Weather Placement - Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures. Comply with ACI 306R and following requirements:
 - 1. Air temperature at or expected to fall below 40 degrees F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 degrees F and not more than 80 degrees F at point of placement.
 - 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 - 3. Do not use calcium chloride, salt, and other materials containing antifreeze agents or chemical accelerators unless otherwise accepted in mix designs.
- B. Hot Weather Placement - Place concrete in accordance with ACI 305R and following requirements:
 - 1. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90 degrees F. Use chilled mixing water or chopped ice if water equivalent of ice is calculated in total amount of mixing water.
 - 2. If required, cover reinforcing steel with water soaked burlap, so that steel temperature will not exceed ambient air temperature.
 - 3. Fog spray forms, reinforcing steel, and subgrade just before concrete is placed.
 - 4. Use water-reducing retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers - Concrete Chemicals:
 - 1. BASF Corporation. (www.buildingsystems.basf.com)
 - 2. Dayton Superior. (www.daytonsuperior.com)
 - 3. W. R. Meadows, Inc. (www.wrmeadows.com)
 - 4. Meadow Burke. (www.meadowburke.com)
 - 5. Nox-Crete Products Group. (www.nox-crete.com)
- B. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Portland Cement: ASTM C150, Type I or III, gray color.
- B. Aggregates:
 - 1. Fine: ASTM C33, clean, hard, durable, uncoated natural sand, free from silt, loam, and clay.
 - 2. Coarse: ASTM C33, clean, hard, durable, uncoated crushed stone, maximum size No. 467, Table No. 2.
 - 3. Lightweight: ASTM C330, expanded shale or clay produced by rotary kiln method.
- C. Fibrous Reinforcing: ASTM C1116/1116M, 100 percent virgin polypropylene free from reprocessed olefin materials and specifically manufactured for use as concrete secondary reinforcement.

2.3 ACCESSORIES

- A. Water: Clean and potable.
- B. Admixtures:
 - 1. Water reducing or water reducing/set retarding: ASTM C494, Type A or D.
 - 2. Air entraining: ASTM C260.
- C. Expansion Joint Filler: ASTM D1752, non asphaltic type.
- D. Non Shrink Grout: Premixed, consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.
- E. Bonding Agent: Two component modified epoxy resin.
- F. Curing Compound: ASTM C309, water based type.
- G. Curing Paper: ASTM C171, waterproof paper or polyethylene film.

2.4 MIXES

- A. Proportions: In accordance with ACI 301.
- B. Design concrete to yield characteristics indicated on Drawings.
- C. Use accelerating admixture in cold weather only when approved by Architect. Use of admixtures will not reduce cold weather placement requirements.

PART 3 EXECUTION

3.1 PREPARATION

- A. Notify Architect and Testing Laboratory minimum 24 hours prior to placing concrete.
- B. Accurately position anchor bolts, sleeves, conduit, inserts, and accessories. Do not cut reinforcing steel to facilitate installation of inserts or accessories.
- C. Remove water and debris from forms and excavations.
- D. Close openings left in forms for cleaning and inspection.
- E. Prepare previously placed [and existing] concrete surfaces by cleaning with steel wire brush and applying bonding agent in accordance with manufacturer's instructions.

- F. Where new concrete is doweled to existing, drill holes in existing concrete, insert steel dowels, and pack holes solid with non shrink grout.

3.2 PLACEMENT OF CONCRETE

- A. Place concrete in accordance with ACI 301 and ACI 318.
- B. Ensure reinforcement, inserts, and embedded parts are not disturbed during concrete placement.
- C. Deposit concrete as nearly as possible in its final position to minimize handling and flowing.
- D. Place concrete continuously between predetermined expansion, control, and construction joints.
- E. Do not place partially hardened, contaminated, or retempered concrete.
- F. Do not allow concrete to free fall over 8 feet; provide tremies, chutes, or other means of conveyance.
- G. Consolidate concrete with mechanical vibrating equipment. Hand compact in corners and angles of forms.
- H. Screed slabs level, to flatness tolerance of 1/8 inch in 10 feet.

3.3 PLACEMENT OF SEPARATE FLOOR TOPPINGS

- A. Prior to placing toppings, remove deleterious material from concrete substrates; broom surfaces clean.
- B. Apply bonding agent to concrete substrate; follow manufacturer's instructions.

**** OR ****

- C. Apply sand and cement slurry coat to concrete surfaces just prior to placing topping.
- D. Place divider strips and reinforcing.
- E. Place toppings to required lines and elevations; screed level, to tolerance of 1/8 inch in 10 feet.

3.4 PLACEMENT OF GROUT

- A. Remove loose and foreign matter from concrete; lightly roughen bonding surface.
- B. Just prior to grouting, thoroughly wet concrete surfaces; remove excess water.
- C. Mix grout in accordance with manufacturer's instructions. Do not retemper.
- D. Place grout continuously, by most practical means; avoid entrapped air. Do not vibrate grout.

3.5 PROTECTION

- A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
- C. Provide artificial heat to maintain temperature of concrete above minimum specified temperature for duration of curing period.

- D. Keep forms sufficiently wet to prevent cracking of concrete or loosening of form joints.

3.6 CURING

- A. Cure concrete in accordance with ACI 308:
 - 1. Horizontal surfaces:
 - a. Surfaces to receive additional toppings or setting beds: Use curing paper method.
 - b. Other surfaces: Use either curing paper or curing compound method.
 - 2. Vertical surfaces: Use either wet curing or curing compound method.
- B. Curing Compound Method:
 - 1. Spray compound on surfaces in two coats, applying second at right angle to first, at minimum rate recommended by manufacturer.
 - 2. Restrict traffic on surfaces during curing.
- C. Curing Paper Method:
 - 1. Spread curing paper over surfaces, lapping ends and sides minimum 4 inches; maintain in place by use of weights.
 - 2. Remove paper after curing.
- D. Wet Curing Method: Spray water over surfaces and maintain wet for 7 days.

3.7 CLEANING

- A. Remove efflorescence, stains, oil, grease, and foreign materials from exposed surfaces.

3.8 FIELD QUALITY CONTROL

- A. Testing and Inspection Services:
 - 1. Certify each delivery ticket.
 - 2. Record time at which concrete was discharged from truck.
 - 3. Monitor and record amount of water and water reducing admixture added to concrete at project site.
 - 4. Determine ambient temperature and temperature of concrete sample for each set of test cylinders.
 - 5. Test cylinders:
 - a. Make test cylinders in accordance with ASTM C172; one set of 3 cylinders for each 100 cubic yards or fraction thereof placed in any one day, for each different class of concrete.
 - b. Mold and cure cylinders in accordance with ASTM C31; test cylinders in accordance with ASTM C39; one at 7 days and two at 28 days.
 - 6. Slump tests: Make slump tests at beginning of each day's placement and for each set of test cylinders in accordance with ASTM C143.
 - 7. Air content: Determine total air content of air entrained concrete for each strength test in accordance with ASTM C231.

END OF SECTION

SECTION 03 3100

UNDER SLAB VAPOR RETARDER

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Vapor retarder under concrete slabs and related accessories.

1.02 RELATED REQUIREMENTS

A. Division 1: Administrative, procedural, and temporary work requirements.

1.03 REFERENCES

- A. ASTM C 168 - Terminology Relating to Thermal Insulating Materials; current edition.
- B. ASTM E 1643 - Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs; current edition.
- C. ASTM E 1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs; current edition.

1.04 DEFINITIONS

- A. Vapor Retarder: A material or system that impedes the transmission of water vapor under specified conditions.
 - B. Vapor Barrier: A term used synonymously with vapor retarder in accordance with ASTM C 168.
- ##### 1.05 SUBMITTALS
- A. See Division 1 for submittal procedures.
 - B. Product Data: Provide manufacturer's descriptive product literature indicating compliance with specified requirements.
 - C. Samples: Submit two vapor retarder samples, 6 x 6 inch in size. Submit two seaming tape samples, 6 inches long.
 - D. Certificates: Certify that products of this section meet or exceed specified requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Fortifiber Building Systems "Moiststop Ultra 15": www.fortifiber.com.
- B. Insulation Solutions, "Viper Vaporcheck II 15-Mil": www.insulationsolutions.com.
- C. Raven Industries "Vapor Block 15": www.vaporblock.com.
- D. Stego Industries "Stego Wrap Vapor Barrier": www.stegoindustries.com.
- E. W.R. Meadows "Perminator Vapor-Mat 15": www.wrmeadows.com.
- F. Substitutions: Not permitted.

2.02 PERFORMANCE CRITERIA

A. Vapor retarder shall fully comply with requirements of ASTM E 1745, Class A.

2.03 MATERIALS

A. Vapor Retarder: Single ply polyethylene film, minimum 10 or 15 mils thick. Refer to Structural Drawings.

2.04 ACCESSORIES

- A. Tape: High density polyethylene tape with pressure sensitive adhesive. Minimum 4 inches wide.
- B. Pipe Boots: Construct pipe boots from vapor retarder material and pressure sensitive tape per manufacturer's instructions or use prefabricated boots constructed of vapor retarder material.

PART 3 EXECUTION

3.01 PREPARATION

A. Ensure that subsoil preparation has been completed and complies with specified requirements.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions and ASTM E 1643.
- 1. Unroll vapor retarder with longest dimension parallel with direction of pour.
- 2. Lap vapor retarder over footings and seal to grade beams.
- 3. Overlap joints 6 inches and seal with sealing tape.
- 4. Seal all penetrations, including pipes, with pipe boots and sealing tape.
- 5. No penetration of vapor retarder is allowed except for reinforcing steel and permanent utilities.
- 6. Repair damaged areas by cutting patches of vapor retarder, overlapping damaged area 6 inches and taping all four sides with sealing tape.

3.03 FIELD QUALITY CONTROL

- A. Inspect for punctures in vapor retarder prior to pouring concrete.

3.04 CLEANING

- A. Waste Management: Comply with requirements of Section 01732 for removal and disposal of construction debris and waste.

END OF SECTION

SECTION 03 3500
CONCRETE FINISHING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Concrete Floor Liquid Densifier Sealer.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.
 - 2. Section 03 3000 - Cast-In-Place Concrete.

1.2 REFERENCES

- A. American Concrete Institute (ACI):
 - 1. 301 - Structural Concrete for Buildings.
 - 2. 302.1 - Guide for Concrete Floor and Slab Construction.
- B. ISO International Organization for Standardization
 - 1. ANSI/ISO 9001 – Quality Management Systems - Requirements.

1.3 DEFINITIONS

- A. Specified Overall Value (SOV): Describes the flatness or levelness value which must be achieved when all measured values of that type on a given Test Surface are combined.
- B. Minimum Local Value (MLV): Describes the flatness or levelness value below which repair or replacement is required and applies to Minimum Local Area.
- C. Minimum Local Area (MLA): An area bounded by construction or contraction joints or by column lines or half-column lines, whichever is smaller; no boundary crosses a construction joint or expansion joint.
- D. Level: Horizontal, normal to the direction of gravity. An envelope is defined by 2 level lines which are separated by stated distances.

1.4 SUBMITTALS

- A. Submittals for Review:
 - 1. Product List: List manufacturer name and product name.
 - 2. Product Data: Descriptive data for sealer/hardener.
 - 3. Manufacturer Certificate: Indicating products listed on Contractor's Product List are compatible and suitable for the specified applications

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Minimum 3 years experience in work of this Section.
- B. Manufacturer: ISO 9001 quality certified as primary manufacturer of specified products.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers - Concrete Sealer/Hardener:

1. The Euclid Chemical Company (www.euclidchemical.com)
2. Manufacturer Single Source: Provide liquid densifier sealer and related concrete treatment and admixture products from a single qualified manufacturer.

B. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

A. Concrete Materials: Specified in Section 033000.

B. Liquid Floor Treatments:

1. Liquid Densifier Sealer: High performance, deeply penetrating concrete densifier; odorless, colorless, VOC – Compliant, non-yellowing silicate and silicate base solution designed to harden, dustproof and protect concrete floors and to resist black rubber tire marks. The compound must contain a minimum solids content of 20% of which 50% is silicate.
 - a. Basis of Design Product: “Euco Diamond Hard” by the Euclid Chemical Co.
 - b. Substitutions: Under provisions of Division 01

PART 3 EXECUTION

3.1 FINISHING INTERIOR FLOOR SURFACES

- A. Finish concrete floor surfaces in accordance with ACI 301 and ACI 302.1
- B. Wood float surfaces to receive thick set tile
- C. Steel trowel and fine broom finish surfaces to receive thin set tile
- D. Steel trowel and seal surfaces to be exposed. Apply sealer/hardener in strict accordance with manufacturer’s instructions.
- E. In areas with floor drains, maintain design floor elevation at walls; slope surfaces uniformly to drains as indicated.
- F. Tolerances
 1. Maximum variation of surface flatness for exposed concrete floors: 1/8 inch in 10 feet.

3.2 PREPARATION FOR LIQUID DENSIFIER SEALER

- A. When used on existing concrete, prepare concrete surfaces in accordance with manufacturer’s written instructions.
 1. Ensure surfaces are clean, dry and free of standing water.
 2. Remove dirt, dust, oil, grease, sealers, and other materials that may prevent penetration of liquid densifier sealer
- B. Clean slab with mechanical scrubber

3.3 APPLICATION OF LIQUID DENSIFIER SEALER

- A. Apply Liquid Densifier Sealer in strict accordance with the directions of the manufacturer. Spray, squeegee or roll on liquid to clean, dry concrete surface at a rate no greater than 225 sq ft per gallon. The liquid shall be scrubbed into the surface with a mechanical scrubber. Keep the surface wet for a minimum of 30 minutes with the Liquid Densifier Sealer during the application process. When the product thickens, but not more than 60 minutes after initial application, the surface shall then be squeegeed or vacuumed to remove all excess liquid.
 1. Do not leave any residue on surface
 2. Do not track material on to untreated surfaces.
- B. Protect floors from heavy traffic, scratching and marring for the remainder of construction.
- C. Re-apply Liquid Densifier Sealer after other trades have completed their work, in accordance with manufacturer’s recommendations.

3.4 FINISHING EXTERIOR SLAB SURFACES

- A. Finish exterior concrete slab surfaces in accordance with ACI 301.
- B. Steel trowel and broom finish surfaces.
- C. Steel trowel and cross rake ramp surfaces.
- D. Tolerances:
 - 1. Maximum variation of surface flatness: 1/4 inch in 10 feet.
 - 2. Correct defects by grinding or removal and replacement of defective work. Re-measure corrected areas by same process.

END OF SECTION

SECTION 05 4000

COLD-FORMED METAL FRAMING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Formed steel stud wall framing.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.

1.2 REFERENCES

- A. American Iron and Steel Institute (AISI) - Specification for the Design of Cold-Formed Steel Structural Members.
- B. American Society of Civil Engineers (ASCE) 7 - Minimum Design Loads for Buildings and Other Structures.
- C. American Welding Society (AWS) D1.3 - Structural Welding Code - Sheet Steel.
- D. ASTM International (ASTM):
 - 1. A1003/A1003M - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members.
 - 2. C1513 - Standard Specification for Steel Tapping Screws for Cold-Formed Steel Framing Connections.
- E. Society for Protective Coatings (SSPC) - Painting Manual.
- F. Steel Framing Alliance (SFA).

1.3 SUBMITTALS

- A. Submittals for Review:
 - 1. Shop Drawings: Indicate framing layout, components, connections, fastenings, etc.
 - 2. Product Data: Indicate framing components, sizes, materials, finishes, and accessories.
- B. Quality Control Submittals:
 - 1. Certificates of Compliance: Certificate from Professional Structural Engineer responsible for system design that system was designed in accordance with Contract Document requirements, applicable Building Code, and generally accepted engineering practices.

1.4 QUALITY ASSURANCE

- A. Manufacturer and Installer Qualifications: Minimum 5 years experience in work of this Section.
- B. Manufacturer: Current member of SFA.
- C. Calculate structural properties of framing members in accordance with AISI Specifications.
- D. Welder Qualifications: AWS D1.3.
- E. Design exterior wall stud system to withstand:

2. Wind pressure loads in accordance with ASCE 7.
 3. Movement caused by an ambient temperature range of 120 degrees F and a surface temperature range of 160 degrees F.
 4. Maximum deflection under loading: L/600 without sheathing materials.
- F. Design system to accommodate construction tolerances, deflection of building structural members, and clearances at openings.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
1. California Expanded Metal Company. (www.cemcosteel.com)
 2. ClarkDietrich Building Systems. (www.clarkdietrich.com)
 3. Craco Mfg., Inc. (www.cracometals.com)
- B. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Framing Materials:
1. ASTM A1003/A1003M, galvanized sheet steel, G60 coating class.
 2. Fabricate components to ASTM C955.
 3. Studs: Channel profile, punched for utility access.
 4. Tracks:
 - a. Depth: As indicated on construction documents.
 - b. Channel profile, same gage and depth as studs, unpunched.
 - c. Top track: Deflection compensating type, deep leg runner with slotted screw holes; permit plus or minus 1/2 inch movement of overhead structure without damage to framing.
 - d. Bottom track: 1-1/4 inch high legs.

2.3 ACCESSORIES

- A. Bracing, Furring, Bridging: Formed sheet steel, thickness determined by performance requirements specified.
- B. Plates, Gussets, Clips: Formed sheet steel, thickness determined by performance requirements specified.
- C. Fasteners: ASTM C1513; self-drilling, self-tapping screws.
- D. Touch Up Paint: SSPC Paint 20, Type I or II.
- E. Welding Materials: AWS D1.3; type required for materials being welded.

2.4 FABRICATION

- A. Prefabricate framing components using templates. Field fabrication prohibited except for minor alterations to accommodate site conditions.
- B. Cut and fit members to tight fit.
- C. Assemble components using screw connection method.

- D. Fabricate straight, level, and true, without warp or rack.
- E. Fabrication Tolerances:
 - 1. Variation from indicated length: Maximum 1/2 inch for components up to 30 feet long; maximum 3/4 inch for components over 30 feet long.
 - 2. Variation from indicated height: Maximum 1/4 inch for components up to 5 feet high; maximum 1/2 inch for components over 5 feet high.

PART 3 EXECUTION

3.1 INSTALLATION - GENERAL

- A. Install framing components in accordance with ASTM C1007, manufacturer's instructions, and approved Shop Drawings.
- B. Welding: In accordance with AWS D1.3.
- C. Make provisions for erection stresses. Provide temporary alignment and bracing.

3.2 INSTALLATION - STUD FRAMING

- A. Place top and bottom tracks in straight lines with ends butted. Fasten tracks at maximum 12" o.c.
- B. Place studs at spacing indicated and not more than 2 inches from abutting walls and at each side of openings.
- C. Connect studs to top and bottom tracks using fastener method.
- D. Construct corners using minimum of three studs.
- E. Double studs at wall openings, door jambs, and window jambs. Do not splice studs.
- F. Erect studs, brace, and reinforce to develop full strength, to achieve design requirements.
- G. Install headers above openings and intermediate studs above and below openings to align with wall stud spacing.
- H. Install framing between studs for attachment of mechanical and electrical items, and to prevent stud rotation.
- I. Laterally brace walls at location indicated.

3.3 INSTALLATION TOLERANCES

- A. Maximum Variation from True Position and any Member from Plane: 1/4"

3.4 ADJUSTING

- A. Touch up field connections and breaks in factory coatings with touch up paint applied in accordance with manufacturer's instructions.

END OF SECTION

**SECTION 05 5133
METAL LADDERS**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Aluminum Fixed Vertical Ladders.

1.2 REFERENCES

- A. ANSI A14.3 Ladders - Fixed - Safety Requirements.
- B. OSHA 1910.23: Ladders.

1.3 SUBMITTALS

- A. Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
- B. Shop Drawings for Ladders:
 - 1. Plan and section of ladder installation.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store products until installation inside under cover. If stored outside, under a tarp or suitable cover.

1.5 WARRANTY

- A. Limited Warranty: Five years against defective material and workmanship, covering parts only, no labor or freight. Defective parts, if deemed so by the manufacturer, will be replaced at no charge, freight excluded, upon inspection at manufacturer's plant which warrants same.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturer: Precision Ladders, LLC, which is located at: P. O. Box 2279; Morristown, TN 37816-2279; Toll Free Tel: 800-225-7814; Tel: 423-586-2265; Email: info@PrecisionLadders.com; Web: www.PrecisionLadders.com

2.2 ALUMINUM FIXED VERTICAL LADDER

- A. Aluminum Fixed Vertical Ladder and Components: Ladder, walk-thru, side rails, security doors and finishes.
 - 1. One each Model: Model FL -132 (132 = vertical height in inches) Aluminum Fixed Vertical Ladder as manufactured by Precision Ladders LLC.
 - 2. Capacity: Unit shall support a 1,500 lb loading without failure.
 - 3. Performance Standard: Units designed and manufactured to meet or exceed ANSI A14.3, OSHA 1910.23, OSHA 1910.28 and OSHA 1910.29.

- B. Components:
1. Ladder Stringer: 2-1/2 inch by 1-1/16 inch by 1/8 inch extruded 6005-T5 aluminum channel. Pitch: 90 degrees.
 2. Ladder Tread: 2-1/4 inch by 3/4 inch by 1/4 inch extruded 6005-T5 aluminum with deeply serrated top surface.
 3. Ladder Mounting Bracket: 8-1/2 inch by 2 inch by 3 inch by 1/4 inch thick aluminum angle.
 4. Walk-Thru:
 - a. Hand Rails: 1-1/4 inch (32 mm) aluminum square tube with rounded edges.
 - b. Mounting Brackets: 4 inch by 4 inch by 1/4 inch aluminum.
 - c. Side Rails: 42 inch side rail extension for through ladder exits.
 5. Security Door: 0.125 inch 3003-H14 aluminum panel 84 inches tall with padlock provision.
 6. Finishes:
 - a. Standard: Mill finish on aluminum ladder components.

2.3 FABRICATION

- A. Completely fabricate ladder ready for installation before shipment to the site.

PART 3 EXECUTION

3.1 EXAMINATION

- A. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- B. Examine materials upon arrival at site. Notify the carrier and manufacturer of any damage.

3.2 INSTALLATION

- A. Install in accordance with approved submittals.

3.3 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 06 4100

PLASTIC LAMINATE CLAD CASEWORK

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Special fabricated plastic laminate clad cabinet units.
 - 2. Shop finishing.
 - 3. Cabinet hardware.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.
 - 2. Section 066116 - Solid Surfacing Fabrications.
 - 3. Section 079200 - Joint Sealers.

1.2 REFERENCES

- A. Architectural Woodwork Institute/Architectural Woodwork Manufacturers of Canada/Woodwork Institute (AWI/AWMAC/WI) - Architectural Woodwork Standards.
- B. Association of Electrical and Medical Imaging Equipment Manufacturers (NEMA) LD-3 - High Pressure Decorative Laminates.
- C. Forest Stewardship Council (FSC) STD-40-004 - Chain of Custody Standard.

1.3 SUBMITTALS

- A. Submittals for Review:
 - 1. Shop Drawings:
 - a. Include dimensioned plan, sections, elevations, and details, including interface with adjacent work.
 - b. Designate wood species and finishes.
 - 2. Samples:
 - a. 3 x 3 inch plastic laminate samples [showing available colors and finishes.
 - b. Each hardware component.

1.4 QUALITY ASSURANCE

- A. Fabricator Qualifications:
 - 1. Minimum 5 years experience in work of this Section.
 - 2. Certified under AWI/AWMAC/WI Quality Certification Program.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Do not deliver materials until proper protection can be provided, and until needed for installation.

1.6 PROJECT CONDITIONS

- A. Environmental Requirements: Maintain following conditions in building for minimum 7 days prior to, during, and after installation of casework:
 - 1. Temperature: 60 to 80 degrees F.
 - 2. Humidity: 15 to 55 percent.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers - Plastic Laminate:
 - 1. Formica Corp. (www.formica.com)
 - 2. Nevamar Co. (www.nevamar.com)
 - 3. Wilsonart International, Inc. (www.wilsonart.com)
- B. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Sheet Products:
 - 1. Graded in accordance with AWI/AWMAC/WI Architectural Woodwork Standards, Section 4 requirements for quality grade specified.
 - 2. Sheet core: Medium density fiberboard.
- B. Lumber:
 - 1. Graded in accordance with AWI/AWMAC/WI Architectural Woodwork Standards, Section 3 requirements for quality grade specified, average moisture content of 6 percent.
- C. Plastic Laminate: NEMA LD-3.
 - 1. High pressure decorative laminate:
 - a. Horizontal surfaces:
 - 1) Backing sheet: Grade BGF.
 - 2) Postformed surfaces: Grade HGP.
 - 3) Acid resisting: Grade LGP.
 - 4) Other surfaces: Grade HGS.
 - b. Vertical surfaces:
 - 1) Backing sheet: Grade BLF.
 - 2) Cabinet liner: Grade CLS.
 - 3) Other surfaces: Grade VGP.
 - 2. Low pressure decorative laminate: Grade VGL.
 - 3. Colors: To be selected from manufacturer's full color range.]

2.3 ACCESSORIES

- A. Solid Surfacing Countertops: Specified in Section 066116.
- B. Fasteners: Type and size as required by conditions of use.
- C. Adhesives:
 - 1. Waterproof, water based type, compatible with backing and laminate materials.
- D. Finish Hardware: As scheduled at end of Section.
- E. Joint Sealers: Specified in Section 079200.

2.4 FABRICATION

- A. Cabinets - Plastic Laminate Finish:
 - 1. Quality: AWI/AWMAC/WI Architectural Woodwork Standards, Section 10, Custom Grade.
 - 2. Construction type: Face frame.
 - 3. Interface style: Overlay.
 - 4. Semi-exposed surfaces: High pressure decorative laminate.
 - 5. Fit exposed and semi-exposed sheet edges with matching laminate edging.

6. Fabricate drawer bodies to full depth of drawer fronts less $\frac{1}{2}$.
- B. Shop assemble for delivery to project site in units easily handled. Prior to fabrication, field verify dimensions to ensure correct fit.
- C. Apply plastic laminate in full uninterrupted sheets; fit corners and joints to hairline. Slightly bevel arises. Apply laminate backing sheet to reverse side of laminate faced surfaces.
- D. Where field fitting is required, provide ample allowance for cutting. Provide trim for scribing and site conditions.
- E. Provide cutouts and reinforcement for plumbing, electrical, appliances, and accessories. Prime paint surfaces of cut edges.

PART 3 EXECUTION

3.1 PREPARATION

- A. Prior to installation, condition cabinets to average humidity that will prevail after installation.

3.2 INSTALLATION

- A. Install in accordance with AWI/AWMAC/WI Architectural Woodwork Standards.
- B. Set plumb, rigid and level. Scribe to adjacent construction with maximum 1/8 inch gaps.
- C. Adhere skirts with beads of adhesive.
- D. Fill joints between cabinets, tops, splashes, and adjacent construction with joint sealer as specified in Section 079200; finish flush.

3.3 CABINET HARDWARE

- A. Hardware: BHMA A159.9, types as recommended by fabricator for quality grade specified.
- B. Shelving Supports: As designed on drawings.
- C. Drawer and Door pulls: "U" shaped wire pull, steel with brushed chrome finish, 4" on centers.
- D. Drawer Slides:
 1. Type: Standard full extension.
 2. Static Load Capacity: Commercial grade 100 lbs.
 3. Mounting: Slide Mounted
 4. Stops: Integral type
 5. Features: Provide self-closing/stay closed type.
 6. Manufacturers:
 - a. Accuride International, Inc.
 - b. Grass America, Inc.
 - c. Knape & Vogt Manufacturing Company
- E. Hinges: European style concealed self-closing type, finish as selected.

END OF SECTION

SECTION 06 6116

SOLID SURFACING FABRICATIONS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Solid surfacing countertops. Refer to MEP drawings for drop-in type sinks.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.
 - 2. Section 079200 - Joint Sealers.

1.2 REFERENCES

- A. ASTM International (ASTM) E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

1.3 SUBMITTALS

- A. Submittals for Review:
 - 1. Shop Drawings: Indicate dimensions, component sizes, fabrication details, attachment provisions and coordination requirements with adjacent work.
 - 2. Product Data: Indicate product description, fabrication information and compliance with specified performance requirements.
- B. Closeout Submittals:
 - 1. Maintenance Data: Include recommended cleaning materials and procedures and damage repair.

1.4 QUALITY ASSURANCE

- A. Fabricator Qualifications: Minimum 5 years experience in work of this Section.
- B. Fire Hazard Classification: Class [A] flame spread/smoke developed rating, tested to ASTM E84.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. Avonite Surfaces. (www.avonitesurfaces.com)
 - 2. Diamond Surfaces. (www.diamondsurfaces.com)
 - 3. DuPont. (www.corian.com)
 - 4. Formica Corp. (www.formica.com)
 - 5. Wilsonart International, Inc. (www.wilsonart.com)
- B. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Solid Surfacing:
 - 1. Thickness: 1/2 inch.
 - 2. Color: To be selected from manufacturer's full color range.
 - 3. Surface finish: To be selected.

2.3 ACCESSORIES

- A. Adhesive:
 - 1. Type recommended by solid surfacing manufacturer.
- B. Joint Sealer: Specified in Section 079200.

2.4 FABRICATION

- A. Fabricate components in shop to sizes and shapes indicated, in accordance with manufacturer's instructions and approved Shop Drawings.
- B. Fabricate [splashes] [and skirts] from solid surfacing in color to match countertops.
- C. Form joints to be inconspicuous in appearance and without voids. Join pieces with adhesive.
- D. Provide holes and cutouts for mounting of sinks, trim and accessories.
- E. Finish exposed edges to smooth, uniform bullnose profile.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions and approved Shop Drawings.
- B. Set plumb, level, and rigid.
- C. Adhere countertops, splashes, and skirts with beads of adhesive.
- D. Seal perimeter with joint sealer as specified in Section 079200. Finish smooth and flush.

3.2 ADJUSTING

- A. Buff out minor scratches and abrasions.

3.3 PROTECTION

- A. Protect surfaces from damage with nonstaining coverings.

END OF SECTION

SECTION 07 2115

BATT INSULATION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Batt insulation in exterior wall assemblies where shown.
 - 2. Provide glass fiber acoustical insulation for interior partitions as indicated in building plans.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.

1.2 REFERENCES

- A. ASTM International (ASTM):
 - 1. C665 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Wood Frame and Light Construction Buildings.
 - 2. E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 3. E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 Degrees C.

1.3 SUBMITTALS

- A. Quality Control Submittals:
 - 1. Certificates of Compliance: Certification from an independent testing laboratory that insulation meets fire hazard classification requirements.

1.4 QUALITY ASSURANCE

- A. Fire Hazard Classification:
 - 1. Noncombustible, tested to ASTM E136.
 - 2. Flame spread/smoke developed rating of 25/50 or less, tested to ASTM E84.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Store insulation in clean, dry, sheltered area, off ground or floor, until used. Protect against wetting and moisture absorption.

1.6 PROJECT CONDITIONS

- A. Do not install until insulation until building is substantially water and weather tight.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. Johns Manville. (www.jm.com)
 - 2. Knauf Insulation. (www.knaufusa.com)
 - 3. Owens Corning. (www.owenscorning.com)
- B. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Thermal & Acoustical Batt Insulation:
 - 1. Type: ASTM C665, glass fiber composition.
 - 2. Facing: Unfaced.
 - a. Thickness: Fill Wall Cavity, full height.
 - b. R-19 for 6" metal stud wall framing (16" wide) and R-19 above lay-in ceiling tile/grid systems (24' wide)
 - c. R-15 for 3 5/8" metal stud wall framing (16" wide)

PART 3 EXECUTION

3.1 INSTALLATION

- A. Friction fit between framing members.
- B. Butt insulation to adjacent construction. Butt ends and edges.
- C. Carry insulation around pipes, wiring, boxes, and other components.
- D. Ensure complete enclosure of spaces without voids.

END OF SECTION

SECTION 07 5400

SINGLE PLY MEMBRANE (FULLY ADHERED) PVC ROOFING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Rigid roof insulation.
 - 2. Cover board.
 - 3. Fully adhered single ply membrane roofing.
 - 4. Base flashings.
 - 5. Walkway pads.

- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.
 - 2. Section 076200 - Sheet Metal Flashing and Trim.

1.2 REFERENCES

- A. American Society of Civil Engineers (ASCE) 7 - Minimum Design Loads for Buildings and Other Structures.

- B. ASTM International (ASTM):
 - 1. C208 - Standard Specification for Cellulosic Fiber Insulating Board.
 - 2. C578 - Standard Specification for Preformed Cellular Polystyrene Thermal Insulation.
 - 3. C728 - Standard Specification for Perlite Thermal Insulation Board.
 - 4. C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
 - 5. C1278/C1278M - Standard Specification for Fiber-Reinforced Gypsum Panel.
 - 6. C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
 - 7. C1549 - Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer.
 - 8. D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
 - 9. D4434 - Standard Specification for Poly (Vinyl Chloride) Sheet Roofing.
 - 10. D6878 - Standard Specification for Thermoplastic Polyolefin Based Sheet Roofing.
 - 11. E108 - Standard Test Methods for Fire Tests of Roof Coverings.
 - 12. E1980 - Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces.

- C. Energy Star(www.energystar.gov) - Qualified Products.

- D. Factory Mutual Insurance Co. (FM):
 - 1. 4470 - Approval Standard for Single-Ply, Polymer-Modified Bitumen Sheet, Built-Up Roof (BUR) and Liquid Applied Roof Assemblies for Use in Class 1 and Noncombustible Roof Deck Construction.
 - 2. Property Loss Prevention Data Sheet 1-28 - Design Wind Loads.
 - 3. Property Loss Prevention Data Sheet 1-49 - Perimeter Flashing.

- E. National Roofing Contractors Association (NRCA) - Roofing and Waterproofing Manual.

1.3 SYSTEM DESCRIPTION

- A. Design Requirements: Design roofing system to resist minimum wind loads in accordance with Building Code.

1.4 SUBMITTALS

- A. Submittals for Review:
 - 1. Shop Drawings: Indicate:
 - a. Setting plan for insulation.
 - b. Roof slopes.
 - c. Layout of seams.
 - d. Base flashing, termination, and special details.
 - e. Fastener types and locations.
 - 2. Product Data: Manufacturer's product specifications, installation instructions, and general recommendations for each product.
 - 3. Samples:
 - 4. Warranty: Sample warranty form.
- B. Quality Control Submittals:
 - 1. Certificates of Compliance: Certification from an independent testing laboratory that roofing system meets fire hazard and windstorm classification requirements.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications:
 - 1. Minimum [10] years' experience in work of this Section.
 - 2. Licensed or certified by roofing materials manufacturer.
- B. Pre-Installation Conference:
 - 1. Convene at site [2] weeks prior to beginning work of this Section.
 - 2. Attendance: Architect, Contractor, roofing applicator, roofing manufacturer's representative, and related trades.
 - 3. Review and discuss: Contract Documents, roofing system manufacturer's literature, project conditions, scheduling, and other matters affecting application.
 - 4. Tour representative areas of roofing substrates; discuss substrate construction, related work, work conditions, and materials compatibility.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Store materials, other than membrane, in protected, dry area, between 60 and 80 degrees F until used; provide proper ventilation.
- B. Protect sheet goods from damage and wetting.

1.7 PROJECT CONDITIONS

- A. Do not apply roofing to damp or frozen substrate.
- B. Do not apply roofing during inclement weather or at temperatures below 40 degrees F, or above 100 degrees F or if freezing weather is anticipated within 24 hours after application. Do not use frozen materials.

1.8 WARRANTIES

- A. Provide 20 years No Dollar Limit (NDL), from date of substantial completion system warranty for the roofing work as specified in this Section. Warranty shall protect the Owner against the costs of repairing leakage resulting from building defects in all components of the system supplied to include membrane, fasteners, and insulation, as well as from defects in the workmanship involved in their installation.

Applicator/Roofing Contractor Warranty: Applicator shall supply the Owner with a separate two-year workmanship warranty. In the event any work related to roofing, flashing, or metal is found to be within the Applicator warranty term, defective or otherwise not in accordance with the Contract Documents, the Applicator shall repair that defect at no cost to the Owner. Applicator's warranty obligation shall run directly to the Owner, and a copy shall be sent to the manufacturer

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers - PVC Roofing System:
 - 1. Duro-Last Roofing, Inc. (basis for project design).
 - 2. Carlisle Syntec, Inc. (www.carlisle-syntec.com)
 - 3. GAF Materials Corp. (www.gaf.com)
 - 4. Johns Manville. (www.jm.com)
 - 5. Sika Sarnafil, Inc. (usa.sarnafil.sika.com)
- B. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Rigid Insulation:
 - 1. General: In locations where called for, provide preformed roof insulation boards (R-22.8 minimum main building), manufactured or approved by PVC membrane roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated.
 - 2. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, Grade 2, felt or glass-fiber mat facer on both major surfaces. 4 ½" thickness on building & 1" thickness on front entry canopy.
 - 3. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated. Fabricate to slopes indicated.
- B. Cover Board:
 - 1. Type: ASTM C1177/C1177M or ASTM C1278/C1278M; 48 inches wide x 1/2 inch thick, maximum practical length, square cut ends and edges.
 - 2. Mold resistance: 10, tested to ASTM D3273.
- C. Roof Membrane:
 - 1. Type: ASTM D4434, reinforced plasticized polyvinyl chloride (PVC), ultraviolet resistant.
 - 2. Size: Maximum sheet size permitted by application and job conditions.
 - 3. Thickness: 50 mils.
 - 4. Color: White on main building and gray on front walkway canopy.

2.3 ACCESSORIES

- A. Accessories:

1. By manufacturer of roofing system, including adhesives, tapes, solvents, sealants, water cutoff mastic, and prefabricated pipe flashings.
- B. Walkway Pads: Preformed resilient pads, recommended by roofing manufacturer, minimum .135" thick. Bid quantity equals of 30" wide pads shall be 70 lin/ft. Contractor shall verify exact locations.
- C. Metal Flashings: Specified in Section 076200

PART 3 EXECUTION

3.1 PREPARATION

- A. Remove projections that could puncture membrane from substrate.
- B. Clean substrate of loose and foreign material, oil, and grease.
- C. Complete roof penetrations and preparation for drains, flashings, and other penetrations prior to beginning roofing.
- D. Protect adjacent and underlying surfaces.

3.2 INSTALLATION - GENERAL

- A. Install roofing system in accordance with roofing system manufacturer's instructions, NRCA Manual, and approved Shop Drawings. Note that no screws shall be visible from below in areas on building with open exposed structure ceilings.

3.3 INSTALLATION OF INSULATION

- A. Apply [base layer] with long edges continuous and perpendicular to deck ribs. Stagger end joints in adjacent rows. Locate ends over solid bearing.
- B. Adhere to substrate in accordance with manufacturer's instructions.]

3.4 INSTALLATION OF COVER BOARD

- A. Apply panels with long edges continuous and perpendicular to [deck flutes. Stagger end joints in adjacent rows.
- B. Adhere to substrate in accordance with manufacturer's instructions.]

3.5 INSTALLATION OF ROOF MEMBRANE

- A. Position sheets without stretching; minimize wrinkles. Allow membrane to relax before proceeding.
- B. Provide minimum 5-1/2 inch lap at joints between adjacent sheets.
- C. Splice sheets by heat welding method.
- D. Bond membrane to substrate with adhesive applied in accordance with manufacturer's instructions.

3.6 INSTALLATION OF FLASHINGS

- A. Construct in accordance with roofing system manufacturer's standard details.
- B. Juncture of Horizontal and Vertical Surfaces:

1. Use longest practical length flashing to minimize joints.
 2. Complete splice between flashing and main roof sheet before bonding flashing to vertical surface. Extend splice 3 inches beyond fasteners that attach membrane to horizontal surface.
 3. Adhere flashing to substrate with full bed of adhesive.
 4. Fasten top of flashing at 12 inches on center maximum, under metal flashing.
- C. Penetrations through Membrane:
1. Flash pipe with premolded pipe flashings wherever possible.
 2. Where molded pipe flashings cannot be installed, use field fabricated pipe seals.
 3. Seal clusters of pipes and unusually shaped penetrations with minimum 2 inch high flashing containing pourable sealer.

3.7 INSTALLATION OF WALKWAY PADS

- A. Clean underside of pad; set pads in full adhesive bed.
- B. Leave 2 inch space between pieces.

END OF SECTION

SECTION 07 6200

SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Metal flashings and trim
 - 2. Fascia
 - 3. Gutters and downspouts.
 - 4. Counterflashings at roof mounted equipment and utility penetrations.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.
 - 2. Section 07 9200 - Joint Sealers.

1.2 REFERENCES

- A. American Architectural Manufacturers Association (AAMA):
 - 1. 611 - Voluntary Specification for Anodized Architectural Aluminum.
 - 2. 621 - Voluntary Specifications for High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) and Zinc-Aluminum Coated Steel Substrates.
- B. American National Standards Institute/Single Ply Roofing Institute (ANSI/SPRI) ES-1 - Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems.
- C. ASTM International (ASTM):
 - 1. A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
 - 2. B32 - Standard Specification for Solder Metal.
 - 3. B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- D. Sheet Metal and Air Conditioning Manufacturer's Association International (SMACNA) - Architectural Sheet Metal Manual.

1.3 SUBMITTALS

- A. Submittals for Review:
 - 1. Shop Drawings: Show locations, types and thicknesses of metal, profiles, dimensions, fastening methods, provisions for expansion and contraction, and joint details.
 - 2. Samples:
 - a. Each flashing and trim profile, minimum 12 inches long. Include corners where applicable
 - b. 3 x 3 inch prefinished metal samples showing available colors.
 - c. Show sample of flashing color for each application, per Finish Schedule.

1.4 QUALITY ASSURANCE

- A. Fabricator Qualifications: Minimum 10 years experience in work of this Section.
- B. Design, fabricate, and install metal copings, edge flashings in accordance with ANSI/SPRI ES-1.
- C. Conform to SMACNA Manual for nominal sizing of gutters, scuppers, collector boxes and downspouts for rainfall intensity determined by a storm occurrence of 1 in 100 years.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Precoated Aluminum-Zinc Alloy Coated Steel Sheet:
 - 1. ASTM A792/A792M, Commercial Quality, AZ50 aluminum-zinc alloy coating, 24 gage core steel unless noted otherwise.
 - 2. Finish: AAMA 621, fluoropolymer coating, containing minimum 70 percent PVDF resins, color to be selected from manufacturer's full color range.

2.2 ACCESSORIES

- A. Solder: ASTM B32.
- B. Fasteners: Same material and finish as sheet metal, with neoprene gasketed washers where exposed.
- C. Joint Sealers: Specified in Section 07 9200.

2.3 FABRICATION

- A. Fabricate components in accordance with SMACNA Manual.
- B. Profiles:
 - 1. Gutters: SMACNA Plate, rectangular
 - 2. Downspouts: SMACNA Plate, rectangular
 - 3. Fabricate end caps, downspout outlets and headers, straps, brackets, and downspout strainers in profile to suit gutters and downspouts.
- C. Pre tin edges of sheet.
- D. Pop rivet and seal joints at prefinished metal.
- E. Fabricate corners in single units with minimum 18 inch long legs.
- F. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.
- G. Form sections accurate to size and shape, square and free from distortion and defects.
- H. Provide for thermal expansion and contraction in sheet metal:
 - 1. Gutters:
 - a. Place expansion joints at maximum 50 feet on center.
 - b. Locate expansion joints between downspouts; prevent water flow over joint.
 - 2. Other sheet metal:
 - a. Provide expansion joints in sheet metal exceeding 15 feet in running length.
 - b. Place expansion joints at 10 feet on center maximum and maximum 2 feet from corners and intersections.
 - 3. Joint width: Consistent with types and sizes of materials, minimum width 1/4inch.
- I. Fabricate expansion joints in metal copings, edge flashings with backing and cover plates formed to flashing profile, minimum 8 inches long.
- J. Unless otherwise indicated, provide minimum 3/4inch wide flat lock seams; lap in direction of water flow.
- K. Fabricate cleats and starter strips of same material as sheet metal.

PART 3 EXECUTION

- 3.1 **INSTALLATION** (Verify colors of each flashing application before installation).
- A. Install flashing and sheet metal as indicated and in accordance with SMACNA Manual.
 - B. Install cleats and starter strips before starting installation of sheet metal. Fasten at 6 inches on center maximum.
 - C. Expansion Joints in Metal Copings and Edge Flashings:
 - 1. Center backing plate between flashing pieces at end joints.
 - 2. Apply two continuous beads of joint sealer between backing plate and flashing sections at each end.
 - 3. Install flashing pieces with 1/2 inch expansion space at abutting ends; apply sealer to expansion space.
 - 4. Apply two continuous beads of joint sealer between cover plate and flashing sections at each end.
 - D. Secure flashings with concealed fasteners where possible.
 - E. Apply plastic cement between metal and bituminous flashings.
 - F. Fit flashings tight, with square corners and surfaces true and straight.
 - G. Seam and seal field joints.
 - H. Separate dissimilar metals with bituminous coating or non-absorptive gaskets.
 - I. Reglets:
 - 1. Install reglets true to line and level. Seal top of surface mounted reglet with joint sealer.
 - 2. Install flashings into reglets to form tight fit. Secure with lead or plastic wedges at 9 inches on center maximum. Seal remaining space with joint sealer.
 - J. Gutters: Secure with straps spaced maximum 36 inches on center and within 12 inches of ends.
 - K. Downspouts:
 - 1. Secure with straps spaced maximum 8 feet on center and within 2 feet of ends and elbows.
 - 2. Flash downspouts into gutters and fasten.
 - 3. Flash upper sections into lower sections minimum 2 inches at joints; fasten sections together.
 - L. Apply joint sealers as specified in Section 07 9200.
- 3.2 **CLEANING**
- A. Clean sheet metal; remove slag, flux, stains, spots, and minor abrasions without etching surfaces.

END OF SECTION

SECTION 07 6500
FLEXIBLE FLASHINGS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Rubberized asphalt sheet for concealed wall flashings
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.

1.2 REFERENCES

- A. ASTM International (ASTM) D1970 - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.

1.3 SUBMITTALS

- A. Submittals for Review:
 - 1. Product Data: Manufacturer's descriptive data and installation instructions.

1.4 PROJECT CONDITIONS

- A. Do not apply flashings at ambient or surface temperatures less than 40 degrees F.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. Grace Construction Products. (www.graceconstruction.com)
 - 2. W.R. Meadows, Inc. (www.wrmeadows.com)
 - 3. Polyguard Products, Inc. (www.polyguardproducts.com)
- B. Substitutions: [Under provisions of Division 01.] [Not permitted.]

2.2 MATERIALS

- A. Rubberized Asphalt Flashings:
 - 1. Description: ASTM D1970; minimum 32 mil thick butyl rubber modified asphalt laminated to 8 mil thick cross-laminated HDPE film, release paper facing, self adhering.

2.3 ACCESSORIES

- A. Termination Mastic: Type recommended by flashing manufacturer.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Provide flexible flashings in exterior wall assemblies at:
 - 1. Base of walls.
 - 2. Heads of openings in walls.

3. Top of walls under copings.
 4. Transitions between materials.
 5. Around openings and penetrations through walls.
- B. Lap ends 4 inches minimum.
 - C. Press to full bond with substrate without voids, wrinkles, bridging, or fishmouths.
 - D. Roll ends and edges with hand held roller; ensure tight seal.
 - E. Apply trowel coat of mastic along flashing at top edge, seams, cuts, and penetrations.

END OF SECTION

SECTION 07 8400

FIRESTOPPING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Firestopping perimeter of and penetrations through fire rated assemblies.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.

1.2 REFERENCES

- A. ASTM International (ASTM):
 - 1. E814 - Standard Test Method for Fire Tests of Through-Penetration Firestops.
 - 2. E1966 - Standard Test Method for Fire-Resistive Joint Systems.
 - 3. E2307 - Standard Test Method for Determining Fire Resistance of Perimeter Fire Barrier Systems Using Intermediate-Scale, Multi-Story Test Apparatus.
- B. Underwriters Laboratories, Inc. (UL):
 - 1. 1479 - Fire Tests of Through-Penetration Firestops.
 - 2. 2079 - Fire Resistance of Building Joint Systems.

1.3 SYSTEM DESCRIPTION

- A. Provide continuous protection against passage of heat, fire, smoke, and gases at perimeter of and penetrations through rated assemblies.

1.4 SUBMITTALS

- A. Submittals for Review:
 - 1. Product Data:
 - a. Firestopping schedule; prepare in tabular format and identify:
 - 1) Type of assembly receiving firestop and required fire rating.
 - 2) Type of penetrating item.
 - 3) Proposed firestop system.
 - b. Include UL or equivalent details for each firestop system.
 - 2. Test Reports: Indicate conformance with ASTM E814, ASTM E1966, ASTM E2307, UL 1479, or UL 2079.
- B. Quality Control Submittals:
 - 1. Certificates of Compliance: Indicate conformance of installed systems with specified requirements.

1.5 QUALITY ASSURANCE

- A. Applicator Qualifications: Minimum 3 years experience in work of this Section.
- B. Firestopping: Fire resistance rating equivalent to adjacent construction, per drawings; tested to ASTM E814, ASTM E1966, ASTM E2307, UL 1479, or UL 2079.
- C. Mockups:

3. Approved mockups may remain as part of the Work.

1.6 PROJECT CONDITIONS

- A. Do not apply sealants, mortars, or putties when temperature of substrate material and surrounding air is below 40 degrees F or is anticipated to drop below that temperature within 24 hours after installation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
 1. Hilti, Inc. (www.us.hilti.com)
 2. 3M Fire Protective Products. (www.3m.com)
 3. Nelson Firestop Products. (www.nelsonfirestop.com)
 4. Rectorseal. (www.rectorseal.com)
 5. Specified Technologies, Inc. (www.stifirestop.com)
 6. Tremco, Inc. (www.tremcosealants.com)
- B. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Firestopping: One or more of the following:
 1. Silicone elastomer compound: Single or multiple component, low modulus, moisture curing silicone sealant.
 2. Ceramic sealant: Single component, moisture curing ceramic sealant.
 3. Intumescent sealant: Single component, water based intumescent sealant.
 4. Acrylic sealant: Single component acrylic sealant, suitable for painting.
 5. Putty: Single component ceramic fiber base putty or intumescent elastomer putty that expands on exposure to surface heat gain.
 6. Mortar: Hydraulic cementitious mortar.
 7. Pillows or blocks: Formed intumescent or mineral fiber pillows or blocks.
 8. Intumescent strips: Solvent free intumescent wrap strips.
 9. Mechanical devices: Incombustible fillers or silicone elastomer covered with sheet stainless steel jacket, joined with collars, penetration sealed with flanged stops.
 10. Cast-in-place devices: Containing intumescent material and smoke/water seals.

2.3 ACCESSORIES

- A. Forming and Damming Materials: As recommended by firestopping manufacturer for intended use.
 1. Permanent: Mineral fiber board, mineral fiber matting, or mineral fiber putty.
 2. Temporary: Plywood, particle board, or other.

PART 3 EXECUTION

3.1 PREPARATION

- A. Prepare openings to receive firestopping as directed by manufacturer:
 1. Remove incidental and loose materials from penetration opening.
 2. Remove free liquids and oil from involved surfaces and penetration components.
 3. Install damming materials to accommodate and ensure proper thickness and fire rating requirements and provide containment during installation.
 4. Remove combustible materials and materials not intended for final penetration seal system.

3.2 INSTALLATION

- A. Install firestopping at perimeter of and penetrations through fire rated assemblies.
- B. Apply materials in accordance with manufacturer's instructions.
- C. Apply firestopping material in sufficient thickness to achieve required ratings.
- D. Compress fibered material to achieve a density of 40 percent of its uncompressed density.
- E. Place foamed material in layers to ensure homogenous density, filling cavities and spaces. Place sealant to completely seal junctions with adjacent dissimilar materials.
- F. Place intumescent coating in sufficient coats to achieve rating required.
- G. Remove dam material after firestopping material has cured.
- H. Finish exposed surfaces to smooth, flush appearance.

END OF SECTION

SECTION 07 9200
JOINT SEALERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Sealants and joint backing.
- B. Pre-compressed foam sealers.

1.02 RELATED SECTIONS

- A. Section 08 8000 - Glazing: Glazing sealants and accessories.
- B. Section 09 3000 - Tile: Sealant used with tile.

1.03 REFERENCES

- A. ASTM C 834 - Standard Specification for Latex Sealants; 2000.
- B. ASTM C 920 - Standard Specification for Elastomeric Joint Sealants; 1998.
- C. ASTM C 1193 - Standard Guide for Use of Joint Sealants; 2000.
- D. ASTM D 1667 - Standard Specification for Flexible Cellular Materials--Vinyl Chloride Polymers and Copolymers (Closed-Cell Foam); 1997.

1.04 SUBMITTALS

- A. Contact Contractor for submittal procedures.
- B. Product Data: Provide data indicating sealant chemical characteristics, performance criteria, substrate preparation, limitations, and color availability.
- C. Manufacturer's Installation Instructions: Indicate special procedures.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- B. Applicator Qualifications: Company specializing in performing the work of this section with minimum three years experience.

1.06 ENVIRONMENTAL REQUIREMENTS

- A. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

1.07 COORDINATION

- A. Coordinate the work with all sections referencing this section.

1.08 WARRANTY

- A. Correct defective work within a (5) five year period after Date of Substantial Completion.
- B. Warranty: Include coverage for installed sealants and accessories which fail to achieve airtight seal, exhibit loss of adhesion or cohesion, or do not cure.
- C. The Warranties submitted under this Section shall not deprive the Owner of other rights or remedies that the Owner may have under other provisions of the Contract Documents and the laws of governing jurisdictions and is in addition to and runs concurrently with other warranties made by the Contractor under requirements of the Contract Documents.

PART 2 PRODUCTS

2.01 SEALANTS

- A. General Purpose Exterior Sealant: Polyurethane; ASTM C 920, Grade NS, Class 25, Uses M, G, and A; single component.
 - 1. Color: Standard colors matching finished surfaces.
 - 2. Applications: Use for:
 - a. Control, expansion, and soft joints in masonry.
 - b. Joints between concrete and other materials.
 - c. Joints between metal frames and other materials.
 - d. Other exterior joints for which no other sealant is indicated.
- B. Exterior Expansion Joint Sealer: Pre-compressed foam sealer; urethane with water-repellent;
 - 1. Color: Black.
 - 2. Size as required to provide weather-tight seal when installed.
 - 3. Provide product recommended by manufacturer for traffic-bearing use.
 - 4. Applications: Use for:
 - a. Exterior wall expansion joints.
 - b. Horizontal pedestrian traffic joints.
- C. Exterior Metal Lap Joint Sealant: Butyl or polyisobutylene, nondrying, non-skinning, non-curing.
 - 1. Applications: Use for:
 - a. Concealed sealant bead in sheet metal work.
 - b. Concealed sealant bead in siding overlaps.

- D. General Purpose Interior Sealant: Acrylic emulsion latex; ASTM C 834, Type OP, Grade NF single component, paintable.
 - 1. Color: Standard colors matching finished surfaces.
 - 2. Applications: Use for:
 - a. Interior wall and ceiling control joints.
 - b. Joints between door and window frames and wall surfaces.
 - c. Other interior joints for which no other type of sealant is indicated.
- E. Tile Sealant: White silicone; ASTM C 920, Uses I, M and A; single component, mildew resistant.
 - 1. Applications: Use for:
 - a. Joints between plumbing fixtures and floor and wall surfaces.
 - b. Joints between kitchen and bath countertops and wall surfaces.
- F. Interior Floor Joint Sealant: Polyurethane, self-leveling; ASTM C 920, Grade P, Class 25, Uses T, M and A; single component.
 - 1. Approved by manufacturer for wide joints up to 1-1/2 inches.
 - 2. Color: Standard colors matching finished surfaces.
 - 3. Applications: Use for:
 - a. Expansion joints in floors.
- G. Concrete Paving Joint Sealant: Polyurethane, self-leveling; ASTM C 920, Class 25, Uses T, I, M and A; single component.
 - 1. Color: Gray.
 - 2. Applications: Use for:
 - a. Joints in sidewalks and vehicular paving.

2.02 ACCESSORIES

- A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.
- B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.
- C. Joint Backing: Round foam rod compatible with sealant; ASTM D 1667, closed cell PVC; oversized 30 to 50 percent larger than joint width.
- D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces are ready to receive work.

- B. Verify that joint backing and release tapes are compatible with sealant.

3.02 PREPARATION

- A. Remove loose materials and foreign matter which might impair adhesion of sealant.
- B. Clean and prime joints in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C 1193.
- D. Protect elements surrounding the work of this section from damage or disfigurement.

3.03 INSTALLATION

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Perform installation in accordance with ASTM C 1193.
- C. Measure joint dimensions and size joint backers to achieve the following, unless otherwise indicated:
 - 1. Width/depth ratio of 2:1.
 - 2. Neck dimension no greater than 1/3 of the joint width.
 - 3. Surface bond area on each side not less than 75 percent of joint width.
- D. Install bond breaker where joint backing is not used.
- E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
- F. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- G. Tool joints concave.
- H. Pre-compressed Foam Sealant: Do not stretch; avoid joints except at corners, ends, and intersections; install with face 1/8 to 1/4 inch below adjoining surface.

3.04 CLEANING

- A. Clean adjacent soiled surfaces.

3.05 PROTECTION OF FINISHED WORK

- A. Protect sealants until cured.

END OF SECTION

SECTION 08 1113

HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Hollow steel doors and frames.

B. Related Sections:

1. Division 01: Administrative, procedural, and temporary work requirements.
2. Section 08 7100 - Door Hardware.
3. Section 08 8000 - Glazing.

1.2 REFERENCES

A. American National Standards Institute (ANSI)/Steel Door Institute (SDI):

1. A250.8 - Recommended Specifications for Standard Steel Doors and Frames.
2. A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
3. A250.11 - Recommended Erection Instructions for Steel Frames.

B. ASTM International (ASTM):

1. A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
2. A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
3. C518 - Standard Test Method for Steady State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.

C. National Fire Protection Association (NFPA) 80 - Standard for Fire Doors and Fire Windows.

D. Steel Door Institute (SDI) 117 - Manufacturing Tolerances for Standard Steel Doors and Frames.

E. Underwriters Laboratories (UL):

1. 10B - Standard for Fire Tests of Door Assemblies.
2. 10C - Standard for Positive Pressure Fire Tests of Door Assemblies.

1.3 SUBMITTALS

A. Submittals for Review:

1. Shop Drawings: Show locations, elevations, dimensions, model designations, [fire] [thermal] [acoustical] ratings, preparation for hardware, and anchoring details.
2. Product Data: Show elevations, dimensions, gages of metal, hardware reinforcing gages and locations, and anchor types.

1.4 QUALITY ASSURANCE

A. Doors: ANSI/SDI A250.8.

1. Grade: III - Extra Heavy Duty, 16 gauge
2. Model: 1 - Full Flush
3. Exterior doors: Maximum thermal transmittance (U-value) of 0.50, tested to ASTM C518.

B. Frames: ANSI/SDI A250.8, Grade III - Extra Heavy Duty, 16 gauge

C. Fire Door and Frame Construction: Conform to UL 10B.

D. Installed Fire Rated Door and Frame Assemblies: Conform to NFPA 80.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Ship door frames with removable angle spreader; do not remove until frame is installed.
- B. Store doors upright in protected, dry area, off ground or floor, with at least 1/4 inch space between individual units.
- C. Do not cover with non-vented coverings that create excessive humidity.
- D. Remove wet coverings immediately.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:

1. Ceco Door. (www.cecodoor.com)
2. Curries. (www.curries.com)
3. Pioneer Industries, Inc. (www.pioneerindustries.com)
4. Steelcraft. (www.steelcraft.com)

B. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

A. Steel Sheet:

1. ASTM A1008/1008M, cold rolled.

B. Galvanized Steel Sheet:

1. ASTM A653/A653M, hot dipped, Structural Quality, Class G40 galvanized.

C. Door Core:

1. Exterior doors: Rigid polystyrene insulation
2. Interior fire-rated and non-fire rated doors: Resin impregnated fibrous honeycomb

2.3 ACCESSORIES

A. Glass, Glazing Sealers, and Accessories: Specified in Section 08 8000.

B. Primer: Zinc rich type.

2.4 FABRICATION

A. Fabricate doors and frames in accordance with ANSI/SDI A250.8.

B. Fabricate exterior doors and frames from galvanized steel sheet.

C. Doors:

1. Fabricate from minimum 16 gage sheets.
2. Close top and bottom edges of doors with steel channel, minimum 16 gauge, extending full width of door, and spot welded to both faces, with top channel flush and bottom channel recessed.

D. Frames:

1. Fabricate from minimum 16 gage sheets.
2. Close corner joints tight with trim faces mitered and face welded, full profile welded, or continuously welded and ground smooth.
3. Anchors:
 - a. Provide one anchor at each jamb for each 30 inches of door height.
 - b. Design anchors to provide positive fastenings to adjacent construction.
 - c. Provide one floor anchor welded to each jamb.
4. Where frames will be filled with concrete or grout, install silencers in frames before erection.

E. Accurately form to required sizes and profiles.

F. Grind and dress exposed welds to form smooth, flush surfaces.

G. Do not use metallic filler to conceal manufacturing defects.

H. Fabricate with internal reinforcement for hardware specified in Section 087100; weld in place.

I. Glazing Stops:

1. Manufacturer's standard, screw on type with mitered corners.
2. Form stops from minimum 20 gage steel; prefit for field glazing.
3. Locate screws within 1 inch of ends of stops and maximum 8 inches on center.
4. Install glazing stops on secure side of frames.

J. Design Clearances:

1. Between door and frame: Maximum 1/8 inch.
2. Between meeting edges of pairs of doors:
 - a. Non-fire rated doors: 3/16 inch plus or minus 1/16 inch.
 - b. Fire-rated doors: 1/8 inch plus or minus 1/16 inch.
3. Undercut:
 - a. Non-fire rated doors: Maximum 3/4 inch.
 - b. Fire-rated doors: Comply with NFPA 80.
4. Between face of door and stop: 1/16 to 3/32 inch.

K. Manufacturing Tolerances: In accordance with SDI-117.

2.5 FINISHES

- A. Dress tool marks and surface imperfections to smooth surfaces.
- B. Clean and chemically treat steel surfaces.
- C. Touch up damaged metallic coatings.
- D. Apply manufacturer's standard rust inhibiting primer paint, air-dried or baked on, meeting requirements of ANSI/SDI A250.10.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install doors and frames in accordance with ANSI/SDI A250.11.
- B. Set plumb and level.
- C. Secure to adjacent construction using fastener type best suited to application.
- D. Install glass as specified in Section 08 8000.
- E. Install hardware in accordance with Section 08 7100.

3.2 ADJUSTING

- A. Touch up minor scratches and abrasions in primer paint to match factory finish.

END OF SECTION

SECTION 08 1416

FLUSH WOOD DOORS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Wood veneer faced flush doors.
 - 2. Factory finishing.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.
 - 2. Section 08 7100 - Door Hardware.
 - 3. Section 08 8000 - Glazing.

1.2 REFERENCES

- A. Architectural Woodwork Institute/Architectural Woodwork Manufacturers of Canada/Woodwork Institute (AWI/AWMAC/WI) - Architectural Woodwork Standards.
- B. ASTM International (ASTM) E90 - Standard Test Method for Measurement of Airborne-Sound Transmission Loss of Building Partitions.
- C. Forest Stewardship Council (FSC) STD-40-004 - Chain of Custody Standard.
- D. National Fire Protection Association (NFPA) 80 - Standard for Fire Doors and Fire Windows.
- E. Underwriters Laboratories (UL):
 - 1. 10B - Standard for Fire Tests of Door Assemblies.
 - 2. 10C - Standard for Positive Pressure Fire Tests of Door Assemblies.

1.3 SUBMITTALS

- A. Submittals for Review:
 - 1. Shop Drawings: Show locations, elevations, dimensions, fire ratings, and preparation for hardware.
 - 2. Samples:
 - a. 6 x 6 inch door samples showing edges, core, and faces.
 - b. 12 x 12 inch veneer samples showing [specified] [selected] stain color and finish.
 - 3. Warranty: Sample warranty form.

1.4 QUALITY ASSURANCE

- A. Fire Door Construction: Conform to UL 10B or 10C.
- B. Installed Fire Rated Door Assembly: Conform to NFPA 80.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Package doors in heavy plastic with identifying marks; slit plastic wrap on site to permit ventilation, but do not remove from plastic until ready to install.
- B. Do not deliver doors until building is substantially water and weather tight. Store doors flat and level, with spacers between doors to allow for air circulation, in protected, dry area.

- C. Environmental Requirements: Maintain following conditions in building for minimum 7 days prior to, during, and after installation of doors:
 - 1. Temperature: 60 to 80 degrees F.
 - 2. Humidity: 25 to 55 percent.

1.6 WARRANTIES

- A. Furnish manufacturer's 2 year warranty providing coverage against:
 - 1. Defects in materials and workmanship.
 - 2. Warpage beyond specified amount.
 - 3. Telegraphing of core construction.
 - 4. Delamination of faces.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. Eggers Industries. (www.eggersindustries.com)
 - 2. VT Industries, Inc. (www.vtindustries.com)
 - 3. Marshfield Door Systems, Inc (www.marshfielddoors.com)
- B. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Flush Wood Doors:
 - 1. AWI/AWMAC/WI Architectural Woodwork Standards, Section 9.
 - 2. Core type:
 - a. Solid, fire rated: Fire-Resistant Composite Core.
 - b. Solid, non rated: Particleboard.
 - 3. Fire-rated doors: Provide treated edges on meeting stiles; metal astragals not acceptable.
 - 4. Wood veneer faces: Soft maple species, rotary cut, of quality suitable for transparent finish at Administration area (prefinished) and for painted finish to match existing at Classrooms. Refer to Door Schedule for finishes.
 - 5. Glazing beads: Formed metal.
 - 6. Adhesives: Water Resistant type.

2.3 ACCESSORIES

- A. Glass and Glazing Accessories: Specified in Section 08 8000.

2.4 FABRICATION

- A. Fabricate doors in accordance with AWI/AWMAC/WI Architectural Woodwork Standards, Section 9.
 - 1. Grade: Custom.
 - 2. Performance Level: Heavy Duty.
 - 3. Edge Type: Solid wood.
 - 4. Number of plies: 5.
- B. Prefitting; fit doors to frames at factory with following clearances:
 - 1. Fire rated doors:
 - a. Width: Cut lock edge only; 3/16 inch maximum.
 - b. Height: Cut bottom edge only; Conform to NFPA 80.
 - 2. Non-rated doors:
 - a. Width: Cut hinge and lock edges equally.
 - b. Height: Cut bottom edge only; maximum 3/4 inch.

3. Edge clearances:
 - a. Jambs and head: 1/8 inch maximum between door and frame.
 - b. Sills without thresholds: 1/8 inch maximum between door and top of finish floor.
 - c. Sills with thresholds: 1/4 inch maximum between door and top of threshold.
 - d. Meeting stiles of pairs: 1/8 inch maximum between doors.
4. Lock edge: Bevel 1/8 inch in 2 inches.

C. Premachining: Machine doors at factory to receive hardware specified in Section 08 7100.

2.5 FINISHES

- A. Factory Finishing:
1. Factory finish doors in accordance with AWI/AWMAC/WI Architectural Woodwork Standards, Section 5.
 2. Color: To be selected from manufacturer's full color range.
 3. Sheen: Satin.

PART 3 EXECUTION

3.1 PREPARATION

A. Condition doors to average humidity that will be encountered after installation.

3.2 INSTALLATION

- A. Install doors in accordance with AWI/AWMAC/WI Architectural Woodwork Standards. Install doors plumb and level.
- B. Field Fitting to Frames:
1. Fire rated doors:
 - a. Width: Cut lock edge only; 3/16 inch maximum.
 - b. Height: Cut bottom edge only; Conform to NFPA 80.
 2. Non-rated doors:
 - a. Width: Cut hinge and lock edges equally.
 - b. Height: Cut bottom edge only; maximum 3/4 inch.
 3. Edge clearances:
 - a. Jambs and head: 1/8 inch maximum between door and frame.
 - b. Sills without thresholds: 1/8 inch maximum between door and top of finish floor.
 - c. Sills with thresholds: 1/4 inch maximum between door and top of threshold.
 - d. Meeting stiles of pairs: 1/8 inch maximum between doors.
 4. Lock edge: Bevel 1/8 inch in 2 inches.
 5. Do not cut doors down to opening sizes smaller than those for which they were manufactured.
- C. Seal field cut surfaces.
- D. Install door hardware in accordance with Section 08 7100.
- E. Install glass as specified in Section 08 8000.
- F. Installation Tolerances:
1. Warp: Maximum 1/4 inch in any 3'-0" x 7'-0" portion of door, measured with taut string or straight edge on concave face of door.

END OF SECTION

SECTION 08 4113

ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Aluminum entrance doors and frames.
 - 2. Aluminum framed glazed storefronts.
 - 3. Glass infill panels.
 - 4. Door hardware.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.
 - 2. Section 07 9200 - Joint Sealers.
 - 3. Section 08 7100 - Door Hardware.
 - 4. Section 08 8000 - Glazing.

1.2 REFERENCES

- A. American Architectural Manufacturers Association (AAMA):
 - 1. CW-10 - Care and Handling of Architectural Aluminum from Shop to Site.
 - 2. 611 - Voluntary Specification for Anodized Architectural Aluminum.
 - 3. 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections.
- B. ASTM International (ASTM):
 - 1. B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
 - 2. B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
 - 3. B456 – Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium
 - 4. B633 – Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel
 - 5. E283 - Standard Test Method for Rate of Air Leakage through Exterior Windows, Curtain Walls and Doors.
 - 6. E330 - Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors under the Influence of Wind Loads.
 - 7. E331 - Standard Test Method for Water Penetration of Exterior Windows, Doors, and Curtain Walls by Uniform Static Air Pressure Differential.

1.3 SYSTEM DESCRIPTION

- A. Design Requirements: Design exterior systems to withstand:
 - 1. Design wind pressure in accordance with Building Code, with maximum allowable deflection of L/175, tested in accordance with ASTM E330.
 - 2. Movement caused by an ambient temperature range of 120 degrees F and a surface temperature range of 160 degrees F.
 - 3. Movement between storefront and adjacent construction.
 - 4. Dynamic loading and release of loads.
 - 5. Deflection of supports.
 - 6. Overhead structure deflection of 1/2 inch.

- B. Performance Requirements:
1. Air infiltration, tested to ASTM E283.
 - a. Entrances:
 - 1) Single door: Maximum 0.5 CFM per minute per linear foot of perimeter crack, at static pressure differential of 6.24 PSF.
 - b. Storefront: 0.06 CFM per square foot of fixed area at static pressure differential of 6.24 PSF.
 2. Water infiltration: No uncontrolled water leakage, tested to ASTM E331 at minimum test pressure of 8.0 PSF for outswing doors and storefront.
 3. Uniform structural loading: No glass breakage or permanent damage to fasteners or system components, tested to ASTM E330 at 1.5 times design pressure.
 4. Thermal transmittance due to conduction (Uc): Maximum 0.35 tested to AAMA 1503 on two 6'-0" x 6'-0" units with 1 inch low-e insulating glass.
 5. Condensation resistance factor (CRF): Minimum 68 tested to AAMA 1503.

1.4 SUBMITTALS

- A. Submittals for Review:
1. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, trim, sealers, hardware, and accessories.
 2. Samples:
 - a. 3 x 3 inch coating samples in specified color.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Minimum 10 years experience in work of this Section.
- B. Conform to 2012 Texas Accessibility Standards for locating hardware and for door opening force requirements.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Handle products in accordance with AAMA CW-10.

1.7 WARRANTIES

- A. Furnish manufacturer's 2 year warranty providing coverage against water leakage through storefront system and reduction of performance.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
1. Kawneer Co., Inc. (www.kawneer.com)
 2. EFCO Corporation. (www.efcocorp.com)
- B. Substitutions: Under Provisions of Division 01

2.2 MATERIALS

- A. Aluminum:
1. Extrusions: ASTM B221, 6063-T6 alloy and temper
- B. Fasteners:

1. Aluminum, nonmagnetic stainless steel or other materials to be non-corrosive and compatible with aluminum members trim hardware, anchors, and other components.
- C. Anchors, Clips and Accessories:
 1. Aluminum, nonmagnetic stainless steel, or zinc coated steel or iron complying with ASTM B633 for SC 3 severe service conditions or other suitable zinc coating; providing sufficient strength to withstand design pressure indicated.
- D. Reinforcing members:
 1. Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.
- E. Sealant:
 1. For sealants required within fabricated storefront system, provide permanently elastic, non-shrinking, and non-migrating type recommended by sealant manufacturer for joint size and movement.

2.3 COMPONENTS

- A. Design Basis for Fixed Exterior Aluminum Framed Windows and Doors:
 1. Trifab 451T
 2. Glass: Center Plane
 3. Doors: 350 Medium Silte
 4. Kawneer Co., Inc. (www.kawneer.com)
 5. Substitutions: Under Provisions of division 01
- B. Door Hardware: Specified in Section 08 7100
- C. Glazing:
 1. Specified in Section 08 8000.

2.4 ACCESSORIES

- A. Fasteners:
 1. Series 300 stainless steel for wet locations and exposed fasteners.
 2. Stainless or fluoropolymer coated steel for other locations.
- B. Joint Sealers: Specified in Section 07 9200.
- C. Glass and Glazing Accessories: Specified in Section 08 8000.
- D. Weatherstripping: Replaceable, as recommended by manufacturer

2.5 FABRICATION

- A. Fabricate with minimal clearances and shim spaces around perimeter.
- B. Accurately fit and secure joints and intersections. Make joints flush, hairline, and weathertight.
- C. Fabricate in largest practical units.
- D. Conceal fasteners and attachments from view.

- E. Fabricate fascias, covers, closures, flashings, and trim members from same material as storefront.
- F. Fabricate aluminum components with integral low conductance thermal barrier located between exterior and interior exposed components that eliminates metal-to-metal contact.
- G. Doors:
 - 1. Mechanically fastened and welded corner construction.
 - 2. Fabricate stiles and rails of minimum 0.125 inch thick extrusions and glass stops from minimum 0.050 inch thick extrusions.
 - 3. Provide weatherstripping at door head, jambs, meeting stiles, and sills.
 - 4. Prepare with internal reinforcements for door hardware.

2.6 FINISHES

- A. Aluminum: AAMA 611, Architectural Class I anodized to 0.0007 inch minimum thickness
 - 1. Refer to Finish Schedule in Specifications for color selection.
 - 2. Note that exterior door 101A shall have color finish equal to Kawneer Permadyze. Refer to Finish Schedule.
- B. Apply bituminous coating to aluminum surfaces in contact with cementitious materials.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions and approved Shop Drawings.
- B. Install components plumb and level, in proper plane, free from warp and twist.
- C. Anchor to supporting construction.
- D. Set thresholds and sill members exposed to weather in mastic and secure.
- E. Install hardware using templates provided by manufacturer.
- F. Install glass and accessories in accordance with Section 08 8000.
- G. Installation Tolerances:
 - 1. Maximum variation from plumb or level: 1/8" in 3 feet or 1/4" in any 10 feet, whichever is less.
 - 2. Maximum misalignment of members abutting end to end: 1/32 inch.
 - 3. Sealant space between framing members and adjacent construction: 1/2 inch plus or minus 1/8"

3.2 ADJUSTING

- A. Adjust hardware for smooth operation.
 - 1. Adjust doors to operate with max. opening forces in accordance with applicable accessibility code.
- B. Touch up minor scratches and abrasions to match original finish.
- C. Adjust weatherstripping to contact appropriate surfaces and form weather seal.

END OF SECTION

**SECTION 08 7100
DOOR HARDWARE**

PART 1 GENERAL

1.01 SECTION INCLUDES

Hardware for swinging, sliding, and folding doors except special types of unique and non-matching hardware specified in other sections.

1.02 RELATED WORK

- A. Section 08 11 13 – Hollow Metal Door Frames
- B. Section 08 21 11 – Flush Wood Doors
- C. Section 08 4113 – Aluminum Framed Entrances & Storefronts

1.03 REFERENCES

- A. ADA - Americans with Disabilities Act of 1990 including Accessibility Guidelines as amended by the D.O.J. September 15, 2010, as adopted by the Authority Having Jurisdiction (AHJ).
- B. ANSI A117.1 - Buildings and Facilities - Providing Accessibility and Usability for Physically Handicapped People.
- C. ANSI/BHMA A156 (.1 through .21)
- D. ANSI/DHI – A115.IG Installation Guide for Doors and Hardware.
- F. NFPA 80 - Fire Doors and Windows.
- G. NFPA 101 – Life Safety Code
- H. IBC - International Building Code, as adopted by public Authority Having Jurisdiction (AHJ).
- I. State and local Rules and Regulations for Barrier Free Facilities, as adopted by AHJ.

1.04 DOOR HARDWARE TYPES

- A. Types of finish hardware required include, but is not necessarily limited to, the following:
 - 1. Hinges.
 - 2. Lock cylinders.
 - 3. Keys, keying, and key control.
 - 4. Locksets, latchsets, and privacy sets.
 - 5. Closers.
 - 6. Overhead, wall, and floor stops.
 - 7. Protection plates.
 - 8. Gasketing for exterior and interior doors, as required.
 - 9. Silencers.
 - 10. Automatic ADA door operators.
- B. Refer to Part 2 Products for Manufacturer's identification and allowable substitutions.

1.05 SUBMITTALS

- A. Under provisions of Section 01 34 00, submit the following:
 - 1. Product information: Manufacturer's published technical product data for all specified door hardware items indicating compliance with the requirements.
 - 2. Hardware Schedule:
 - a. Hardware schedules are intended for the Contractor's coordination of the work. Review and acceptance by the Architect or Owner does not relieve the Contractor of his exclusive responsibility to fulfill the requirements as shown and specified.
 - b. Submit hardware schedule in the manner and format as specified, complying with the actual construction progress schedule requirements for each draft. Include the following information:

- 1) Explanation of all abbreviations, symbols, codes, at the like, including door handing.
 - 2) Type, style, function, size, and finish of each hardware item.
 - 3) Door and frame sizes and materials cross referenced to the Architect's marks in the door schedule.
 - 4) Room identification (name and number) on each side of door opening as indicated on the drawings.
 - 5) Product name, model number, description, and name of manufacturer of each item.
 - 6) Fastenings and other pertinent information.
 - 7) Locations of hardware cross referenced to architectural floor plans and door schedules.
 - 8) Mounting heights and locations of each type of hardware.
3. Key Schedule:
 - a. Key schedule, cylinders, keying and installation shall be done by the TGC facility locksmith.
 4. Samples: Upon request, submit actual material samples.
 5. Templates: Hardware supplier will furnish hardware templates to the Contractor for each fabricator of doors, frames, and other work to be shop prepared or factory prepared for the installation of hardware. Upon request check shop drawings of such other work, to conform that adequate provisions are made for proper location and installation of hardware.
- B. Under provisions of Section 01 70 00, submit the following:
1. Product information.
 2. Hardware schedule.
 3. Manufacturer's published operation and maintenance data. Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.
 4. Tools and extra materials as required.
 5. Manufacturer's warranties, revise to meet criteria as established within this section. Warranty periods shall commence upon acceptance of the building by the owner. Where warranties listed exceed the manufacturer's standard warranty, obtain in writing an extended warranty to meet the requirements above and as noted. If the manufacturer will not meet these requirements, and another approved manufacturer will comply, supply the alternate approved manufacturer.

1.06 QUALITY ASSURANCE

- A. Acceptable Designs:
1. Items specified in this section are products which are of acceptable design.
 2. Do not substitute products without Architect's written prior approval per Section 01 60 00. Requests for approval shall be submitted by factory authorized distributor firms representing the products proposed for substitution. Items that are noted to allow no substitution are matching existing materials and the owner's material inventory for servicing the facility.
- B. Qualifications:
1. Manufacturer: Manufacturers named in Part 2 of this section with not less than 5 years experience in manufacturing commercial door hardware of the type indicated.
 2. Hardware Supplier:
 - a. A recognized architectural finish hardware supplier who has been furnishing hardware in the same state as the project for a period of not less than 5 years.
 - b. Hardware supplier's organization shall include an experienced Architectural Hardware Consultant (AHC), certified by the Door and Hardware Institute (DHI), who is physically available, at reasonable times during the course of the work, for consultation about project's hardware requirements, to Owner, Architect and Contractor. Mail or telephone correspondence is not acceptable.
 - c. Hardware supplier shall have local warehousing facilities and shall maintain an adequate parts inventory of items supplied for future service to the owner. Supplier will be a factory authorized distributor of all hardware specified.

3. Installer: Company specializing in installing work of this section with not less than 5 years experience and acceptable to the manufacturers and the hardware supplier. Maintain regular work force of qualified personnel, trained, skilled, and experienced in installing door hardware and constant, competent supervision per the requirements of the General Contractor. Hardware installer shall meet with the representatives of the General Contractor and hardware supplier to jointly inventory all hardware items. Upon satisfactory inventory of products, the hardware installer accepts responsibility for all hardware items inventoried.
- C. Regulatory and Operational Requirements:
1. Provide hardware for all openings, whether specified or not, in compliance with NFPA Standard No. 80, proper operation and local building code requirements. Where required provide only hardware which has been tested and listed by UL or FM for types and sizes of doors required and complies with requirements of door and door frame labels. Label hardware, as required, for compliance with pressure testing criteria as dictated in IBC.
 2. Provide hardware which meets or exceeds handicap accessibility per local building code requirements. Conform to the Americans with Disabilities Act (ADA) of 1990 as amended by the D.O.J. September 15, 2010, as adopted by the Authority Having Jurisdiction (AHJ).

1.07 DELIVERY, STORAGE, HANDLING, AND PROTECTION

- A. Deliver, store, handle, and protect products to project site under provisions of Section 01600 and as specified herein.
- B. Require hardware supplier to:
1. Tag each item or package separately, with identification related to final hardware schedule.
 2. Include manufacturer's basic installation instructions with each item or package.
 3. As material is received by hardware supplier from various manufacturers, sort and repackage in containers with each item clearly marked with appropriate opening numbers to match the approved hardware schedule. Two or more identical items may be packed in the same container.
 4. Deliver individually packaged hardware items at the proper times to the proper locations (shop or project site) for installation.
 5. Inventory hardware jointly with representatives of the General Contractor, hardware supplier and the hardware installer until each is satisfied that count is correct.
- C. Protect hardware from theft by cataloging and storing in a secure and lockable area. Control the handling and installation of hardware items which are not immediately replaceable, so that the completion of the work will not be delayed by hardware losses, both before and after installation. Replace lost, missing, damaged, or stolen door hardware items at no additional cost to the Owner as required to meet schedule requirements.

1.08 SEQUENCING AND SCHEDULING

- A. Coordinate work of this section with the work of other sections of work under provisions of Section 01 04 00
- B. Furnish hardware templates to each fabricator of doors, frames, and other work to be shop or factory prepared for the installation of hardware.
- C. Verify completeness and suitability of door hardware with the hardware supplier and the hardware installer.

1.09 MAINTENANCE MATERIALS

- A. Under provisions of Section 01 70 00, furnish to Owner a complete set of special wrenches and tools applicable to each different or special hardware component as needed for Owner's continued adjustment, maintenance, removal, and replacement of door hardware.
- B. Special tools and accessories shall be supplied by the hardware component manufacturer.

PART 2 PRODUCTS

2.01 MATERIALS AND FABRICATION

- A. General:
 - 1. Provide all door hardware for complete work, in accordance with the drawings and as specified herein. Note that existing (2) exterior doors on west side on building shall have all finish hardware replaced.
 - 2. Quantities listed, in any instance, are for the Contractor's convenience only and are not guaranteed.
 - 3. Provide items and quantities not specifically mentioned to ensure a proper and complete operational installation. Match the quality and finish of items specified.
 - 4. Provide miscellaneous hardware as listed in hardware groups.
 - 5. All hardware is to be anti-ligature type.
- B. Hand of door: Drawings show direction of slide, swing or hand of each door leaf. Door schedule indicates door and frame sizes, materials, required fire ratings, and other pertinent information. Furnish each item of hardware for proper installation and operation of door movement as indicated.
- C. Manufacturer's Name Plate: Do not use manufacturer's products which have manufacturer's name or trade name displayed in a visible location (omit removable name plates), except in conjunction with required UL or FM labels and as otherwise acceptable to the Architect. Manufacturer's identification will be permitted on rim of lock cylinders and latch faceplates only.
- D. Base Metals: Produce hardware units of basic metal and forming method indicated, using manufacturer's standard metal alloy, composition, temper and hardness, but in no case of lesser (commercially recognized) quality than specified for applicable hardware units by applicable ANSI A156 series standard for each type hardware item and with ANSI A156.18 for finish designations indicated. Do not furnish "optional" materials or forming methods for those indicated, except as otherwise specified.
- E. Fasteners: Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation. Do not provide hardware which has been prepared for self-tapping sheet metal screws, except as specifically indicated.
 - 1. Screws: Furnish manufacturer's standard security head screws.
 - 2. Concealed Fasteners: Provide concealed fasteners for hardware units which are exposed when door is closed, except to extent no standard units of type specified are available with concealed fasteners. Do not use thru-bolts for installation where bolt head or nut on opposite face is exposed in other work, except where it is not feasible to adequately reinforce the work. In such cases, provide sleeves for each thru-bolt or use sex screw fasteners.

2.02 HINGES

- A. Manufacturer:
 - 1. Listed in Door Hardware Schedule: Stanley
 - 2. Approved Substitutions: Hager, McKinney or approved equal prior to bidding.
 - 3. Continuous hinges are as manufactured by Stanley. Equals by Select or ABH are acceptable (required on main entry door).
- B. Templates: Except for hinges and pivots to be installed entirely (both leaves) into wood doors and frames, provide only template produced units.
- C. Screws: Furnish Phillips flat head or machine screws for installation of units, except furnish Phillips flat head or wood screws for installation of units into wood. Finish screw heads to match surface of hinges.
- D. Pin Tips: Hospital type.
- E. Continuous hinges are to be warranted for a period of two years.

2.03 LOCK CYLINDERS

- A. Manufacturer:
 - 1. Listed in Door Hardware Schedule: Sargent
 - 2. Substitutions: None – facility standard
- B. Contact the Owner's locksmith that will provide, key and install all lock cylinders as required.

Provide temporary construction cores as needed for security during the construction phase. These cylinders shall be returned to the hardware supplier once the permanent cylinders are installed.

- C. Construct lock cylinder parts from brass/bronze, stainless steel, or nickel silver.

2.04 KEYS, KEYING, AND KEY CONTROL

A. Keys:

1. Material: Provide keys of nickel silver only.
2. Quantities: These quantities are to establish a maximum allowable quantity of cut keys to service the project and may not necessarily be assigned as noted. A lesser quantity of cut keys required will not result in any credits, nor a quantity of uncut keys to be issued unless noted otherwise.
 - a. 3 change keys per each cylinder unit.
 - b. New keys shall coordinate with exist grand master & master keys.

B. Keying:

1. Comply with Owner's written instructions for masterkeying and, except as otherwise indicated, provide individual change keys for each lock which is not designated to be keyed alike with a group of related locks. All keying and required materials shall be provided by the Owner's locksmith.
2. Grandmaster key all cylinder items to coordinate with the Owner's instructions. Existing system is Sargent, verify. Confirm series with the Owner and match accordingly. Permanently inscribe each key with the notation "DO NOT DUPLICATE".

2.05 LOCKSETS, LATCHSETS, AND PRIVACY SETS:

A. Manufacturer:

1. Listed in Door Hardware Schedule: Best 9K
2. Approved Substitutions: Sargent 10-Line or approved equals prior to bidding

B. Types: Locksets, latchsets, and privacy sets as indicated in Door Hardware Schedule.

C. Strikes: Provide manufacturer's standard wrought box strike for each latch or lock bolt. Provide dust-proof strikes for foot bolts, except where not available. At these locations, provide manufacturer's standard recessed strike. Provide roller type strikes where recommended by lock, latch or bolt manufacturer. If aluminum frames are specified, confirm with the aluminum frame supplier that the standard lock strikes will function. Provide the manufacturer's standard extended lip strikes if required.

D. Lock Throw: Provide 3/4" minimum throw of mortise type latches and deadbolts used. Cylindrical latches will be 1/2" minimum. Comply with UL requirements for throw of bolts and latch bolts on rated fire openings.

E. Locks and latches shall be warranted for a period of five years.

2.06 CLOSERS:

A. Manufacturer:

1. Listed in Door Hardware Schedule: Stanley QDC100
2. Approved Substitutions: 4040 XP-DA, Dorma 8916-DA

B. Size of Units: Except as otherwise specifically indicated, comply with the manufacturer's recommendations for size of door control unit, depending on the size of the door, exposure to weather and anticipated frequency of use.

C. Provide manufacturer's standard through bolt attachment where door construction is not adequate for support.

D. Arms:

1. All closers shall be concealed overhead with dead stop feature. Multi-Purpose Room & Staff Office doors shall also have hold-open feature.

E. Mount all closers to the maximum allowable degree of opening by the closer manufacturer's template. Where closer arms incorporate dead stop features, mount closers to the maximum

degree of opening available before conflict with adjacent structures. If not apparent on the contract documents, verify the use of open space with the Architect or Owner's Representative to determine the maximum allowable degree of opening.

- F. Access Free Manual Closers: Where manual closers are indicated for doors required to be accessible to the physically handicapped, provide adjustable units complying with ANSI A117.1 provisions for door opening force. Fire protection has precedence over handicap compatibility, check with local jurisdiction.
- G. Closers shall have the manufacturer's standard adjustable delayed action feature.
- H. Automatic ADA door operator with time clock override is required on main entry door.
- I. Door closers and related hardware shall be warranted for a period of twenty-five years or lifetime. Electronic closers shall be warranted for a period of two years.

2.08 WALL AND FLOOR STOPS

- A. Manufacturers:
 - 1. Listed in Door Hardware Schedule: Trimco
 - 2. Approved Substitutions: Rockwood, DonJo or approved equal prior to bidding.
- B. General: Except as otherwise indicated, provide stops (wall, floor or overhead) at each leaf of every swinging door leaf.

2.09 OVERHEAD STOPS

- A. Manufacturer:
 - 1. Listed in Door Hardware Schedule: ABH
 - 2. Approved Substitutions: Glynn Johnson, Dorma or approved equal prior to bidding.
- B. Mount stops to the maximum degree of opening available before conflict with adjacent structures, or, if adjacent structures are not considered, to the maximum allowable by stop manufacturer's template.
- C. If not apparent on the contract documents, verify the use of open space with the Architect or Owner's Representative to determine the maximum allowable degree of opening.
- D. Overhead stops shall integrate with the concealed overhead closer as specified.
- E. Overhead stops shall be warranted for a period of two years.

2.10 SILENCERS

- A. Manufacturers:
 - 1. Listed in Door Hardware Schedule: Trimco
 - 2. All non-fire rated hollow metal door frames require silencers.
 - 3. Approved Substitutions: Hager, Ives or approved equal prior to bidding.

2.11 FINISHES

- A. Exposed surfaces of hardware shall be Dark Anodized, Satin Bronze, Oil Rubbed (US10B) unless noted otherwise.
- B. The designations used in the schedule and elsewhere to indicate hardware finishes are the industry recognized standard commercial finishes common to the product's manufacturer listed.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Under provisions of Section 01 0400, examine and verify that substrates and project site conditions are ready to receive work of this section.
- B. Do not begin installation until finishes indicated to be field applied have been applied to doors, frames, and similar items requiring project site finishing and are thoroughly dry and cured.

- C. Do not begin installation until unsatisfactory conditions are corrected in a manner acceptable to the installer. Beginning installation means installer accepts project site conditions and substrates as ready to receive work of this section.

3.02 **INSTALLATION**

- A. General: Types and approximate quantities of door hardware required for this project are indicated at the end of this section.
- B. Key Cabinet: Install in location as indicated on drawings or as directed by the Architect.
- C. Heights: Mount hardware units at heights indicated in "Recommended Locations for Builders Hardware for /standard Steel Doors and Frames" by the Door and Hardware Institute, except as specifically indicated or required to comply with governing regulations, and except as may be otherwise directed by the Architect.
- D. Substrates: Adjust and reinforce attachment substrates as necessary for proper installation and operation of hardware.
- E. Installation:
 - 1. Install each hardware item in compliance with the manufacturer's instructions, requirements of NFPA 80, NFPA 101, IBC, ADA, State Rules and Regulations for Barrier Free Facilities and recommendations of the DHI.
 - 2. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
 - 3. Drill and countersink units which are not factory prepared for fasteners. Space fasteners and anchors in accordance with industry standards.
 - 4. Where not factory machined, machine cut for hardware per template, as required.
 - 5. Cut and fit thresholds and floor covers to profile of door frames. Join units with concealed welds. Cut smooth openings for spindles, bolts, or similar items. Screw thresholds to substrate with the manufacturer's standard machine screws/expansion anchors (MS/EA) unless otherwise noted. Fill cavities of thresholds at sound rated openings with 1 inch thick (uncompressed thickness) low density fiberglass sill sealer insulation full width and length of the threshold. In addition to fastening requirements, set thresholds for exterior doors in a full bed of butyl-rubber or polyisobutylene mastic sealant.
 - 6. Do not install hardware which is incomplete or apparently improper for application. Notify the hardware supplier immediately of any such deficiencies. Failure to comply with this requirement indicates the hardware installer's acceptance of responsibility for proper application and performance.
- F. Cutting and Patching:

Wherever cutting and fitting is required to install hardware onto or into surfaces which are later to be painted or finished in another way, coordinate removal, storage and reinstallation or application of surface protections with finishing work specified in the Division-9 sections.

3.03 **ADJUSTING**

- A. Initial Adjustment:
 - 1. Adjust and check each operating item of hardware and each door, to ensure proper operation or function of every unit. Adjust resilient faced sound stops for continuous contact with door and threshold. Adjust weatherstripping and sweeps to completely seal doors with frames and to adjacent structures.
 - 2. Replace units which cannot be adjusted to operate freely and smoothly as intended for the application made.
- B. Final Adjustment: Wherever hardware installation is made more than one month prior to acceptance or occupancy of a space or area, return to the work during the week prior to acceptance or occupancy, and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.

3.04 **DEMONSTRATION**

Instruct Owner's personnel in proper adjustment and maintenance of hardware and hardware finishes, during the final adjustment of hardware.

3.05 CLEANING AND DEBRIS

- A. Cleaning:
 - 1. Clean work under provisions of Section 01 7000
 - 2. Clean adjacent surfaces soiled by work of this section.
- B. Debris: Under provisions of Section 01 5000, remove debris from project site and legally dispose of off-site.

3.06 MAINTENANCE

- A. Approximately six months after the acceptance of hardware in each area, the hardware installer shall:
 - 1. Return to the project and re-adjust every item of hardware to restore proper function of doors and hardware.
 - 2. Consult with and instruct Owner's personnel in recommended additions to the maintenance procedures.
 - 3. Replace hardware items which have deteriorated or failed due to faulty design, materials or installation of hardware units.
 - 4. Prepare a written report of current and predictable problems (of substantial nature) in the performance of the hardware and submit to the Architect.

3.07 PROTECTION

Under provisions of Section 01 5000, protect work of this section as required so that work will be without damage or deterioration at the time of completion and acceptance by the Owner.

3.08 DOOR HARDWARE

List of Manufacturers

AB	ABH Corporation	Overhead Stops
BE	Best Access Systems	Locks
BY	By Others	Cylinders
DM	Dorma	Electric Strikes, Auto Operator
NA	National Guard	Weatherstrip, Thresholds
PR	Precision	Exit Devices, Power Supplies
RC	Rutherford Controls	Operator Switches
ST	Stanley	Hinges, Door Closers, Wire Harnesses
TK	Telkee	Key Cabinet
TR	Trimco	Stops, Flat Goods

Finish Codes

<u>Code</u>	<u>Description</u>
626, 652	Brushed Chrome
628	Clear Anodized Aluminum
313	Dark Anodized Aluminum
613 (US10B)	Oxidized Satin Bronze, Oil Rubbed
630	Satin Stainless Steel
689	Painted Aluminum
695	Painted Dark Bronze
GREY	Grey

Option List

<u>Code</u>	<u>Description</u>
C	Quick Connect Wiring Option (Precision)
CD	Cylinder Dogging (Precision)
LD	Less Dogging (Precision)
FL	Fire Exit Hardware (Precision)
TS	Touchbar Monitoring Switch (Precision)
MLR	Motorized Latch Retraction (Precision)
LM	Latchbolt Monitor (Dorma)
N Mounting	Spanner Through Bolt Mounting (Trimco)
B4E	Beveled 4 Edges - Kick and Mop Plates (Trimco)
CS	Counter Sinking of Kick and Mop Plates (Trimco)
MS/EA	Machine Screws/Expansion Anchors (NGP)
SMS-TEKS	Self-Drilling Machine Screws (NGP)

3.09 BID ALLOWANCE

Refer to Spec. Section 01 2200 for Finish Hardware Allowance.

End of Section

SECTION 08 8000

GLAZING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Glass for other sections referencing this Section.
 - 2. Unframed mirrors.

- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.
 - 2. Section 08 1113 – Hollow Metal Door Frames
 - 3. Section 08 1416 - Flush Wood Doors
 - 4. Section 08 4113 - Aluminum Framed Storefronts

1.2 REFERENCES

- A. American Architectural Manufacturers Association (AAMA) 800 - Voluntary Specifications and Test Methods for Sealants.

- B. American National Standards Institute (ANSI) Z97.1 - Safety Performance Specifications and Methods of Test for Safety Glazing Material Used in Buildings.

- C. ASTM International (ASTM):
 - 1. C509 - Standard Specification for Elastomeric Cellular Preformed Gasket and Sealing Material.
 - 2. C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers.
 - 3. C920 - Standard Specification for Elastomeric Joint Sealants.
 - 4. C1036 - Standard Specification for Flat Glass.
 - 5. C1048 - Standard Specification for Heat-Treated Flat Glass-Kind HS, Kind FT, Coated and Uncoated Glass.
 - 6. C1115 - Standard Specification for Dense Elastomeric Silicone Rubber Gaskets and Accessories.
 - 7. C1184 - Standard Specification for Structural Silicone Sealants.
 - 8. E163 – Standard Test Method for Fire Tests of Window Assemblies
 - 9. E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings.
 - 10. E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation.

- D. Consumer Product Safety Commission (CPSC) 16 CFR 1201 - Safety Standard for Architectural Glazing Materials.

- E. Glass Association of North America (GANA):
 - 1. Engineering Standards Manual.
 - 2. Glazing Manual.

- F. National Fenestration Rating Council (NFRC):
 - 1. 100 - Procedure for Determining Fenestration Product Thermal Properties.
 - 2. 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficients at Normal Incidence.
 - 3. 300 - Procedures for Determining Solar Optical Properties of Simple Fenestration Products.

1.3 SYSTEM DESCRIPTION

- A. Glass Thicknesses:
 1. Indicated thicknesses are minimums; select actual glass thicknesses by analyzing loads and conditions.
 2. Size glass to withstand positive and negative wind pressure acting normal to plane in accordance with Building Code.
 3. Provide glass in thicknesses and strengths to meet or exceed following criteria:
 - a. Use the procedure specified in ASTM E1300 to determine glass type and thickness.
- B. Thermal and Optical Performance Properties: Provide glass meeting specified performance properties, based on manufacturer's published test data for units of thickness indicated:
 1. U-factor: Per NFRC 100 expressed as Btu/square foot x hour x degree F.
 2. Solar heat gain coefficient: Per NFRC 200.
 3. Solar optical properties: Per NFRC 300.

1.4 SUBMITTALS

- A. Submittals for Review:
 1. Product Data: Descriptive data and performance attributes for insulated glass.
 2. Samples:
 - a. 12 x 12 inch glass samples.
 - b. 1/4 x 1/4 x 3 inch long sealant samples showing available colors.
 3. Warranty: Sample warranty form.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Minimum 5 years experience in work of this Section.
- B. Regulatory Requirements:
 1. Provide safety glass for locations subject to human impact as required by Building Code.
 2. Safety glass: Tested and labeled to CPSC 16 CFR 1201.
- C. Perform Work in accordance with GANA Glazing Manual and FGMA Sealant Manual for glazing installation methods.
- D. Fire Rated Glass Assemblies: Conform to ASTM E163

1.6 PROJECT CONDITIONS

- A. Perform glazing when ambient temperature is above 40 degrees F.
- B. Perform glazing on dry surfaces.

1.7 WARRANTIES

- A. Insulating Glass Units: Provide manufacturer's 5 year warranty against material obstruction of vision through unit due to:
 1. Intrusion of dust or moisture.
 2. Internal condensation.
 3. Film formation on internal glass surfaces caused by failure of hermetic seal except failure caused in whole or in part by breakage or fracturing of any portion of glass surface.
- B. Mirrors: Provide manufacturer's 5 year warranty against silver spoilage resulting from manufacturing defects.
- C. The warranties submitted under this sections shall not deprive the Owner of other rights or remedies that the Owner may have under other provisions of the Contract Documents and the laws of

governing jurisdictions and is in addition to and runs concurrently with other warranties made by the Contractor under requirement of the Contract Documents.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers - Glass:
 - 1. Vitro Architectural Glass (www.vitroglazings.com)
- B. Substitutions: Under provisions of Division 01.

2.2 MATERIALS - GLASS

- A. Clear Glass: ASTM C1036, Type 1 transparent flat, Class 1 clear, Quality q3 glazing select.
- B. Insulated Window Glass:
 - 1. Design Basis: Solarban 60 Atlantica
 - 2. Sealed, insulated units with Low-E coating.
 - 3. Max. SHGC 0.27
 - 4. Max. U-Factor 0.32
- C. Clear Tempered Glass: ASTM C1048, Type 1 transparent flat, Class 1 clear, Quality q3 glazing select, Kind FT fully tempered.
- D. Mirror Glass: ASTM C1036, Type I transparent flat, Class 1 clear, Quality q1 mirror select, Edges to be ground and polished.
- E. Fire Rated Glass (where scheduled)
 - 1. Type: Specially tempered glass, clear, of fire resistance ratings indicated
 - 2. Source: Equal to FireLite Plus Glazing System or approved substitute

2.3 ACCESSORIES

- A. Setting Blocks and Spacers: ASTM C864, neoprene or EPDM, or ASTM C1115 silicone.
- B. Glazing Gaskets:
 - 1. Dense compression gaskets: ASTM C864, neoprene or EPDM, or ASTM C1115, silicone or thermoplastic polyolefin rubber, molded or extruded shape to fit glazing channel retaining slot; black color.
 - 2. Soft compression gaskets: ASTM C509, Type II, black, molded or extruded, neoprene, EPDM, silicone or thermoplastic polyolefin rubber, of profile and hardness required to maintain watertight seal; black color.
- C. Mirror Attachment Accessories: refer to drawings and schedules.

2.4 FABRICATION

- A. Annealed Glass: Comply with ASTM C1036.
- B. Tempered Glass:
 - 1. Comply with ASTM C1048.

2. Process in horizontal position so that inherent roller distortion will run parallel to building floor lines after installation.
- C. Sealed Insulating Glass:
1. Comply with ASTM E2190.
 2. Fabricate spacer bar frame of tubular aluminum filled with desiccant.
 3. Bond spacer bar frame to glass panes with twin primary seals.
 4. Fill space outside frame to glass edge with elastomeric sealant.
- D. Low-E Coated Glass: Apply low-emissivity coating to scheduled glass surface.
- E. Mirror Glass:
1. Apply one coat of silver, one coat of electroplated copper, and one coat of organic mirror backing compound to back surface of glass.
 2. Grind and polish edges.
- F. Fabrication Tolerances: ASTM C1036 and ASTM C1048.
- G. Glass Identification:
1. Apply manufacturer's label indicating type and thickness to each light of glass. Show position of exterior face when installed, where applicable.
 2. Etch manufacturer's label on each light of tempered glass.

PART 3 EXECUTION

3.1 PREPARATION

- A. Clean glazing rabbets; remove loose and foreign matter.
- B. Remove protective coatings on metal surfaces.
- C. Clean glass just prior to installation.

3.2 INSTALLATION - GENERAL

- A. Install glass in accordance with glass manufacturer's instructions.
- B. Install glass in accordance with recommendations and procedures in GANA Glazing Manual and FGMA Sealant Manual
- C. Maintain manufacturer's recommended edge and face clearances between glass and frame members.

3.3 PROTECTION

- A. After installation, mark glass with an 'X' using removable plastic tape.

END OF SECTION

SECTION 09 2900
GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Metal stud wall framing.
- B. Metal channel ceiling framing.
- C. Acoustic insulation.
- D. Gypsum wallboard.
- E. Joint treatment and accessories.
- F. Textured finish system.

1.02 REFERENCES

- A. ASTM C 36/C 36M - Standard Specification for Gypsum Wallboard; 1999.
- B. ASTM C 475 - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 1994.
- E. ASTM C 630/C 630M - Standard Specification for Water-Resistant Gypsum Backing Board; 1996a.
- F. ASTM C 645 - Standard Specification for Nonstructural Steel Framing Members; 1999.
- G. ASTM C 665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 1998.
- H. ASTM C 754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 1999a.
- I. ASTM C 840 - Standard Specification for Application and Finishing of Gypsum Board; 1999.
- J. Application of Gypsum Panel Products or Metal Plaster Bases; 1998.
- K. ASTM E 90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 1999.
- L. ASTM E 413 - Classification for Rating Sound Insulation; 1987 (Reapproved 1999).
- M. GA-216 - Application and Finishing of Gypsum Board; Gypsum Association; 2000.
- N. GA-600 - Fire Resistance Design Manual; Gypsum Association; 2000.

1.03 SYSTEM DESCRIPTION

- A. Acoustic Attenuation for Interior Partitions Indicated as Acoustic: Thickness as indicated on the drawings.

1.04 SUBMITTALS

- A. See Division 01 - Administrative Requirements, for submittal procedures.

- B. Product Data: Provide data on metal framing.
- C. Samples: Submit two samples of gypsum board finished with proposed texture application, 12x12 inch in size, illustrating finish and texture.

1.05 **QUALITY ASSURANCE**

- A. Perform in accordance with ASTM C 840. Comply with requirements of GA-600 for fire-rated assemblies.
- B. Applicator Qualifications: Company specializing in performing the work of this section with minimum three years of experience.

PART 2 PRODUCTS

2.01 **MANUFACTURERS**

- A. Gypsum Board:
 - 1. G-P Gypsum Corporation: www.gp.com.
 - 2. National Gypsum Company: www.nationalgypsum.com.
 - 3. USG Corporation: www.usg.com.
 - 4. Substitutions: See Section 01600 - Product Requirements.

2.03 **GYPSON BOARD MATERIALS** (refer to partition schedules for exact locations)

- A. Regular Gypsum Board: ASTM C1396; 48 inches wide x 5/8 inch thick, maximum practical length, tapered edge.
- B. Fire Resistant Gypsum Board: ASTM C1396, Type X; 48 inches wide x 5/8 inch thick, maximum practical length, tapered edge; apply to fire rated assemblies.
- C. Fiberglass-Mat Faced Gypsum Tile Backing Board: ASTM C1178, Type X:
 - 1. 5/8 inch DensShield Fireguard Tile Backer, Georgia-Pacific Gypsum
 - 2. Thickness: 5/8 inch
 - 3. Width: 4 feet
 - 4. Surfacing: Coated fiberglass mat on face, back and long edges

2.04 **ACCESSORIES**

- A. Acoustic Insulation: ASTM C 665; preformed glass fiber, friction fit type, unfaced. Full thickness.
- B. Acoustic Sealant: Non-hardening, non-skinning, for use in conjunction with gypsum board.
- C. Corner Beads: Galvanized steel.
- D. Edge Trim: Bead type(s) as detailed.
- E. Joint Materials: ASTM C 475 and as recommended by gypsum board manufacturer for project conditions.
 - 1. Ready-mixed vinyl-based joint compound.
- F. Textured Finish Materials: Latex-based compound; plain.
- G. Screws: ASTM C 1002; self-drilling type; cadmium-plated for exterior locations.
- H. Nails: ASTM C 514.
- I. Anchorage to Substrate: Tie wire, nails, screws, and other metal supports, of type and size to suit application; to rigidly secure materials in place.
- J. Adhesive for Attachment to Wood: ASTM C 557.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that project conditions are appropriate for work of this section to commence.

3.02 ACOUSTIC ACCESSORIES INSTALLATION

- A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.
- B. Acoustic Sealant: Install in accordance with manufacturer's instructions.
 - 1. Place one bead continuously on substrate before installation of perimeter framing members.
 - 2. Place continuous bead at perimeter of each layer of gypsum board.
 - 3. Seal around all penetrations by conduit, pipe, ducts , and rough-in boxes.

3.03 GYPSUM BOARD INSTALLATION

- A. Comply with ASTM C 840 , and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.
- B. Single-Layer Non-Rated: Install gypsum board vertically, with ends and edges occurring over firm bearing.
- C. Single-Layer Fire-Rated: Install gypsum board vertically, with edges and ends occurring over firm bearing.
- D. Double-Layer Installation: Use gypsum backing board for first layer, placed perpendicular to framing or furring members. Use fire rated gypsum backing board for fire rated partitions and ceilings. Place second layer perpendicular to first layer. Offset joints of second layer from joints of first layer.
- E. Installation on Metal Framing: Use screws for attachment of all gypsum board except face layer of non-rated double-layer assemblies, which may be installed by means of adhesive lamination.
- F. Moisture Protection: Install moisture resistant board in areas called for in 2.03B above, as indicated on the drawings. Treat cut edges and holes in moisture resistant gypsum board with sealant.

3.04 INSTALLATION OF TRIM AND ACCESSORIES

- A. Control Joints: Place control joints consistent with lines of building spaces and as indicated. Verify locations with architect.
 - 1. Not more than 30 feet apart on walls and ceilings over 50 feet long.
- B. Corner Beads: Install at external corners, using longest practical lengths.
- C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials and as indicated.

3.05 JOINT TREATMENT

- A. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
 - 1. Feather coats of joint compound so that camber is maximum 1/32 inch.
 - 2. Taping, filling, and sanding is not required at surfaces behind adhesive

applied ceramic tile, and fixed cabinetry.

3.06 **TEXTURE FINISH**

A. Level 4 finish with light rolled on texture.

3.07 **TOLERANCES**

A. Maximum Variation of Finished Gypsum Board Surface from True Flatness:
1/8 inch in 10 feet in any direction.

END OF SECTION

SECTION 09 3000

TILING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Ceramic and Porcelain tile floor and wall finishes.
 - 2. Interior panel/sheathing behind wall tile.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.
 - 2. Section 07 9200 - Joint Sealers.

1.2 REFERENCES

- A. American National Standards Institute (ANSI):
 - 1. A108/A118/A136.1 - American National Standard for Installation of Ceramic Tile.
- B. ASTM International (ASTM):
 - 1. C144 - Standard Specification for Aggregate for Masonry Mortar.
 - 2. C150 - Standard Specification for Portland Cement.
 - 3. C207 - Standard Specification for Hydrated Lime for Masonry Purposes.
 - 4. C1028 - Standard Test Method for Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method.
 - 5. D4263 - Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method.
- C. Tile Council of North America (TCNA) - Handbook for Ceramic Tile Installation.

1.3 SUBMITTALS

- A. Submittals for Review:
 - 1. Product Data: Manufacturer's installation, cleaning, and maintenance instructions. Literature for wall panels behind tile.
 - 2. Samples:
 - a. Tile: Full size samples in each color.
 - b. Grout: 1/2 x 1/2 x 3 inch long samples showing available colors.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Minimum 10 years experience in work of this Section.
- B. Tile Units: Meet ANSI A137.1, Standard Grade.
- C. Static Coefficient of Friction for Floor Tile: Minimum 0.60, tested to ASTM C1028 in dry condition.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver mortar, adhesive, and grout containers bearing hallmark certifying compliance with reference standards.
- B. Protect adhesive containers from freezing and overheating according to manufacturer's instructions.

1.6 PROJECT CONDITIONS

- A. Environmental Requirements: Maintain minimum ambient temperature of 50 degrees F during and after installation.

1.7 MAINTENANCE

- A. Extra Materials: One unopened carton of each tile.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Floor and Wall Tile
 - 1. Design Basis: Refer to Finish Schedule in Specifications
 - 2. Equivalent products by following manufacturers are acceptable:
 - a. American Marazzi Tile, Inc. (www.marazzitile.com)
 - b. American Olean Tile Co., Inc. (www.aotile.com)
 - c. Interceramic USA. (www.interceramicusa.com)
 - d. Summitville Tiles, Inc. (www.summitville.com)
- B. Acceptable Manufacturers - Setting and Grouting Materials:
 - 1. BASF Corporation. (www.buildingsystems.basf.com)
 - 2. Bostik, Inc. (www.bostik-us.com)
 - 3. Laticrete International, Inc. (www.laticrete.com)
 - 4. Mapei Corporation. (www.mapei.us)
- C. Acceptable Manufacturers – Waterproofing and Crack Isolation Membrane
 - 1. Mapei Corporation. (www.mapei.us)
- D. Acceptable Manufacturers for wall panels behind tile - Basis for design:
 - 1. Georgia Pacific
- E. Substitutions: Under provisions of Division 01

2.2 MATERIALS

- A. Floor Tile
 - 1. Refer to Finish Schedule in Specifications

- B. Wall Tile
 - 1. Refer to Finish Schedule in Specifications
- C. Wall panels behind tile
 - Georgia Pacific, Dens Armor Plus 5/8" thick interior wall panels.

2.3 ACCESSORIES

- A. Latex-Portland Cement Mortar: ANSI A118.4, polymer modified dry set type.
- B. Dry Set Portland Cement Mortar: ANSI A118.1, polymer modified dry set type.
- C. Epoxy Adhesive:
 - 1. ANSI A118.3, thin set bond type.
- D. Portland Cement: ASTM C150, Type 1.
- E. Sand: ASTM C144, clean, free of organic matter.
- F. Lime: ASTM C207, Type S, hydrated.
- G. Water: Clean, potable.
- H. Grout: ANSI A118.6, polymer modified dry set type, sanded.
- I. Joint Sealers: Specified in Section 07 9200.
- J. Joint Tape: Waterproof, perforated bedding tape.
- K. Waterproofing and Crack Isolation Membrane
 - 1. Mapelastic AquaDefense – Mapei Corporation
- L. Aluminum Tile Edge Protection:
 - 1. Schluter Systems aluminum edge protection trim pieces shall be installed at all exposed tile edges. Verify required trim profiles and heights. Trim shall be required at inside corners, outside corners, top of wainscot, top of wall or transitions to other wall finish materials, etc.

PART 3 EXECUTION

3.1 PREPARATION

- A. Clean surfaces to remove loose and foreign matter that could impair adhesion.
- B. Remove ridges and projections. Fill voids and depressions with patching compound compatible with setting materials.
- C. Allowable Substrate Tolerances:
 - 1. Thin set method:
 - a. Maximum variation in substrate surface: 1/8 inch in 8 feet.
 - b. Maximum height of abrupt irregularities: 1/32 inch.
- D. Test concrete substrate to ASTM D4263; do not install tile until surfaces are sufficiently dry.
- E. Follow all MFG's requirements for preparation of subflooring prior to installing tile products.

3.2 INSTALLATION

- A. Install waterproof membrane in accordance with manufacturer's instructions.
- B. Methods:
 - 1. Walls: ANSI A108.6, thin set with epoxy adhesive.
 - a. Apply waterproofing and crack isolation membrane to 4'-0" A.F.F. in accordance with manufacturer's instructions.
 - b. Apply reinforcing fabric at floor/wall intersections
 - 2. Thin set floors: ANSI A108.5, thin set with latex-portland cement mortar.
 - a. Apply waterproofing and crack isolation membrane in accordance with manufacturer's instructions.
- C. Minimize pieces less than one half size. Locate cuts to be inconspicuous.
- D. Lay tile to pattern. Do not interrupt tile pattern through openings.
- E. Joint Widths:
 - 1. Tile: 1/16 inch.
- F. Make joints watertight, without voids, cracks, excess mortar, or excess grout.
- G. Fit tile around projections and at perimeter. Smooth and clean cut edges. Ensure that trim will completely cover cut edges.
- H. Install Trim:
 - 1. Inside corners: Cove units.
 - 2. Outside corners: Bead units.
 - 3. Base: Base units, coved
 - 4. Top of wall tile: Bullnose units.
- I. Install thresholds where tile abuts dissimilar floor finish. Center on door or opening.
- J. Allow tile to set for a minimum of 48 hours before grouting.
- K. Grout tile joints in accordance with ANSI A108.10 without excess grout.

3.3 ADJUSTING

- A. Remove and replace pieces that have been damaged during installation.

3.4 PROTECTION

- A. Provide protection for completed work using nonstaining sheet coverings.
- B. Prohibit traffic on tile floors for minimum 3 days after installation.

END OF SECTION

SECTION 09 5100

SUSPENDED ACOUSTICAL CEILINGS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Suspended 24" x 24" metal ceiling grid system.
 - 2. 24" x 24" Lay-In panels
 - 3. 24" x 48" Acoustical panels.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.

1.2 REFERENCES

- A. ASTM International (ASTM):
 - 1. A641 - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
 - 2. C635 - Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings.
 - 3. C636 - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.
 - 4. E1264 - Standard Classification of Acoustical Ceiling Products.
- B. Ceiling and Interior Systems Construction Association (CISCA) - Ceiling Systems Handbook.
- C. Underwriters Laboratories, Inc. (UL) - Fire Resistance Directory.

1.3 SUBMITTALS

- A. Submittals for Review:
 - 1. Manufacturer Product information for Acoustical Panels and Grid System

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Minimum 5 years experience in work of this Section.

1.5 PROJECT CONDITIONS

- A. Environmental Requirements: Install in approximately same conditions of temperature and humidity as will prevail after installation.

1.6 MAINTENANCE

- A. Extra Materials: One unopened carton of each acoustical panel.

PART 2 PRODUCTS

2.1 MANUFACTURERS:

- A. Acceptable Manufacturers - Acoustical Units:
 - 1. Primacoustic <https://www.primacoustic.com/nimbus/>
- B. Acceptable Manufacturers - Suspension System:

1. Armstrong World Industries, Inc. (www.armstrong.com)
 2. USG (www.usg.com)
- C. Acceptable Manufacturers – Ceiling Lay-in Panels:
1. Armstrong World Industries, Inc. (www.armstrong.com)
 2. USG (www.usg.com)
- D. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Suspension Grid System: Prelude by Armstrong
1. ASTM C635, die cut, interlocking ends.
 2. Grid type: Exposed T.
 3. Material: Galvanized metal
 4. Runners: 1-1/2 inches high, 15/16 inch exposed width, flush profile.
 5. Perimeter molding: Angle shape.
 6. Finish: Factory applied enamel paint, sprayed and baked, color as selected.
 7. Accessories: Stabilizer bars, clips, splices, and other as required.
- B. Acoustical Panels: Nimbus Ceiling by Primacoustic (<https://www.primacoustic.com/nimbus/>)
1. Size: 24 x 48 inches x 1 1/2 inch thick.
 2. Edge configuration: Square
 3. Performance requirements: Tested in accordance with ASTM E1264. NRC .70; CAC 40.
 4. These panels will be hung 2" below insulated metal ceiling per manufacturer's instructions.
 5. Finish: Surface shall be field painted. Refer to Finish Schedule 01 1001.
 6. Bid Quantity: Contractor shall include a quantity of 25 each acoustical panels. Exact location and mounting heights shall be determined at a later date.
- C. Acoustical Lay-in Panels: School Zone Fine Fissured by Armstrong
1. Size: 24 x 24 inches x 3/4 inch thick.
 2. Edge configuration: Beveled tegular
- Performance requirements: Tested in accordance with ASTM E1264. NRC .70; CAC 40.

2.3 ACCESSORIES

- A. Support Channels:
1. Galvanized steel; size and type to suit application.
- B. Hanger Wire:
1. ASTM A641, minimum 12 gage galvanized steel.
- C. Hold Down Clips: Minimum 24 gage spring steel, manufacturer's standard profile.
- D. Impact Clips: Minimum 24 gage spring steel, manufacturer's standard profile.
- E. Touch-Up Paint: Color to match acoustical panels and suspension grid.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install ceilings in accordance with ASTM C636 and CISCA Handbook.
- B. Install acoustic panels in accordance with manufacturer's instructions, in pattern shown on reflected ceiling plan.

- C. Minimize panels less than one half size.
- D. Install molding around perimeters and abutting surfaces. Miter molding at exterior corners; cut flanges and bend web to form interior corners.
- E. Space hanger wires maximum 48 inches on center. Install additional hangers where required to support light fixtures and ceiling supported equipment.
- F. Do not suspend hangers directly from metal deck. Attach steel channel horizontally to adjacent framing members; place hanger at regular spacing.
- G. Hang suspension system independent of walls, columns, ducts, pipes, and conduit.
- H. Where ducts or other equipment prevent regular spacing of hangers:
 - 1. Reinforce nearest related hangers to span extra distance, or:
 - 2. Suspend steel channel horizontally beneath duct or equipment; place hanger at regular spacing.
- I. Install main tees at maximum 48 inches on center.
- J. Install cross tees to form 24 x 24 inch modules. Lock cross tees to main tees.
- K. Support ends of tees on flange of perimeter molding.
- L. Cutting Acoustic Units:
 - 1. Cut to fit irregular grid and perimeter edge trim and around penetrations.
 - 2. Locate cuts to be concealed.
 - 3. Cut and field paint exposed edges of reveal edge units to match factory edge.
- M. Place hold down clips over cross tees at mid point of each module.
- N. Installation Tolerances: Ceilings level to 1/8 inch in 12 feet measured in any direction.

3.2 ADJUSTING

- A. Touch up minor scratches and abrasions to match factory finish.

END OF SECTION

SECTION 09 6513

RESILIENT BASE

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Resilient wall base.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.

1.2 REFERENCES

- A. ASTM International (ASTM) F1861 - Standard Specification for Resilient Wall Base.
- B. Resilient Floor Covering Institute (RFCI) – Floor Score Certification Program.

1.3 MAINTENANCE

- A. Extra Materials: One unopened carton of each profile and color.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Design Basis: Contract Documents are based on products by Armstrong (www.armstrong.com)
- B. Equivalent products by following manufacturers are acceptable:
 - 1. Allstate Rubber Corp. (www.allstaterubber.com)
 - 2. Burke Flooring. (www.burkeflooring.com)
 - 3. Johnsonite, Inc. (www.johnsonite.com)
 - 4. Roppe Corp. (www.roppe.com)
- C. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Resilient Base:
 - 1. Type: ASTM F1861, thermoset vulcanized rubber.
 - 2. Thickness: 0.080
 - 3. Profile: Coved.
 - 4. Height: 4 inches.
 - 5. Length: Continuous rolls.
 - 6. Color: Refer to Finish Schedules at the front of the specifications manual.
 - 7. Finish: Satin.

2.3 ACCESSORIES

- A. Adhesive:
 - 1. Water based, waterproof, recommended by base manufacturer.

PART 3 EXECUTION

3.1 PREPARATION

- A. Prepare surfaces to receive base:
 - 1. Remove materials that could interfere with adhesion.
 - 2. Fill low spots with patching compound; finish flush with adjacent surface.
 - 3. Remove high spots, ridges and nibs.

3.2 INSTALLATION

- A. Apply adhesive continuously to back of base.
- B. Maintain top edge true to line and bottom edge in continuous contact with floor. Butt joints tight; butt base tight to adjacent construction.
- C. Do not install pieces less than 6 inches long.
- D. Miter and butt inside corners.
- E. At outside corners "V" cut back of base to 2/3 of its thickness and bend around corner.
- F. At exposed ends, install premolded units.
- G. Scribe to door frames and other interruptions.

END OF SECTION

SECTION 09 6519
RESILIENT TILE FLOORING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Resilient tile and plank flooring.
 - 2. Reducers.
 - 3. Grounding tape.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.

1.2 REFERENCES

- A. ASTM International (ASTM):
 - 1. D2047 - Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine.
 - 2. E648 - Standard Test Method for Flooring Radiant Panel Test.
 - 3. F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
 - 4. F970 - Standard Test Method for Static Load Limit.
 - 5. F1066 - Standard Specification for Vinyl Composition Tile.
 - 6. F1344 - Standard Specification for Rubber Floor Tile.
 - 7. F1700 - Standard Specification for Solid Vinyl Floor Tile.
 - 8. F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
 - 9. F2195 - Standard Specification for Linoleum Floor Tile.
- B. Resilient Floor Covering Institute (RFCI) – Floor Score Certification Program.

1.3 SUBMITTALS

- A. Submittals for Review:
 - 1. Product Data: Provide data on specified products, describing physical and performance characteristics.
- B. Quality Control Submittals:
 - 1. Certificates of Compliance: Certification from an independent testing laboratory that flooring meets fire hazard classification requirements.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Minimum 10 years experience in work of this Section.
- B. Fire Hazard Classification: Class I rated, tested to ASTM E648.
- C. Static Coefficient of Friction: Minimum 0.5, tested to ASTM D2047.

1.5 PROJECT CONDITIONS

- A. Maintain temperature in spaces to receive flooring between 70 and 90degrees F for 24 [] hours before, during, and for minimum 48 hours after installation.

- B. Maintain minimum temperature of 55 degrees F after flooring is installed, except as otherwise specified.

1.6 MAINTENANCE

- A. Extra Materials: One unopened carton of each type.

PART 2 PRODUCTS

2.1 MANUFACTURERS / MATERIALS

- A. Acceptable Manufacturers - Refer to Finish Schedule for Design Basis

2.2 ACCESSORIES

- A. Reducer Strips: Solid vinyl or rubber composition, 1 inch wide by flooring thickness, tapered, color to be selected from manufacturer's full color range.
- B. Leveling Compound: White, premixed, latex based.
- C. Adhesive:
 - 1. Water based, waterproof, recommended by flooring manufacturer.
- D. Grounding Tape: 1/2 inch wide copper tape.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that concrete floors have cured a minimum 28 days and do not exhibit negative alkalinity, carbonization, or dusting.

3.2 PREPARATION

- A. Clean substrate to ASTM F710.
- B. Fill cracks, voids, and depressions in substrate with leveling compound.
- C. Grind off high spots and projections in substrate; leave smooth and level to 1/4 inch in 10 feet.
- D. Test substrate for moisture content to ASTM F1869; do not install flooring until moisture emission level is acceptable to flooring manufacturer.

3.3 INSTALLATION OF TILE

- A. Install in accordance with manufacturer's instructions.
- B. Mix materials from multiple containers to ensure shade variations are consistent when flooring is placed.
- C. Spread only enough adhesive to permit installation of flooring before initial set.
- D. Lay flooring with joints parallel to building lines to produce symmetrical pattern.
- E. Install flooring to pattern indicated. Allow minimum half-size units at room or area perimeter.

- F. Set flooring in place; press with heavy roller to attain full adhesion.
- G. Scribe flooring to walls, columns, cabinets, and other appurtenances to produce tight joints. Ensure that base, trim, plates, or escutcheons will completely cover cut edges.
- H. Extend flooring into recesses and under equipment.
- I. Terminate flooring at centerline of door openings where adjacent floor finish is dissimilar.
- J. Install grounding tape at static-dissipating flooring in accordance with manufacturer's instructions. Ground to building ground system.

3.4 INSTALLATION OF REDUCER STRIPS

- A. Install where tile stops with edge exposed; set in adhesive.
- B. Center strips under doors where flooring terminates at door openings.
- C. Install in longest practical lengths; butt ends tight.
- D. Scribe to abutting surfaces.

3.5 ADJUSTING

- A. Correct tiles that are not seated; replace damaged tiles.

3.6 CLEANING

- A. Clean flooring, wax tile (not plank) and machine buff in accordance with manufacturer's instructions.

3.7 PROTECTION

- A. Do not allow traffic on flooring until adhesive has set.
- B. Cover areas subject to traffic with protective covering.

END OF SECTION

SECTION 09 6813

TILE CARPETING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Tile carpeting.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.

1.2 REFERENCES

- A. ASTM International (ASTM):
 - 1. D2859 - Standard Test Method for Flammability of Finished Textile Floor Covering Materials.
 - 2. D4258 - Standard Practice for Surface Cleaning Concrete for Coating.
 - 3. E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 4. E648 - Standard Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source.
 - 5. E662 - Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.
 - 6. F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
- B. Carpet and Rug Institute (CRI):
 - 1. 104 - Standard for Installation Specification of Commercial Carpet.
 - 2. Indoor Air Quality Testing Program.
- C. National Fire Protection Association (NFPA) 253 - Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source.

1.3 SUBMITTALS

- A. Submittals for Review:
 - 1. Warranty: Sample warranty form.
- B. Quality Control Submittals:
 - 1. Certificates of Compliance: Certification from an independent testing laboratory that carpet tiles meet fire hazard classification requirements.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Minimum 10 years experience in work of this Section.
- B. Fire Hazard Classification: Class I rated, tested to NFPA 253.

1.5 PROJECT CONDITIONS

- A. Do not begin installation until painting and finishing work have been completed.
- B. Environmental Requirements:
 - 1. Temperature of spaces and subfloor between 65 and 90 degrees F.
 - 2. Humidity in spaces to receive carpet tiles between 20 and 65 percent.

1.6 WARRANTIES

- A. Furnish manufacturer's warranty providing coverage against defective materials and workmanship.

1.7 MAINTENANCE

- A. Extra Materials: One unopened carton of each tile.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers - Carpet Tiles:
 - 1. Design Basis: Patcraft

Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Carpet Tiles: Refer to Finish Schedule for patterns/colors and manufacturer.

2.1 ACCESSORIES

- A. Adhesive:
Waterproof, latex based cement formulated specifically for installing carpet tiles; recommended by carpet tile manufacturer.
- A. Edgings: Preformed rubber, or approved substitute, profile required to suit conditions, color to match carpet tiles.
- B. Leveling Compound: Premixed, latex based.

PART 3 EXECUTION

3.2 EXAMINATION

- A. Verify that concrete floors have cured a minimum 28 days and do not exhibit negative alkalinity, carbonization, or dusting.

3.3 PREPARATION

- A. Clean substrate; remove loose and foreign matter that could impede adhesion or performance of flooring.
- B. Fill cracks, voids, and depressions with leveling compound.
- C. Grind ridges and high spots smooth.
- D. Test substrate for moisture content to ASTM F1869; do not install carpet tiles until moisture emission level is acceptable to carpet tile manufacturer.

3.4 INSTALLATION OF CARPET TILES

- A. Install in accordance with CRI 104.
- B. Install carpet tile and adhesive in accordance with manufacturers' instructions.
- C. Blend carpet tiles from different cartons to ensure minimal variation in color match.
- D. Lay out each room or area to minimize tiles less than one half size.

- E. Cut tile clean. Fit tiles tight to intersection with vertical surfaces without gaps.
- F. Lay carpet tile to basket weave pattern, with tile direction alternating to next unit, set parallel to building lines.
- G. Locate change of color or pattern between rooms under door centerline.
- H. Fully adhere carpet tiles to substrate.
- I. Bind cut edges where not concealed by edge strips.

3.5 INSTALLATION OF EDGINGS

- A. Install strips where carpet tiles abut dissimilar flooring materials; secure to subfloor. Discuss with architect prior to installation!
- B. Center strips under doors where carpet tiles terminate at door openings.
- C. Install in longest practical lengths; butt ends tight.
- D. Scribe to abutting surfaces.

3.6 CLEANING

- A. Clean spots as recommended by carpet tile manufacturer.
- B. Cut off loose threads flush with top surface.
- C. Clean with commercial vacuum cleaner.

END OF SECTION

SECTION 09 7800

FIBERGLASS REINFORCED PANELS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Prefinished FRP (Fiberglass Reinforced Plastic) wall panels for decorative and/or sanitary environments.

1.2 ENVIRONMENTAL CONDITIONS

- A. Building should be fully enclosed prior to installation with sufficient heat (70°) and ventilation consistent with good working conditions for finish work.

1.3 SUBMITTALS

- A. Submittals for Review:
 - a. Samples: 6 x 6 inch panel showing selected color.

1.4 DELIVERY AND STORAGE OF MATERIALS

- A. Materials are to be factory packaged on strong pallets. All materials are to be stored lying flat, under cover and protected from the elements. Panels should be allowed to acclimate to room temperature (70°) for 48 hours prior to installation.

1.5 WARRANTY

- A. All products shall be warranted to be free from defects for a period of 30 days after delivery.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Design Basis: Contract Documents are based on products by:
 - Marlite, 202 Harger St.
 - Dover, OH 44622
 - 330.343.6621 (www.marlite.com)
- B. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. FRP Wall Panels:
 - 1. Type: Glass fiber reinforced plastic, USDA approved for incidental food contact.
 - 2. Size: 3/32 inch thick x 48 inches wide x 9 feet long.
 - 3. Color: S100 S/2/S White
 - 4. Surface texture: Smooth.

2.3 ACCESSORIES

- A. Trim:
 - 1. One piece extruded PVC, manufacturer's standard profile.
 - 2. Inside and outside corners, and J-molding (no trim at vertical joints between panels).
 - 3. Color: To match panels

- B. Adhesive:
 - 1. Compatible with panels and substrate; recommended by panel manufacturer.
 - 2. C-551 Marlite FRP Adhesive is available in 3 ½ gallon cans. A water-resistant, non-flammable adhesive, C-551 meets ASTM Specification C557
 - 3. C-375 Marlite Construction Adhesive is available 3 ½ gallon cans. A strong, flexible, water-resistant, solvent based adhesive formulated for fast, easy application, C-375 meets ASTM Specification C557
- C. Joint Sealer:
 - 1. As supplied and recommended by manufacturer.
 - 2. Marlite® Brand Color Match Sealant, Colors available to coordinate with Marlite Panels.
 - 3. Divisions between panels will not use a trim piece. These 1/8" joints will be caulked with same color as panel.
- D. Patching Compound: White latex type.

PART 3 EXECUTION

3.1 PREPARATION

- A. Prepare substrate to receive panels:
 - 1. Remove high spots.
 - 2. Fill low spots with patching compound; sand smooth.
 - 3. Remove loose and foreign matter that could impair adhesion.

3.2 CONDITIONING

- A. Panels should be opened and allowed to acclimate for 48 hours prior to installation.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Caulk joints: Panel-to-panel joints
- C. Install trim:
 - 1. Internal and external corners.
 - 2. Exposed edges: J molding.
 - 3. Secure to substrate.
- D. Cut panels to fit perimeter and around penetrations. Ensure that trim will completely cover cut edges.
- E. Maintain 1/8 to 3/16 inch expansion space at perimeter and around penetrations.
- F. Adhere panels to substrate with full bed of adhesive.
- G. Install continuous bead of joint sealer between panels and trim and between trim and adjacent construction.

3.4 MAINTENANCE

Wipe down using a damp cloth and mild soap solution or cleaner. Refer to manufacturer's specific cleaning recommendations. Do not use abrasive cleaners.

END OF SECTION

SECTION 099100

PAINTING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Interior Paints and Coatings
 - a. Drywall: Gypsum board.
 - b. Masonry: Concrete Masonry Units
 - 2. Interior High Performance Paints and Coatings:
 - a. Masonry: Concrete Masonry Units
 - b. Metal Ferrous: Decks, structural steel, joists, trusses, beams, and similar items including dryfall coatings.
 - c. Drywall: Gypsum board
 - 3. Exterior Paints and Coatings
 - a. Metal Ferrous: Structural steel, beams, trusses, metal panels, steel doors and frames
 - b. Masonry: Concrete masonry units
 - 4. Surface preparation and field application of paints.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.

1.2 REFERENCES

- A. Green Seal, Inc. (GS) 11 - Standard for Paints and Coatings.
- B. Master Painters Institute (MPI)- Architectural Painting Specification Manual.
- C. Society for Protective Coatings (SSPC) - Painting Manual.

1.3 SUBMITTALS

- A. Submittals for Review:
 - 1. Product Data: Manufacturer's data on materials proposed for use including:
 - a. Product designation and grade.
 - b. Product analysis and performance characteristics.
 - c. Standards compliance.
 - d. Material content.
 - e. Mixing and application procedures.
 - 2. Paint Schedule: Indicate types and locations of each surface, paint materials, and number of coats to be applied.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.
- B. Materials, Preparation, and Workmanship: Conform to MPI Painting Manual.
- C. Mockup: Provide a mock-up for evaluation of surface preparation techniques and application workmanship
 - 1. Finish surfaces for verification of products, colors and sheens

2. Finish area designated by Architect
3. Provide samples that designate primer and finish coats.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Container Labels: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage rates, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- B. Paint Materials: Store at ambient temperature from 45 to 90 degrees F in ventilated area, or as required by manufacturer's instructions.

1.6 PROJECT CONDITIONS

- A. Do not apply materials when surface and ambient temperatures or relative humidity are outside ranges required by paint manufacturer.
- B. Maintain ambient and substrate temperatures above manufacturer's minimum requirements for 24 hours before, during, and after paint application.
- C. Do not apply materials when relative humidity is above 85 percent or when dew point is less than 5 degrees F different than ambient or surface temperature.
- D. Provide lighting level of 30 foot candles at substrate surface.

1.7 MAINTENANCE

- A. Extra Materials: 1 gallon of each color and sheen.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
 1. Sherwin Williams. (www.sherwin-williams.com)
- B. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Paints and Coatings:
 1. Unless otherwise indicated, provide factory-mixed coatings. When required, mix coatings to correct consistency in accordance with manufacturer's instructions before application. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.
- B. Primers: Where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by manufacturer.
- C. Coating Application Accessories: Provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials required, per manufacturer's specifications.
- D. Color: Refer to Finish Schedule for paint colors, and as selected.

2.3 ACCESSORIES

- A. Accessory Materials: Paint thinners and other materials required to achieve specified finishes; commercial quality.

- B. Patching Materials: Latex filler.
- C. Fastener Head Cover Materials: Latex filler.
- D. Gypsum Board Texture

2.4 MIXES

- A. Deliver paints pre-mixed and pre-tinted.
- B. Uniformly mix to thoroughly disperse pigments.
- C. Do not thin in excess of manufacturer's recommendations.
- D. Re-mix paint during application; ensure complete dispersion of settled pigment and uniformity of color and gloss.

2.4 PAINT SYSTEMS

A. Drywall – Gypsum Board Interior Walls

1. Latex Systems

a. Eg-Shel Finish

- 1) 1st Coat: S-W Harmony Interior Latex Primer, B11 (4mils wet, 1.3 mils dry)
- 2) 2nd Coat: S-W Harmony Interior Latex Eg-Shel, B9 Series
- 3) 3rd Coat: S-W Harmony Interior Latex Eg-Shel, B9 Series

B. Metal –

1. , Steel doors, frames and front canopy structure: Alkyd Systems (Water based):

a. Semi-Gloss Finish

- 1) 1st Coat: S-W Pro Industrial Pro-Cryl Universal Primer, B66-1310 Series (5.0 mils wet, 2.0 mils dry)
- 2) 2nd Coat: S-W Industrial Water Based Alkyd Urethane Enamel Semi-Gloss, B53-1150 Series

2. Exposed interior structural steel columns, joists, trusses, beams: Dryfall Waterborne Topcoat:

a. Eg-Shel Finish

- 1) 1st Coat: S-W Pro Industrial Pro-Cryl Universal Primer, B66-1310 Series (5.0 mils wet, 2.0 mils dry)
- 2) 2nd Coat: S-W Pro Industrial Waterborne Acrylic Dryfall, B42-800 Series

C. Existing Painted Exterior Concrete Block and Masonry - No block filler.

1. After power washing, apply (semi-gloss, 2 coats) of S-W Loxon XP Masonry Elastomeric coating over surface.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Test shop applied primer for compatibility with subsequent coatings.
- B. Measure moisture content of surfaces using electronic moisture meter. Do not apply coatings unless moisture content of surfaces are below following maximums:
 1. Gypsum board: 12 percent.
 2. Masonry and concrete: 12 percent.

3.2 PREPARATION

- A. General:

1. Protect adjacent and underlying surfaces.
 2. Remove electrical plates, hardware, light fixture trim, escutcheons, thermostats and fittings prior to preparing surfaces or finishing.
 3. Correct defects and clean surfaces capable of affecting work of this section.
 4. Seal marks that may bleed through surface finishes with waterborne stain blocker.
- B. Gypsum Board:
1. Fill minor defects with filler compound. Spot prime defects after repair.
 2. Apply level 5 texture in accordance manufacturer's instructions.
- C. Existing Brick and Unit Masonry Surfaces Scheduled to Receive Paint Finish: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry. Install primer and elastomeric finish coats.
- D. Uncoated Ferrous Metals: SSPC Method SP2 - Hand Tool Cleaning or Method SP3 - Power Tool Cleaning.
- E. Shop Primed Ferrous Metals:
1. SSPC Method SP2 - Hand Tool Cleaning or Method SP3 - Power Tool Cleaning.
 2. Feather edges to make patches inconspicuous.
 3. Prime bare steel surfaces.
- F. Painted Existing Front Canopy Metal: Media blast existing surfaces down to bare metal, reprime and install finish paint coats.

3.3 APPLICATION

- A. Apply paints in accordance with manufacturer's instructions.
- B. Apply primer or first coat closely following surface preparation to prevent recontamination.
- C. Do not apply finishes to surfaces that are not dry.
- D. Apply coatings to minimum dry film thickness recommended by manufacturer.
- E. Apply each coat of paint slightly darker than preceding coat unless specified otherwise.
- F. Apply coatings to uniform appearance without laps, sags, curtains, holidays, and brush marks.
- G. Allow applied coats to dry before next coat is applied.
- H. When required apply an additional finish coat to ensure color consistency.
- I. Continue paint finishes behind wall-mounted accessories.
- J. Sand between coats on interior metal surfaces.
- K. Match final coat to approved color samples.
- L. Mechanical and Electrical Components:
 1. Paint factory primed equipment.
 2. Remove unfinished and primed louvers, grilles, covers, and access panels; paint separately.
 3. Paint exposed and insulated pipes, conduit, boxes, ducts, hangers, brackets, collars, and supports unless factory finished.

4. Do not paint name tags or identifying markings.
5. Paint exposed conduit and electrical equipment in finished areas.
6. Paint duct work behind louvers, grilles, and diffusers flat black to minimum of 18 inches or beyond sight line.

M. Do not Paint:

1. Surfaces indicated on Drawings or specified to be unpainted or unfinished.
2. Surfaces with factory applied finish coat or integral finish.
3. Architectural metals, including brass, bronze, stainless steel, and chrome plating.

3.4 ADJUSTING

- A. Touch up or refinish disfigured surfaces.

3.5 CLEANING

- A. Remove paint from adjacent surfaces.

END OF SECTION

SECTION 10 1423

INTERIOR PANEL SIGNS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Plastic interior panel signs.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.

1.2 REFERENCES

- A. United States Department of Justice (USDOJ) - ADA Standards for Accessible Design (SAD).
- B. 2012 Texas Accessibility Standards

1.3 SUBMITTALS

- A. Submittals for Review:
 - 1. Shop Drawings: Include sign locations, sizes, mounting heights, and content.
 - 2. Samples:
 - a. 3 x 3 inch sign samples showing available colors.
 - b. After color selection, submit typical sign illustrating pictograms, characters, and Braille indications.

1.4 QUALITY ASSURANCE

- A. Conform to 2012 Texas Accessibility Standards for sign design, construction, location, and mounting height.
- B. Mockup:
 - 1. Size: One full-size sign.
 - 2. Locate where directed.
 - 3. Approved mockup may remain as part of the Work.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Signs:
 - 1. Type: Melamine plastic laminate, non static, fire retardant, self extinguishing, matte finish.
 - 2. Thickness: 1/8 inch.
 - 3. Face and core colors: To be selected from manufacturer's full color range, to match existing in color, font, and style.

2.2 ACCESSORIES

- A. Tape: Double sided, waterproof, pressure sensitive

2.3 FABRICATION

- A. Fabricate signs by reverse engraving process to produce characters and graphics in contrasting color, raised 1/32 inch.

- B. Characters:
 - 1. Height: 5/8 inch.
 - 2. Style: Sans serif style to be selected, upper case.
 - 3. Stroke width, strike thickness, character spacing, and line spacing: In accordance with 2012 Texas Accessibility Standards.

- C. Pictograms:
 - 1. Utilize standard international pictograms.
 - 2. Locate pictograms within 6 inch vertical void with text descriptors below pictogram.

- D. Provide round Grade II Braille indications with contractions placed below each corresponding character.

- E. Corners: Square.

- F. Edges: Square.

PART 3 EXECUTION

3.1 PREPARATION

- A. Clean surfaces of loose and foreign matter.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions and approved Shop Drawings.

- B. Locate signs on wall adjacent to scheduled doors in compliance with current Texas Accessibility Standards.

END OF SECTION

SECTION 10 2813

TOILET ACCESSORIES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Toilet accessories.
 - 2. Framed mirrors.

- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.

1.2 REFERENCES

- A. ASTM International (ASTM):
 - 1. A123/A123M - Standard Specification for Zinc (Hot-Galvanized) Coatings on Iron and Steel Products.
 - 2. A269 - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
 - 3. A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
 - 4. A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
 - 5. B456 - Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.
 - 6. C1036 - Standard Specification for Flat Glass.

1.3 SUBMITTALS

- A. Submittals for Review:
 - 1. Product Data:
 - a. Schedule accessories by room; show plans and elevations, and identify room name and number, type and quantity of accessories, and mounting heights.
 - b. Include manufacturer's brochures showing sizes, details of function, finishes, and attachment methods.
 - 2. Samples: One of each accessory, if requested.

3. Warranty: Sample warranty form.

1.4 QUALITY ASSURANCE

- A. Conform to applicable accessibility code for locating accessories.

1.5 WARRANTIES

- A. Furnish manufacturer's 10 year warranty providing coverage against mirror silver spoilage.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Design Basis: Contract Documents are based on products per accessories schedule.
- B. Equivalent products by following manufacturers are acceptable:
 1. A and J Washroom Accessories. (www.ajwashroom.com)
 2. American Specialties, Inc. (www.americanspecialties.com)
 3. Bobrick Washroom Equipment, Inc. (www.bobrick.com)
 4. Bradley Corp. (www.bradleycorp.com)
 5. Seachrome Corporation (<https://seachrome.com/>)
 6. GAMCO. (www.gamcousa.com)
- C. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Stainless Steel:
 1. Sheet: ASTM A666, Type 304, rollable temper.
 2. Tubing: ASTM A269.
- B. Galvanized Steel:
 1. ASTM A1008/A1008M.
- C. Mirror Glass: ASTM C1036, Type I, Class 1, Quality q1, 3/16 inch thick.

2.3 ACCESSORIES

- A. Fasteners: Stainless steel where exposed, hot dip galvanized where concealed; type best suited to substrate conditions.

2.4 FABRICATION

- A. Use stainless steel for exposed surfaces; galvanized steel may be used in concealed locations.
- B. Form exposed surfaces from single sheet of stock, free from joints, and flat, without distortion.
- C. Weld joints of fabricated components and grind smooth.
- D. Fabricate grab bars of tubing, free of visible joints, return to wall with end attachment flanges.
- E. Fabricate soap dispensers to operate with less than 5 pound force.
- F. Provide hangers, adapters, anchor plates, and accessories required for installation.
- G. Key locks alike; furnish six keys.
- H. Mirrors:
 - 1. Frame: Where shown, one piece, roll formed stainless steel channel, 1/2 x 1/2 inch, with corners mitered.
 - 2. Mirror: Apply one coat of silver, one coat of electroplated copper, and one coat of organic mirror backing compound to back surface of glass.
 - 3. Backing: Galvanized steel sheet.
 - 4. Isolate glass from frame and backing with resilient, waterproof padding.
- I. Shop assemble units and package complete with anchors and fittings.

2.5 FINISHES

- A. Stainless Steel: No. 4 satin.
- B. Galvanizing: ASTM A123/A123M to 1.25ounces per square foot.
- C. Chrome Plating: ASTM B456, Type SC 2, polished.
- D. Polyethylene: White.
- E. Enamel: White.

PART 3 EXECUTION

3.1 **INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Set plumb, level, square, and rigid.
- C. Install wiring between power supply and accessories.

3.2 **SCHEDULE:** Refer to drawings.

END OF SECTION

SECTION 10 4413

FIRE EXTINGUISHERS AND CABINETS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Portable fire extinguishers.
 - 2. Cabinets
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.

1.2 REFERENCES

- A. ASTM International (ASTM) E814 - Standard Test Method for Fire Tests of Through-Penetration Firestops.
- B. National Fire Protection Association (NFPA) 10 - Portable Fire Extinguishers.
- C. Underwriters Laboratories (UL):
 - 1. 299 - Dry Chemical Fire Extinguishers.
 - 2. 711 - Rating and Fire Testing of Fire Extinguishers.

1.3 SUBMITTALS

- A. Submittals for Review:
 - 1. Product Data: Include data on extinguishers and cabinets, operational features, materials, finishes, and anchorage.
- B. Closeout Submittals:
 - 1. Maintenance Data: Include test, refill, or recharge schedules and re-certification requirements.

1.4 QUALITY ASSURANCE

- A. Provide fire extinguishers complying with UL 711 and applicable code.
- B. Cabinets in Fire Rated Partitions: Tested in accordance with ASTM E814 with fire resistance rating equivalent to adjacent construction.
- C. Conform to applicable accessibility code for locating extinguishers.

1.5 PROJECT CONDITIONS

- A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Products by following manufacturers are acceptable:
 - 1. Larsen's Mfg. Co. (www.larsensmfg.com)

- B. Substitutions: Under provisions of Section 01 6000.

2.2 COMPONENTS

- A. Extinguishers:
 - 1. Dry Chemical Type: Cast steel tank, with pressure gage.
 - 1. Class A:B:C
 - 2. Size 10.
 - 3. Finish: Baked enamel, red color.
- B. Cabinets:
 - 1. Semi-recessed, glass door; as manufactured by Larsen's Manufacturing Company.
 - 2. Fire Rated as required if located in a fire rated partition
- C. Brackets: Formed steel, sized to accommodate extinguisher.

2.3 ACCESSORIES

- A. Mounting Hardware: Type best suited to application. Pre-drill for anchors.

2.4 FINISHES

- A. Cabinet: Clear anodized.

EXECUTION

2.5 INSTALLATION

- A. Install cabinets in accordance with manufacturer's instructions with centerline of cabinet set at 3'-6" AFF.
- B. Set plumb, level, and rigid.
- C. Place an extinguisher in each cabinet.

END OF SECTION

SECTION 12 2413

ROLLER WINDOW SHADES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Manually operated window shades.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.

1.2 REFERENCES

- A. National Fire Protection Association (NFPA) 701 - Fire Tests for Flame-Resistant Textiles and Films.

1.3 SUBMITTALS

- A. Submittals for Review:
 - 1. Shop Drawings:
 - a. Show locations, sizes, relationship to adjacent construction, power supply locations, and other pertinent information.
 - b. Use same room designations as indicated on Drawings.
 - 2. Product Data: Indicate components, materials, finishes, attachment, and operation.
 - 3. Samples:
 - a. 12 x 12 inch shade cloth samples in each color.
 - 4. Warranty: Sample warranty form.
- B. Closeout Submittals:
 - 1. Operation and Maintenance Data.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Minimum 2 years experience in work of this Section.
- B. Fabric: Pass NFPA 701 small and large-scale vertical burn tests.
- C. Electrical Components: Listed by testing agency acceptable to authorities having jurisdiction, marked for intended use, and tested as system.

1.5 PROJECT CONDITIONS

- A. Verify dimensions at site prior to fabrication of shades.
- B. Do not install shades until painting and finishing work is complete and ambient temperature and humidity conditions are maintained at occupancy levels.

1.6 WARRANTIES

- A. Furnish manufacturer's warranties providing coverage for:
 - 1. 10 years against deterioration, sag, warp of shade cloth and defective hardware.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Design Basis: Contract Documents are based on products by Hunter Douglas.
- B. Equivalent products by following manufacturers are acceptable:
 - 1. Lutron. (www.lutron.com)
 - 2. MechoShade Systems, Inc. (www.mechoshade.com)
 - 3. Solarfective Products Limited. (www.solarfective.com)
 - 4. Solar Shading Systems. (www.solarshadingsystems.com)
- C. Substitutions: Under provisions of Division 01.

2.2 MANUFACTURED UNITS

- A. Window Shades:
 - 1. Operation: manual
 - 2. Shade cloth/orientation: Regular rolling with shade cloth falling on window side of roller.
 - 3. Mounting: Wall. Consult with architect.
 - 4. Head tube: Extruded aluminum.
 - 5. Fascia: Extruded aluminum.
- B. Shade Cloth:
 - 1. Fabric hem pocket with RF-welded seams and hem weights concealed in continuous sealed hem pocket.
 - 2. Fabricate with heat-sealed trimmed edges to hang straight without curling or raveling.
 - 3. Provide battens when required to ensure proper tracking and uniform rolling of shade cloth.
 - 4. Fabricate shade cloth to completely fill openings from head to sill and jamb-to-jamb, unless otherwise indicated. Note that shade cloth shall overlap wall a min. of 2" on each side.
 - 5. Fabricate shade cloth to hang flat without buckling and distortion.

2.3 FINISHES

- A. Fabric: 5% open percentage. Color to be selected from manufacturer's full color range.
- B. Aluminum: Baked enamel, color to be selected from manufacturer's full color range.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide adequate clearances to allow for proper operation.
- C. Place units to locate shade cloth minimum 2 inches from interior face of glass. Verify with Architect.

3.2 ADJUSTING

- A. Adjust shades for smooth, quiet operation.

3.3 SCHEDULE:

- Provide window shades at Store Front Elev. B and Window Elevation 11 at Staff Workroom 105
- Provide window shades at 5'-0" high windows at Store Front Elevations A & C at Entry/Reception 101 and Children's Area 103
- Provide window shade at Window Elevation 10 at Multi-Purpose Room 107

End of Section

SECTION 31 1100
CLEARING AND GRUBBING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Removal of surface debris, paving, curbs, etc. where shown.
 - 2. Removal of plant life and grass.
 - 3. Grubbing roots.
 - 4. Topsoil excavation.

- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.
 - 2. Section 31 2200 - Grading.

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

3.1 SITE CLEARING

- A. Remove vegetation, debris, and obstructions from areas of walks, paving and planting beds.
- B. Apply herbicide to remaining stumps and plant life to inhibit growth.
- C. Strip existing topsoil from areas of structures, walks, and paving. Stockpile on site for reuse as specified in Section 31 2200.
- D. Grub out roots and underground obstructions.
- E. Remove waste material from site as it accumulates. Comply with applicable codes and ordinances regarding waste transportation and disposal.

END OF SECTION

SECTION 31 2200

GRADING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Cutting and grading of site.
 - 2. Topsoil placement.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.
 - 2. Section 31 1100 - Clearing and Grubbing.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Topsoil:
 - 1. Stockpiled on site material, specified in Section 31 1100 install supplemented by off site material if required.
 - 2. Off site materials: Natural friable loam of region, free of clay, toxic substances, large or matted roots, debris, excess weeds, and rocks over 1 inch in any dimension, with acidity range of 5.5 to 7.5.

PART 3 EXECUTION

3.1 CUTTING AND GRADING

- A. Excavate subsoil to permit placement of structures, paving, and site improvements, and from areas to be regraded.
- B. Uniformly grade areas to smooth surface at required grades and elevations. Adjust contours to eliminate water ponding and provide positive drainage. Make grade changes gradually. Blend slopes into level areas.

3.2 CLEANING

- A. Remove surplus materials and those not suitable for reuse from site.

3.3 PROTECTION

- A. Protect graded areas from traffic and erosion; keep free of trash and debris.
- B. Repair settled, eroded, or rutted areas.

END OF SECTION

SECTION 31 3116

TERMITE CONTROL

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Below grade soil treatment for termite control.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.

1.2 SUBMITTALS

- A. Submittals for Review:
 - 1. Application Procedures: Indicate locations for application, application rates, and application equipment.
 - 2. Warranty: Sample warranty form.
- B. Quality Control Submittals:
 - 1. Current EPA approval listing.
 - 2. Certificates of Compliance: Applicator's certification that termiticide was applied at specified concentrations and using specified methods and materials.

1.3 QUALITY ASSURANCE

- A. Applicator Qualifications: Licensed for termite control by authorities having jurisdiction in State in which Project is located.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Protect containers from accidental opening and use.

1.5 PROJECT CONDITIONS

- A. Do not apply termiticide when surface water is present.

1.6 SEQUENCING

- A. Apply termiticide:
 - 1. After completion of excavating, backfilling, and compaction.
 - 2. Prior to placing vapor retarder.

1.7 WARRANTIES

- A. Provide manufacturer's warranty against invasion or propagation of subterranean termites and damage to building or building contents caused by termites, including repairs to building and building contents.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Termiticide:
 - 1. Approved for termite treatment by Environmental Protection Agency and other authorities having jurisdiction.

2. Water based solution, uniform in composition, synthetically dyed to permit visual identification of treated soil.

2.2 MIXES

- A. Mix materials in accordance with manufacturer's instructions.

PART 3 EXECUTION

3.1 APPLICATION

- A. Apply materials in accordance with manufacturer's instructions.
- B. Inject treatment at minimum rates recommended by manufacturer.
- C. Apply treatment to areas beneath floor slabs structures and outside of building perimeter to minimum 48 inch depth below grade.
- D. Saturate areas around floor slab penetrations.
- E. Prevent spillage and runoff onto adjacent non treated areas.
- F. Ensure complete coverage of treated areas.
- G. Extend treatment onto adjacent construction and floor slab penetrations.
- H. Reapply termiticide to treated soils that are disturbed after treatment.

END OF SECTION

SECTION 32 1216

ASPHALT PAVING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Aggregate base course.
 - 2. Asphalt concrete binder and surface course.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.

1.2 REFERENCES

- A. Asphalt Institute (AI):
 - 1. MS-2 - Mix Design Methods for Asphalt Concrete and Other Hot Mix Types.
 - 2. MS-3 - Asphalt Plant Manual.
 - 3. MS-8 - Asphalt Paving Manual.
 - 4. MS-19 - Basic Asphalt Emulsion Manual.
- B. ASTM International (ASTM):
 - 1. C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregate.
 - 2. D946 - Standard Test Method for Penetration-Graded Asphalt Cement for Use in Pavement Construction.
 - 3. D1188 - Standard Test Method for Bulk Specific Gravity of Compacted Bituminous Mixtures Using Paraffin-Coated Specimens.
 - 4. D2172 - Standard Test Method for Quantitative Extraction of Bitumen from Bituminous Paving Mixtures.
 - 5. D2922 - Standard Test Methods for Determining the Density of Soil and Soil Aggregate in Place by Nuclear Methods (Shallow Depth).

1.3 SUBMITTALS

- A. Submittals for Review:
 - 1. Mix Designs: Indicate composition of asphaltic concrete.

1.4 QUALITY ASSURANCE

- A. Perform work in accordance with AI MS-8.
- B. Mixing Plant: AI MS-3.
- C. Obtain materials from same source throughout work.

1.5 PROJECT CONDITIONS

- A. Do not place asphalt when base surface temperature is less than 40 degrees F, or surface is wet or frozen.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Base Course: Crushed stone or pit run gravel, free of shale, clay, friable material, and debris, graded in accordance with ASTM C136.
- B. Asphalt Cement:
 - 1. ASTM D946.
- C. Aggregate: Crushed stone and sand, graded in accordance with AI MS-2.
- D. Primer: AI MS-19, homogenous, medium curing, cut back liquid asphalt.
- E. Tack Coat: AI MS-19, homogenous, rapid curing, cut back liquid asphalt.

2.2 MIXES

- A. Asphaltic Concrete:
 - 1. Uniform mixture of coarse and fine aggregate, mineral filler, and asphalt cement, accurately proportioned by weight in accordance with AI MS-2.

PART 3 EXECUTION

3.1 CONSTRUCTION

- A. Aggregate Base Course:
 - 1. Roller compact to minimum 95 percent. Add small quantities of fine aggregate if necessary to aid compaction.
 - 2. Uniformly grade areas to smooth surface at required grades and elevations. Make grade changes gradually. Blend slopes into level grades.
- B. Primer: Apply to base course and contact surfaces of curbs and abutments.
- C. Asphaltic Concrete:
 - 1. Place within 24 hours after applying primer.
 - 2. Apply tack coat to binder course as required.
 - 3. Compact with pneumatic roller, then with steel roller. Do not displace or extrude asphaltic concrete from position. Hand compact in areas inaccessible to rolling equipment.
 - 4. Roll with consecutive passes to achieve uniform, smooth surface, free from roller marks.
 - 5. Construction joints:
 - a. Place mixture as nearly continuous as possible. Roll unprotected edge of freshly laid mixture only when laying is discontinued for such length of time as will allow cooling of mixture.
 - b. When resuming work, cut back previously laid material to produce slightly beveled edge for full depth of course; place fresh mixture against fresh cut.
 - c. Hot smoothing irons may be used for sealing joints; use care to avoid burning surface.
 - d. Construct joints either parallel to or at right angles to longitudinal axis of work.

3.2 FIELD QUALITY CONTROL

- A. Testing and Inspection Services:
 - 1. Aggregate base course: Perform field in place density tests, ASTM D1557 or D2922.
 - 2. Asphaltic concrete:
 - a. Perform one laboratory density and stability test for each day's operation.
 - b. Perform one field in place density test, ASTM D1188, on each type of asphaltic concrete for each day's operation.

- c. Perform one extraction and gradation test, ASTM D2172, on each type of asphaltic concrete for each day's operation.
- d. Examine pavement to determine whether specified total thickness of asphaltic concrete has been placed.

END OF SECTION

SECTION 32 1723

PAVEMENT MARKINGS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Painted striping, directional arrows, and letters applied to asphaltic and concrete paving.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.

1.2 SUBMITTALS

- A. Submittals for Review:
 - 1. Product Data: Include product attributes, performance characteristics, and application instructions.

1.3 PROJECT CONDITIONS

- A. Environmental Requirements: Do not apply paint during rain or at ambient temperatures below 40 degrees F, nor when such conditions are anticipated within 8 hours after application.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. Benjamin Moore and Co. (www.benjaminmoore.com)
 - 2. Kelly-Moore Paints. (www.kellymoore.com)
 - 3. PPG Architectural Finishes, Inc. (www.pittsburghpaints.com)
 - 4. Sherwin Williams. (www.sherwin-williams.com)
- B. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Striping Paint:
 - 1. Type: Non-bleeding, formulated specifically for painting in vehicular traffic areas.
 - 2. Colors:
 - a. Parking stall striping, directional markings, and restricted parking zone markings: In color as selected.
 - b. Accessible parking emblems and paths: In accordance with applicable accessibility code.
 - c. Fire lane designations: Red with white copy. In accordance with applicable accessibility code.

2.3 EQUIPMENT

- A. Application Equipment: Pressurized, self contained, capable of applying straight line from 2 to 6 inches wide with consistent coverage.

2.4 MIXES

- A. Mix materials in accordance with manufacturer's instructions.

PART 3 EXECUTION

3.1 PREPARATION

- A. Allow paving to cure minimum time recommended by paint manufacturer prior to applying paint.
- B. Clean paving of grease, oil, and loose and foreign matter that could impair adhesion.
- C. Remove curing compound from new concrete by lightly sandblasting. Minimize sandblasting of surfaces not receiving paint.
- D. Locate markings according to drawings, using guide lines and templates.

3.2 APPLICATION

- A. Apply paint by machine at rates recommended by manufacturer.
- B. Apply paint in one coat.
- C. Provide 4 inch wide parking stall stripes.

3.3 PROTECTION

- A. Close areas to traffic until paint is cured.

END OF SECTION

SECTION 32 3200

METAL PANEL PRIVACY FENCE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Labor and materials necessary to construct and support metal panel privacy fence(s) as shown on Plans. Provide and install fence panels, posts, rails, braces, trim and all accessories as required for a complete and proper installation. Also included in this Section is excavation for post base footings and concrete anchorage.

1.02 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
 - 1. American Association of State Highway and Transportation Officials (AASHTO): a. M111M/M111, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products. b. M133, Standard Specification for Steel Fence Posts and Assemblies.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Preformed, Galvalume Plus finish, 24 ga., 6'-0" high nominal height metal fence panels and flashings in profile as selected from manufacturer's standard line with all miscellaneous trim, closures and accessories. Note that metal fence panels are to be installed on Library side of fence only.
- B. 16-gauge galvanized posts set at 10'-0" O.C., 24-gauge galvanized studs, tracks, and blocking.
- C. Concealed fasteners: Galvanized Steel. Where required exposed fasteners with washers painted to match finish of fence shall be required.
- D. Contractor shall furnish and install concrete pad foundation as per manufactures specification complete with all required utility rough-ins.

PART 3 EXECUTION

3.01 CONSTRUCTION OF FENCE

GENERAL:

- A. Grade shall be prepared and any surface irregularities removed, which may cause interference with installation of fence.
- B. Holes shall be excavated for posts to 8"–12" diameter x 26" deep and spacing to be 8'-0" O.C. max. and to suite local conditions for proper anchorage and stability.
- C. Fence installation shall be in accordance with manufacturer's instructions and details. All exposed adjacent flashing shall be of the same material and finish as fence panels. Hem all exposed edges of flashing on underside, 1/2 inch.
- D. Posts shall be centered and aligned in excavated holes to proper depth. Concrete shall be placed around posts and vibrated or tamped for consolidation.

- E. Vertical and top alignment of posts shall be verified for plumb and true before concrete hardens.
- F. Contractor shall perform such clearing and grubbing as may be necessary to construct or replace the fence to the required grade and alignment as shown on the drawings.
At locations where breaks in a run of fencing are required, appropriate adjustments in fence alignment and/or post spacing shall be made to satisfy requirements or conditions encountered.
- G. Posts and Rails: Posts shall be securely embedded into the ground to meet the proper alignment and elevations. Posts shall be embedded in concrete as shown on the DRAWINGS. Posts and rails shall be held in proper positions by secure bracing until such time as the concrete has set sufficiently to hold the posts. Materials shall not be installed on posts, or stress placed on bracing until the concrete has set sufficiently to withstand the stress. The complete fence shall be plumb and in straight alignment.

DELIVERY, STORAGE AND HANDLING:

- A. Upon receipt of panels and other materials, installer shall examine the shipment for damage and completeness.
- B. Panels shall be stored in a clean, dry place. One end should be elevated to allow moisture to run off.

SUBMITTALS:

- A. Submit detailed drawings showing layout of fence panels, anchoring details, joint details, trim, flashing, and accessories.
- B. Submit a sample of each type of fence panel profile, including color chips.

WARRANTY:

- A. Manufacturer shall provide twenty-year paint finish warranty against rusting (not to exceed 5 N.B.S. units).
- B. Installer shall provide warranty against defects of installed fence system for period of two (2) years from date of substantial completion.

END OF SECTION

**PLUMBING, MECHANICAL & ELECTRICAL
SPECIFICATIONS**

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22 00 10	SHOP DRAWINGS, PRODUCT DATA AND SAMPLES
22 00 20	SITE UTILITIES
22 05 00	PLUMBING SPECIALTIES
22 05 29	HANGERS AND SUPPORTS
22 05 53	PLUMBING IDENTIFICATION
22 07 00	PIPING INSULATION
22 11 00	PLUMBING PIPING
22 42 00	PLUMBING FIXTURES
23 00 00	GENERAL PROVISIONS FOR HVAC
23 00 10	SHOP DRAWINGS, PRODUCT DATA AND SAMPLES
23 05 00	HVAC GENERAL PROVISIONS
23 05 29	HANGERS AND SUPPORTS
23 05 53	MECHANICAL IDENTIFICATION
23 05 93	TESTING, ADJUSTING, BALANCING AND COMMISSIONING
23 07 00	DUCT INSULATION
23 31 00	DUCTWORK
23 80 00	HEATING, VENTILATION AND AIR CONDITIONING EQUIPMENT
26 00 00	GENERAL PROVISIONS FOR ELECTRICAL
26 00 10	SHOP DRAWINGS, PRODUCT DATA AND SAMPLES
26 00 20	SITE UTILITIES
26 05 10	BUILDING WIRE AND CABLE
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26 05 29	SUPPORTING DEVICES
26 05 33	CONDUIT
26 05 34	BOXES

<u>SECTION</u>	<u>TITLE</u>
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26 06 20	WIRING DEVICES
26 24 00	PANELBOARDS
26 27 00	UTILITY SERVICE ENTRANCE
26 28 00	CIRCUIT AND MOTOR DISCONNECTS
26 51 00	LUMINAIRES
27 20 00	COMMUNICATIONS AND COMPUTER SYSTEMS

2015 INTERNATIONAL ENERGY CONSERVATION CODE CERTIFICATES



August 4, 2021

Paul Wilkerson, PE Texas # 50732
Power Systems
Firm #F-6257

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1 PART 1 – GENERAL

1.1 SPECIAL NOTE

- A. The Architectural and Structural Plans and Specifications, including the supplements issued thereto, Information to Bidders, and other pertinent documents issued by the Owner, are a part of these specifications and the accompanying mechanical and electrical plans, and shall be complied with in every respect. All the above is included herewith, will be issued separately or is on file at the Owner's office, and shall be examined by all bidders. Failure to comply shall not relieve the Contractor of responsibility or be used as a basis for additional compensation due to omission of drawings. Where the Supplementary General Conditions conflict with the General Conditions, the Supplementary General Conditions shall govern.
- B. All work covered by this division of the specifications shall be accomplished in accordance with all applicable provisions of the contract documents and any addenda or directive which may be issued.
- C. The mechanical contractor shall familiarize himself with the General Provisions for Electrical, Section 26 00 00, and comply with those requirements which affect his work.

1.2 CHECKING DOCUMENTS

- A. The drawings and the specifications are numbered consecutively. The Contractor shall check the drawings and specifications thoroughly and shall notify the Owner of any discrepancies or omissions of sheets or pages. Upon notification, the Owner will promptly provide the Contractor with any missing portions of the drawings or specifications. No discrepancies or omissions of sheets or pages of the contract documents will relieve the Contractor of his duty to provide all work required by the complete contract documents.

1.3 QUALITY ASSURANCE:

- A. All plumbing work shall be in accordance with the requirements of the International Plumbing Code, 2015 Edition.
- B. All mechanical work shall be in accordance with the requirements of the International Mechanical Code, 2015 Edition.
- C. Buy American Act: Only domestic construction materials will be used by the Contractor, Subcontractors, materialmen, and suppliers in the performance of this contract.
- D. Equipment Vibration Tolerance:

1. After air balance work is completed and permanent drive sheaves are in place, perform field mechanical balancing and adjustments required to meet the specified vibration tolerance.

E. Products Criteria:

1. Standard Products: Material and equipment shall be the standard products of a manufacturer regularly engaged in the manufacture of the products for at least 3 years. See other specification sections for any exceptions.
2. Equipment Service: Products shall be supported by a service organization which maintains an adequate inventory of repair parts and is located within a one hundred mile radius of the site.
3. Multiple Units: When two or more units of materials or equipment of the same type or class are required, these units shall be products of one manufacturer.
4. Assembled Units: Manufacturers of equipment assemblies, which use components made by others, assume, complete responsibility for the final assembled product.
5. Nameplates: Nameplate bearing manufacturer's name or identifiable trademark shall be securely affixed in a conspicuous place on equipment, or name or trademark cast integrally with equipment, stamped or otherwise permanently marked on each item of equipment.

- F. Manufacturer's Recommendations: Where installation procedures or any part thereof are required to be in accordance with the recommendations of the manufacturer of the material being installed, printed copies of these recommendations shall be furnished to the Architect prior to installation. Installation of the item will not be allowed to proceed until the recommendations are received. Failure to furnish these recommendations can be cause for rejection of the material.

1.4 LAWS, CODES AND ORDINANCES

- A. All work shall be executed in strict accordance with all local, state and national codes, ordinances and regulations governing the particular class of work involved, as interpreted by the inspecting authority. The Contractor shall be responsible for the final execution of the work under this heading to suit those requirements. Where these specifications and the accompanying drawings conflict with these requirements, the Contractor shall report the matter to the Owner, shall prepare any supplemental drawings required illustrating how the work may be installed so as to comply and, on approval, make the changes at no cost to the Owner. On completion of the various portions of the work the installation shall be tested by the constituted authorities, approved and,

on completion of the work, the Contractor shall obtain and deliver to the Owner a final certificate of acceptance.

1.5 TERMINOLOGY

- A. Whenever the words “furnish”, “provide”, “furnish and install,” “provide and install”, and/or similar phrases occur, it is the intent that the materials and equipment described be furnished, installed and connected under this Division of the Specifications, complete for operation unless specifically noted to the contrary.
- B. Where a material is described in detail, listed by catalogue number or otherwise called for, it shall be the Contractor’s responsibility to furnish and install the material.
- C. The use of the word “shall” conveys a mandatory condition to the contract.
- D. “This section” always refers to the section in which the statement occurs.
- E. “The project” includes all work in progress during the construction period.
- F. “Concealed” areas are those areas which cannot be seen by the building occupants from the floor with all building components in place.
- G. “Exposed” areas are all areas which are exposed to view by the building occupants including mechanical rooms.
- H. In describing the various items of equipment, in general, each item will be described singularly, even though there may be a multiplicity of identical or similar items.

1.6 ENGINEER’S STATUS DURING CONSTRUCTION:

- A. The work, from its commencement to its completion, shall be under the exclusive charge and control of the Contractor, and all risks in connection therewith shall be borne by the Contractor.
- B. The Engineer’s efforts during periodic site visits will be directed toward assisting the Architect in providing assurance for the Owner that the completed project will conform to the requirements of the contract documents, but the Engineers will not be responsible for the Contractor’s failure to perform the work in accordance with contract documents.
- C. The Engineer will make recommendations to the Architect regarding disapproval or rejection of work which, in his opinion, is defective, i.e.; is unsatisfactory, faulty or defective, or does not conform to the requirements of the contract documents. Failure on the part of the Engineer to recommend disapproval of or rejection of work, methods, or

acts or omissions of any kind shall never at any time be deemed to constitute acceptance or approval of the same.

1.7 GENERAL

- A. In general, the lines and ducts to be installed by the various trades under these specifications shall be run as indicated, as specified herein, as required by particular conditions at the site, and as required to conform to the generally accepted standards as to complete the work in a neat and satisfactorily workable manner. The following is a general outline concerning the running of various lines and ducts and is to be excepted where the drawings or conditions at the building necessitate deviating from these standards.
- B. All piping, conduit and ductwork for the mechanical and electrical trades shall be concealed in chases in finished areas, except as indicated on the drawings. Horizontal lines run in areas that have ceilings shall be run concealed in those ceilings, unless otherwise specifically indicated or directed.
- C. Piping, ductwork, conduits and raceways may be run exposed in machinery and equipment spaces, where serving as connections to motors and equipment items in finished rooms where exposed connections are required, and elsewhere as indicated on the drawings or required.
- D. All conduits in any space where they are exposed shall run parallel with the building walls. They shall enter the concealed areas perpendicular with the walls, ceilings or floors. Fittings shall be used where necessary to comply with this requirement.
- E. The Contractor shall thoroughly acquaint himself with the details of the construction and finishes before submitting his bid as no allowances will be made because of the Contractor's unfamiliarity with these details. Place all inserts in masonry walls while they are under construction. All concealed lines shall be installed as required by the pace of the general construction to precede that general construction.
- F. The mechanical and electrical plans do not give exact details as to elevations of lines and ducts, exact location, etc., and do not show all the offsets, control lines, pilot lines and other installation details. The Contractor shall carefully lay out his work at the site to conform to the architectural and structural conditions, to provide proper grading of lines, to avoid all obstruction, to conform to details of installation supplied by the manufacturers of the equipment to be installed, and thereby to provide an integrated, satisfactorily operating installation. Each Contractor shall verify that each item of mechanical equipment, each electrical panel, light fixture, and device, each grille or ceiling outlet, and each other item of work furnished by him shall fit into the available space before ordering same. Any required changes due to the Contractor's failure to verify that each item of his equipment will fit into

the available space shall be made by the Contractor furnishing the equipment, all at no additional cost to the Owner.

- G. The routing of piping, ductwork, conduits, etc., indicated on the drawings is approximate and where light fixtures or other items of work are to be recessed in ceiling, piping, ductwork, conduits, etc., shall be routed around the light fixtures or other items of work where there is not sufficient space for same to be routed above such item of work with the recessed item properly installed. Any required changes due to the Contractor's failure to properly coordinate his work with recessed items shall be made by the Contractor installing such piping, ductwork, conduits, etc., all at no additional cost to the Owner.
- H. The electrical plans show diagrammatically the locations of the various electrical outlets and apparatus and the method of circuiting and controlling them. Exact locations of these outlets and apparatus shall be determined by reference to the general plans and to all detail drawings, equipment drawings, roughing-in drawings, etc., by measurements at the building, and in cooperation with other sections, and in all cases shall be subject to the approval of the Owner. The Owner reserves the right to make any reasonable change in location of any outlet or apparatus before installation (within 10 feet of location shown on drawings) or after installation if an obvious conflict exists, without additional cost to the Owner.
- I. The Contractor shall submit working scale drawings of all his apparatus and equipment which in any way varies from these specifications and plans, which shall be checked by the Owner before the work is started, and interferences with the structural conditions shall be corrected by the Contractor before the work proceeds.
- J. Order of precedence shall be observed in laying out the pipe, ductwork, material, and conduit in order to fit the material into the space above the ceiling and in the chases and walls. The following order shall govern:
 - 1. Items affecting the visual appearance of the inside of the building such as lighting fixtures, diffusers, grilles, outlets, panelboards, etc. Coordinate all items to avoid conflicts at the site.
 - 2. Large ducts and pipes with critical clearances.
 - 3. Conduit, water lines, and other lines whose routing is not critical and whose function would not be impaired by bends and offsets.
- K. Piping, ducts, and conduits serving outlets on items of equipment shall be run in the most appropriate manner. Where the equipment has built-in chases, the lines shall be contained therein. Where the equipment is of the open type, the lines shall be run as close as possible to the underside of the top and in a neat and inconspicuous manner. All piping, ductwork, conduits and all other items of work supported from the structure above shall be installed as high as physically possible (not just

as convenient) considering all work required to be installed in the available space. If any such work is installed lower than it could have been installed, the Contractor shall furnish all labor, equipment, and materials to remove same and reinstall the work as high as possible, all at no additional cost to the Owner.

- L. Adequate provisions shall be provided for the replacement of all filters.
- M. In addition to insulation called for elsewhere in the specifications, all piping and equipment subject to condensation and/or whose normal operating surface temperature is below 70 degrees F or above 110 degrees F shall be insulated. All piping subject to condensation and/or whose operating temperature is below 70 degrees F shall be insulated same as specified elsewhere in the specifications for chilled water or refrigerant suction line piping. All piping with operating surface temperature above 110 degrees F shall be insulated same as specified elsewhere in the specifications for domestic hot water or steam piping. All insulation shall be provided by the particular Contractor who installs the particular equipment or piping system. All equipment shall be insulated and finished in a manner suitable for the conditions and as approved by the Engineers. Armaflex insulations shall not be permitted in breathing air spaces.
- N. Exceptions and inconsistencies in plans and specifications shall be brought to the Owner's attention before the contract is signed. Otherwise, the Contractor shall be responsible for any and all changes and additions that may be necessary to accommodate his particular apparatus, material, or equipment.
- O. The Contractor shall distinctly understand that the work described herein and shown on the accompanying drawings shall result in a finished and working job, and any item required to accomplish this intent shall be included whether specifically mentioned or not.
- P. Each bidder shall examine the plans and specifications for the General Construction. If these documents show any item requiring work under Division 15 or 16 and that work is not indicated on the respective "M", "P" or "E" drawings, he shall notify the Owner in sufficient time to clarify before bidding. If no notification is received, the Contractor is assumed to require no clarification, and shall install the work as indicated on the General Plans in accordance with the specifications.

1.8 DIMENSIONS

- A. Before ordering any material or doing any work, the Contractor shall verify all dimensions, including elevations, and shall be responsible for the correctness of the same. No extra charge 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 Owner for consideration before proceeding with the work.

1.9 INSPECTION OF SITE

- A. The accompanying plans do not indicate completely the existing mechanical and electrical installations. The bidders for the work under these sections of the specifications shall inspect the existing installations and thoroughly acquaint themselves with conditions to meet and the work to be accomplished in removing and codifying the existing work, and in installing the new work in the present building and underground serving to and from that structure. Failure to comply with this shall not constitute grounds for any additional payments in connection with removing or modifying any part of the existing installations and/or installing any new work.

1.10 ELECTRICAL WIRING

- A. All electric wiring of every character, both for power supply, for pilot and control, for temperature control, for communications, etc. will be done under Division 26 of these specifications. The Contractor for each section shall erect all his motors in place ready for connections. The Contractor, under Division 26, shall mount all the starters and controls, furnishing the supporting structures and any required outlet boxes.
- B. Every electrical current consuming device furnished as a part of this project, or furnished by the Owner and installed in this project, shall be completely wired up under Division 26. Verification of exact location, method of connection, number and size of wires required, voltage requirements, and phase requirements is the responsibility of the Contractor under Division 26. If conflicts occur between the drawings and the actual requirements, actual requirements shall govern.

1.11 MOTORS AND CONTROLS

- A. All motors furnished under any of the several sections of these specifications shall be of recognized manufacture, of adequate capacity for the loads involved and wound for the current characteristics shown on the electrical drawings. All motors shall conform to the standards of manufacture and performance of the National Electrical Manufacturer's Association as shown in their latest publications. They shall further be listed by Underwriters Laboratories.
- B. Unless otherwise noted, the Contractor under Division 16 shall furnish each motor with a starter and all controls of the types specified or required. The starters shall be of the totally enclosed type, of capacity rating within the required limits of the motors which they are to serve, shall be suitable for the motor current characteristics and shall provide thermal overload protection. All starters shall be of standard manufacture and performance as defined by the National Electrical Manufacturers' Association. They further shall be listed by Underwriters Laboratories. Provide overload protection in each phase wire.

- C. All motors larger than 1/3 horsepower shall be of a type that the power consumed is in approximate direct proportion to the load on the motor. At 50% of rated brake horsepower, the power consumed shall be approximately 50% of the power consumed at full load.

1.12 TESTING

- A. The Contractor under each division shall at his own expense perform the various tests as specified and required by the Owner and as required by the State and local authorities. The Contractor shall furnish all fuel and materials necessary for making test.

1.13 PAINTING

- A. Painting for Divisions 22, 23 and 26 shall be as follows:
 - 1. If the factory finish on any apparatus or equipment is marred, it shall be touched up and then given one coat of half-flat-half-enamel, followed by a coat of machinery enamel of a color to match the original. Paint factory prime surfaces.

1.14 SEALING AROUND PIPES, CONDUITS, DUCTS, ETC.

- A. The Contractor installing pipes, conduits, ducts, etc. shall seal all spaces between pipes and/or sleeves where they pierce walls, partitions or floors with Dow Corning No. 2000 fire resistant caulk. The packing shall effect a complete fire and/or air seal where pipes, conduits, ducts, etc., pierce walls, floors or partitions.

1.15 MECHANICAL COORDINATION DRAWINGS:

- A. Prepare and submit a set of coordination drawings showing major elements, components, and systems of mechanical equipment and materials in relationship with other building components. Prepare drawings to an accurate scale of 1/4"=1'-0" or larger. Indicate the locations of all equipment and materials, including clearances for installing and maintaining insulation, servicing and maintaining equipment, valve stem movement, and similar requirements. Indicate movement and positioning of large equipment into the building during construction.
- B. Prepare floor plans, reflected ceiling plans, elevations, sections, and details to conclusively coordinate and integrate all installations. Indicate locations where space is limited, 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. Mechanical equipment room layouts;
 - 2. Specific equipment installations, including:

- a. Pumps and air handling units
 - b. Temperature control panels
 - c. Work in pipe spaces, chases, trenches, and tunnels
 - d. Exterior wall penetrations
 - e. Ceiling plenums which contain piping, ductwork, or equipment in congested arrangement
 - f. Installations in mechanical riser shafts, at typical sections and crucial offsets and junctures
 - g. Pipe expansion loops
 - h. Numbered valve location diagrams
 - i. Manifold piping for multiple equipment units
- C. It shall be incumbent upon the Contractor to prepare special drawings as called for elsewhere herein or as directed by the Owner to coordinate the work under each section, to illustrate changes in his work, to facilitate its concealment in finished spaces to avoid obstructions or to illustrate the adaptability of any item of equipment which he proposes to use.
- D. These drawings shall be used in the field for the actual installation of the work. Unless otherwise directed, they shall not be submitted for approval but three copies shall be provided to the Owner for his information.

1.16 ROUGH-IN AND MAKE FINAL CONNECTION FOR EQUIPMENT

- A. The shop drawings for all equipment are hereby made a part of these specifications. The Contractor under each section of the specifications shall rough-in for the exact item to be furnished on the job, whether in another section of the specifications or by the Owner. The Contractor shall refer to all drawings and other sections of the specifications for the scope of work involved for the new equipment, and by actual site examination determine the scope of the required equipment connections for the Owner furnished equipment.
- B. Should any of the equipment furnished require connections of a nature different from that shown on the drawings, report the matter to the Owner and finally connect as directed by the Owner.
- C. Should any shop drawings not be available for equipment furnished under other contracts or by the Owner, the Contractor under each section of these specifications shall bid the work as detailed on the drawings.
- D. Minor differences in the equipment furnished and that indicated on the drawings will not constitute grounds for additional payment to the Contractor.

2 PART 2 PRODUCTS

2.1 MARKING OF PIPE

- A. The Contractor shall mark all accessible piping systems. The identification of a piping system shall be made by a positive identification

of the material content of the system by lettered legend, giving the name of the content in full or abbreviated form. This mark shall be conspicuously placed at frequent intervals on straight runs, close to all valves, at changes of direction and where pipes pass through walls, floors or ceilings. Arrows shall be used to indicate direction of flow.

- B. Markers shall be placed on piping at each connection to an item of equipment, and on each drop to an outlet. Markers shall be placed on each run of piping at intervals not exceeding 50 feet where exposed in a room and 25 feet when installed above removable ceilings, except that no exposed line shall enter a room without being identified therein. Marker on lines above removable ceilings shall be applied on the undersides of the lines and in other areas shall be applied to be most visible.
- C. Markers shall conform completely with "The Scheme for Identification of Piping Systems (ANSI A131 1981). Markers shall have ANSI specified color coded background, color of legend and legend letter size.
- D. Markers shall be equal to Seton Set Pipe Markers.

2.2 IDENTIFICATION AND LABELING

- A. The Contractor shall make it possible for the personnel operating and maintaining the equipment and systems in this project to readily identify the various pieces of equipment, valves, piping, etc., by marking them. All items of equipment such as fans, pumps, etc., shall be clearly marked using engraved nameplates as hereinafter specified. The item of equipment shall indicate the same number as shown on the drawings.
- B. Interior Equipment: All items of mechanical and electrical equipment shall be identified by the attachment of engraved nameplates constructed from laminated phenolic plastic, at least 1/16" thick, 3-ply, with black surfaces and white core. Engraving shall be condensed gothic, at least 1/2" high, appropriately spaced. Nomenclature on the label shall include the name of the item, its mark number, area, space, or equipment served, and other pertinent information.
- C. Exterior (Outdoor) Equipment: Brass nameplates, with engraved black filled letters, not less than 3/16-inch high riveted or bolted to the equipment.
- D. Valves:
 - 1. Tags for isolation (shut-off) valves concealed in interstitial space, above ceilings or in chases: Engraved black filled numbers and letters not less than 1/2 inch high for number designation, and not less than 1/4-inch for service designation on 19 gage 1-1/2 inches round brass disc, attached with brass "S" hook or brass chain.

3 PART 3 EXECUTION

3.1 PIPE AND EQUIPMENT SUPPORTS:

- A. Where hanger spacing does not correspond with joist or rib spacing, use structural steel channels secured directly to joist and rib structure that will correspond to the required hanger spacing, and then suspend the equipment and piping from the channels. Drill or burn holes in structural steel only with the prior approval of the Architect.
- B. Use chain, wire or strap hangers; wood for blocking stays and bracing; hangers suspended from piping above will not be permitted. Replace or thoroughly clean and red lead paint products that are rusty.
- C. Use hanger rods that are straight and vertical. Turnbuckles for vertical adjustments may be omitted where limited space prevents use. Provide a minimum of 1/2-inch clearance between pipe or pipe covering and adjacent work.

3.2 OPERATING INSTRUCTIONS

- A. The Contractor for each section of the work hereunder shall, in cooperation with the representatives of the manufacturers of the various equipment items, carefully instruct the Owner's representatives in the proper operation of each item of equipment and of each system. During the balancing and adjusting of systems, the Owner's representative shall be made familiar with all procedures.

3.3 OPERATING MANUALS

- A. Prepare and submit 3 copies of the operating manuals bound in hard covers. Three weeks prior to completion of the work, the Owner will check the manuals and any additional material necessary to complete the manuals shall be furnished and inserted by the Contractor.
- B. Manuals shall contain the following data:
 - 1. Catalogue data of all equipment.
 - 2. Shop drawings of all equipment.
 - 3. Wiring diagrams.
 - 4. Recommended maintenance schedule for equipment.
 - 5. Parts list for all items.
 - 6. Name and address of each vendor.
- C. In addition to the information required by Division 1 for Maintenance Data, include the following information.
 - 1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of all replaceable parts.

2. Manufacturer's printed operating procedures to include start-up, break-in, routine and normal operating instructions; regulation, control, stopping, shut-down, 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.

3.4 GUARANTEE

- A. Unless a longer guarantee is hereinafter called for, all work, material and equipment items shall be guaranteed for a period of one year after acceptance by the Owner. All defects in labor and materials occurring during this period, as determined by the Owner, shall be repaired and/or replaced to the complete satisfaction of the Owner. Guarantee shall be in writing and in triplicate.

3.5 COMPLETION REQUIREMENTS

- A. Before acceptance and final payment the Contractor must complete the following requirements:
 1. Submit Test and Balance Report.
 2. Perform final inspection and make all corrections necessary.
 3. Submit maintenance manuals, certificate of owner instruction, equipment warranties and receipt for loose items.

END OF SECTION

SECTION 22 00 10 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

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1 PART 1 – GENERAL

1.1 DESCRIPTION

- A. Related Work Specified Elsewhere:
 - 1. Construction Schedules.
 - 2. Project Record Documents.

1.2 SUBMITTALS

- A. Shop and Installation Drawings, Product Data and Samples as required.
- B. Prepare and submit, with construction schedule, a separate schedule listing dates when shop drawings, product data and any requested samples will be needed for each product.

1.3 GENERAL

- A. Requests for material substitutions must be received and approved prior to submission of shop drawings, said submittals and/or samples; reviewed by architect or engineer does not constitute acceptance of materials other than those originally specified.

1.4 SHOP DRAWINGS

- A. Original drawings, which illustrate portion of the work: Showing equipment, layout, setting or installation details. Deviation from Contract Drawings shall be marked in RED with an explanation of reason for change
- B. Prepared by a qualified detailer.
- C. Identify details by reference to sheet and detail number shown on contract drawings.
- D. Reference specification section and paragraph number(s) represented on the submitted drawings.
- E. Minimum Sheet Size: 8½" x 11".

1.5 PRODUCT DATA

- A. Manufacturer's standard schematic drawings:
 - 1. Modify drawings to delete information which is not applicable to project.

-
2. Supplement standard information to provide additional information applicable to project.
- B. Manufacturer's catalog sheets, brochures, diagrams, schedules, performance charts, illustrations, and other standard descriptive data.
1. Clearly mark each copy to identify pertinent materials, products or models.
 2. Show dimensions and clearance required.
 3. Shop performance characteristics and capacities.
 4. Show wiring diagrams and controls.
- C. Complete catalogs will not be acceptable. Manufacturer's regular catalog sheets will be acceptable if they completely indicate specification requirements. When manufacturer's catalog sheets are submitted, completely line out material not directly connected with subject.
1. Assemble in indexed brochure, catalog sheets of submittals containing more than five (5) different items or equipment.
- D. Reference specification section and paragraph number represented on data submitted.

1.6 CONTRACTOR'S RESPONSIBILITIES

- A. Review shop drawings, product data and samples prior to submission and certify with signature of reviewer
- B. Verify:
1. Field measurements.
 2. Field construction criteria.
 3. Catalog numbers and similar data.
 4. Quantities
- C. Coordinate each submittal with requirements of work and of contract documents.
- D. Contractor's responsibility for errors, omissions and deviations in submittals from requirements of contractor documents is not relieved by architect's review of submittals, unless architect gives written acceptance of specific deviations.

1. Notify architect in writing of deviations at the time of submittal.
 - E. Begin no work which requires submittals until return of submittals with architect's stamp and initials or signature indicating review.
 - F. After architect's / engineer's review, distribute copies.
- 1.7 SUBMISSION REQUIREMENTS
- A. Schedule submissions at least 15 days before dates reviewed submittals will be needed.
 - B. Submit a minimum of 5 copies of all submittals.
 - C. Accompany submittals with transmittal in duplicate, containing:
 1. Date.
 2. Project title and number.
 3. Contractor's name and address.
 4. The number of each shop drawings, product data and samples submitted.
 5. Notification of deviations from contract documents.
 6. Other pertinent data.
 - D. Submittals shall include:
 1. Date and revision date.
 2. Project title and number.
 3. The names of:
 - a. Architect.
 - b. Contractor.
 - c. Subcontractor.
 - d. Supplier.

- e. Manufacturer.
- f. Separate detailer when pertinent.
- 4. Identification of product or material.
- 5. Relation to adjacent structure or materials.
- 6. Field dimensions, clearly identified as such.
- 7. Specification section number.
- 8. Applicable standards, such as ASTM or Federal Specifications numbers.
- 9. A blank space, 3" x 3" for the architect's stamp.
- 10. Identification of deviations from contract documents in red ink include justification for deviation.
- 11. Contractor's stamp, initialed or signed, certifying to review of submittal, verification of field measurements and compliance with contract documents.

Failure to comply with the above requirements shall be grounds for rejection of submittal.

1.8 RESUBMISSION REQUIREMENTS

A. Shop Drawings:

1. Revise initial drawings as required and resubmit as specified for initial submittal.
2. Indicate on drawings any changes which have been made other than those requested by architect.
3. Product Data and Samples: Submit new data and samples as required for initial submittal.

1.9 DISTRIBUTION OF SUBMITTALS AFTER REVIEW

A. Distribute copies of Shop Drawings and Product Data which carry architect's stamp to:

1. Contractor's file.
2. Job-site file.
3. Record document's file.
4. Other prime contractors.
5. Subcontractor.
6. Supplier.
7. Fabricator.

B. Distribute samples as directed.

1.10 ARCHITECT'S / ENGINEER'S RESPONSIBILITIES

A. Review submittals with reasonable promptness.

B. Review for:

1. Design concept of project.
2. Information given in contract documents.

- 3. Architect or Engineer is not responsible for verification of quantities.
- C. Review of separate items does not constitute review of an assembly in which item functions.
- D. Affix stamp and initials or signature certifying the review of submittals.
- E. Return submittals to contractor for distribution.

END OF SECTION

SECTION 22 00 20 SITE UTILITIES

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1 PART 1 GENERAL

1.1 NOTE

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

1.2 SUBMITTALS

- A. Submit manufacturer's data on all materials.

1.3 SCOPE

- A. Perform all layout, trenching, excavation, backfill, shoring and similar work and provide and install all materials and appurtenances necessary for the installation and final connection of all utilities.

1.4 EXISTING UTILITIES

- A. Prior to beginning work, manually locate and stake all utility lines existing at the site. If utilities are to remain in place, provide adequate means of support and protection during earthwork operations.
- B. The Contractor shall not rely solely on the scale drawings in determining the scope of the work.
- C. The drawings are not certified surveys and are not guaranteed for accuracy of location or elevation of existing lines or completeness. Before bidding, each bidder shall be personal examination of the project satisfy himself as to the existing conditions which prevail.
- D. Reasonable differences in actual jobsite dimensions and the drawings shall not be considered justification for a change in the contract sum.

2 PART 2 PRODUCTS

2.1 MATERIALS

- A. All piping materials for every purpose shall be furnished and installed as hereinafter specified.
- B. All pipe and fittings shall be new and unused unless specifically indicated otherwise.
- C. Underground steel piping shall be factory coated pipe "X-Tru-Coat" or epoxy coated pipe with fittings wrapped with a double thickness of 3M Scotch "51" vinyl tape over pipe and fittings.

2.2 SANITARY SEWER

- A. PVC Plastic Pipe and Fittings: ASTM D3034 type PSM with a maximum SDR of 35 with elastomeric joints complying with ASTM D3212.

2.3 WATER LINES

- A. PVC Piping:
 - 1. Lines 1-1/2" and smaller shall be Schedule 80, ASTM D1785 with tapered ends, with solvent weld fittings.
 - 2. Lines 2" and larger shall be ASTM D2241, SDR 26 with tapered ends, with elastomeric gasket bell and socket fittings conforming to requirements of AWWA C900, IPS dimensions only. Reaction blocking shall conform to NFPA 24.

2.4 GAS LINES

- A. Plastic Gas Piping: Polyethylene, Type III, Grade 3, (PE 3406-3408), resin conforming to ASTM D1248-7A, pipe construction conforming to ASTM D2513 (SDR 11).
- B. Mechanical Joints: Where steel lines connect to plastic lines 2" and smaller in size, use Continental Style 5 extra heavy duty malleable iron couplings with stiffeners.
- C. Flanges: Where steel lines valves or accessories connect to plastic lines 2-1/2" and larger, use polyethylene and steel flat face flanges with full face gaskets.
- D. Casing: Encase plastic lines under streets in schedule 40 galvanized steel pipe extending 36" beyond paving.
- E. Service Risers: Wayne Manufacturing compression service riser with anode and built-in stiffener.

2.5 EXTERIOR CLEANOUTS

- A. Provide and install cleanouts in exterior sewer lines where shown or as required by ordinance but not greater than 80 ft. apart. Cleanouts shall consist of a concrete encased special fitting with sewer pipes extending therefrom upward, terminating in a concrete slab. A brass countersunk cleanout ferrule shall be set on this slab in such manner as to be flush with finished grade and to provide access, through its cover, to the cleanout. Cleanouts shall be the same size as the sewer, up to 6" in size, and 4" on 6" and larger sizes.

2.6 GATE VALVES IN EXTERIOR WATER LINES

- A. Buried Valves: Buried valves shall meet the requirements of AWWA standard C500-61. Design working pressure shall be 175 psi and the valves shall be double disc gate valves with non-rising stems. Valves

shall have mechanical joint ends except where flanged ends are shown on the drawings. Valve stems shall be furnished with O-ring seals. All valves shall open by turning counter clockwise.

- B. Valve Boxes: Cast iron valve boxes shall be furnished for each underground valve. 6" cast iron pipe sections shall be used for box extensions where required. Each box shall have a cast iron cover and shall have a flange type base, approximately 4" larger in diameter than the outside diameter of the barrel and provided with a locking device as shown on the drawings. Anchor valve boxes with a flush 18"x18"x8" reinforced concrete collar.
- C. Extension Stems: Extension stems shall be provided for all buried valves where the top of the operating nut is 36" or more below finished grade. Top of the extension stems shall be not more than 18" below finished grade.
- D. Collar: Provide a protective concrete collar, square, dimension equal to valve cover frame plus 12" and no less than 8" thickness. Use 3,000 PSI concrete with reinforcing. Set top of cover flush with finish paving and 1" above finish grade level.

3 PART 3 EXECUTION

3.1 LAYOUT OF UTILITY LINES

- A. Before starting excavation Contractor shall:
 - 1. Uncover and determine the elevation at beginning and end terminals of each line.
 - 2. Compute and verify depth of all lines and grade of sewer lines and submit figures in writing.
 - 3. Stake route of each line.
 - 4. Arrange utility connections with authorities.
 - 5. Locate and identify any conflicting underground structures and adjust grade or routing to accommodate installation of the lines.

3.2 LAYING PIPE

- A. Lay pipe to the lines and profiles required by conditions at the site and the drawings. Keep pipe trenches free of water and dry during the bedding, laying and jointing operations. Install fittings and valves at the required locations, with joints centered and with valve stems vertical. Handle pipe carefully to avoid damage to dimensioned ends. Remove pipe with damaged ends which cannot be suitably repaired. Keep interior of piping and accessories clean.

- B. Proximity of Water and Sewer Lines: Unless otherwise required by drawings, lay parallel water lines and sewer lines in separate trenches at least 5 feet apart. Insofar as possible place water line at a higher elevation than the sewer. Where water lines and sewer lines cross each other, the water line shall be at least 3 feet above the sewer, or if this is not possible, amount of clearance between the lines may be reduced to 12" out to out clearance provided the sewer line is cast iron for at least 10 feet on each side of the water line.

3.3 EXCAVATION FOR OUTSIDE UTILITIES

- A. The Contractor shall perform any excavations of every description and of whatever substances encountered, to the depths indicated on the drawings and/or required for the installation of his work.
- B. Trench Width: The minimum width of the trench shall be the outside diameter of the pipe plus 12" and the maximum width shall be the outside diameter of the pipe plus 18". The trenching equipment shall be maintained on a sufficiently level road bed to provide substantially vertical trench walls from bottom of trench to the top of the trench.
- C. Trench Excavation: The trench shall be excavated to the depth required so as to provide a uniform and continuous bearing and support for the pipe on solid and undisturbed ground. There shall be no classification of or extra payment for excavated materials, and all materials encountered shall be excavated as required.
- D. Bury: Nonmetallic pipe shall be buried with 36" minimum cover, metallic pipe shall have minimum 24" cover.
- E. Bracing and Sheeting: Open-cut trenches shall be sheeted and braced as required by OSHA and the State of Texas Open Trench Act as may be necessary for the safety of the workmen or protection of property. This provision shall be strictly enforced for all trenches greater than 5 feet in depth.
- F. Barricades and Safety Provisions: To protect persons for injury and to avoid property damage, adequate barricades, construction signs, warning lights and guards as required shall be placed and maintained during progress of the construction work. All material, piles, equipment, pipe, and open trenches that may serve as hazards to vehicular or pedestrian traffic shall be protected by barricades or fences and warning lights.

3.4 BACKFILLING

- A. The trenches shall not be backfilled until all required tests are performed and until the utilities systems as installed conform to the requirements specified hereinafter. The trenches shall be carefully backfilled with the excavation materials approved for backfilling, consisting of earth, loam, sandy clay, sand and gravel, soft shale, or other approved materials free from large clods of earth or stones deposited in thoroughly and carefully

rammed 6" layers, until the pipe has a cover of not less than one foot for water mains and two feet where possible for other lines.

- B. The remainder of the backfill material shall then be thrown into the trench, moistened and tamped in one foot layers. Blasted rock, broken concrete or pavement, and large boulders shall not be used as backfill material. Settling the backfill with water will be permissible and will be a requirement when so directed. Any trenches improperly backfilled or where settlement occurs, shall be reopened to the depth required for proper compaction, then refilled and mounded over, and smoothed off.
- C. Open trenches across roadways or other areas to be paved shall be backfilled as specified above, except that the entire depth of the trench shall be backfilled in 6" layers, each layer moistened and compacted to a density at least equal to that of the surrounding earth in such manner as to permit the rolling and compaction of the filled trench together with the adjoining earth to provide the required bearing value, so that paving of the area can proceed immediately after backfilling is completed. Along all other portions of the trenches, the ground shall be graded to a reasonable uniformity and the mounding over the trenches left in a uniform and neat condition.

3.5 OPENING AND RECLOSING PAVEMENT

- A. Where excavation requires the opening of existing walks, streets, drives or other existing pavement, that pavement shall be cut as required to install new lines and to make new connections to existing lines. The sizes of the cut shall be held to a minimum, consistent with the work to be completed and when the excavation has been backfilled, the paving shall be patched, using materials to match those cut out. The patches shall thoroughly bond with the original surfaces and shall be level with them. Quality of the patch shall be equal to or better than adjacent paving.

3.6 UTILITY SERVICES

- A. Water Service: The contractor shall arrange with the city for a new meter and water service at the point(s) shown on the drawings. Refer to the drawings for details. Pay any charges levied by the city for this connection.
- B. Sanitary Sewer: If necessary, the contractor shall arrange with the city for sewer service at the point shown on the drawings. Pay any charges levied by the city for this connection. Refer to the drawings for details.
- C. Gas: The contractor shall provide natural gas service as indicated on the drawings and extend service from the existing meter as shown. Provide service valves at each service point. Refer to the drawings for details.
- D. Electricity: The contractor shall arrange with the electric utility company for new work as shown on the drawings. Pay any charges levied by the

utility for this connection. Refer to the drawings for details and Section 26 27 00.

3.7 TESTING

- A. Sewer: Prior to testing for leakage the trench shall be backfilled up to at least the lower half of the pipe. If required, sufficient additional backfill shall be placed to prevent pipe movement during testing, leaving the joints uncovered to permit inspection. Visible leaks encountered shall be corrected. Test shall be made by filling the line to be tested with water so that a head of at least 10 feet is provided above the top of the pipe at the upper end of the pipe line to be tested. The filled line shall be allowed to stand not less than 4 hours.
- B. Water Lines Soldered or Flanged: Test under hydrostatic pressure of 150 PSIG for 4 hours with no leaks and no pressure drop.
- C. Gas: Before backfilling, test under air pressure at 15 PSIG for 24 hours. There shall be no pressure drop, except for correction for temperature variation. If any pressure drop occurs, soap test every joint, correct the leaks and retest.

END OF SECTION

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1 PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Floor drains.
- B. Cleanouts.
- C. Hose bibs.
- D. Backflow preventers.
- E. Water hammer arrestors.
- F. Pressure reducing valves.

1.2 RELATED SECTIONS

- A. Section 22 11 00 – Plumbing Piping.
- B. Section 22 42 00 – Plumbing Fixtures.

1.3 REFERENCES

- A. ASME A112.21.1 – Floor Drains.
- B. ASME A112.26.1 – Water Hammer Arrestors.
- C. ASSE 1011 – Hose Connection Vacuum Breakers.
- D. ASSE 1012 – Backflow Preventers with Immediate Atmospheric Vent.
- E. ASSE 1013 – Backflow Preventers, Reduced Pressure Principle.
- F. ASSE 1019 – Wall Hydrants, Frost Proof Automatic Draining Anti-Backflow Types.
- G. AWWA C506 – Backflow Prevention Devices – Reduced Pressure Principle and Double Check Valve Types.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years experience.

1.5 DELIVERY, STORAGE, AND PROTECTION

- A. Accept specialties on site in original factory packaging. Inspect for damage.

1.6 EXTRA MATERIALS

- A. Supply two hose end vacuum breakers for hose bibs.

2 PART 2 PRODUCTS

2.1 FLOOR DRAINS

- A. Floor Drain:
 - 1. Manufacturers:
 - a. Josam 30003-5A
 - b. Substitutions: Permitted.
 - 2. ANSI A112.21.1; lacquered cast iron two piece body with double drainage flange, weep holes, 1/2" trap primer and round, adjustable Nikaloy strainer.

2.2 CLEANOUTS

- A. Exterior Unsurfaced Areas:
 - 1. Manufacturers:
 - a. Josam 58180-22.
 - b. Substitutions: Permitted.
 - 2. Line type with lacquered cast iron body and round bronze cover.
- B. Interior Finished Wall Areas:
 - 1. Manufacturers:
 - a. Josam 58600
 - b. Substitutions Permitted.
 - 2. Line type with lacquered cast iron body and round epoxy coated gasketed cover, and round stainless steel access cover secured with machine screw.

2.3 HOSE BIBS

- A. Exterior:
 - 1. Manufacturers:
 - a. Woodford Model B-65.
 - b. Substitutions: Permitted.
 - 2. Bronze or brass, one piece valve plunger to control both flow and drain functions, hose thread spout, loose key, vacuum breaker in conformance with ANSI/ASSE 1011, chrome finished box.

2.4 BACKFLOW PREVENTER

- A. Double Check Valve Assemblies:

1. Manufacturers:
 - a. Watts Series 009QT for lines 1/2" to 3".
 - b. Watts Series 909 for lines 4" to 8".
 - c. Substitutions: Permitted.
2. ANSI/ASSE 1015, AWWA C510; Bronze or epoxy coated ductile iron body with corrosion resistant internal parts and stainless steel springs; two independently operating check valves with intermediate atmospheric vent; valve shut offs.

2.5 WATER HAMMER ARRESTORS

- A. Manufacturer: Watts Series 15.
- B. Other acceptable manufacturers offering equivalent products.
 1. Josam 75000-S Series.
 2. Substitutions: Permitted.
- C. ANSI A112.26.1; copper or stainless steel construction, bellows or piston type sized in accordance with PDI WH-201, precharged suitable for operation in temperature range -33 to 180 degrees F and maximum 150 psi working pressure.

2.6 PRESSURE REDUCING VALVES

- A. Manufacturer: Watts Series 223B or U5B.
 1. Substitutions: Permitted.
- B. Construction: Bronze body, stainless steel strainer, threaded inlet and tailpiece, removable disc holder, sealed cage, high capacity.
- C. Provide pressure reducing valve as required by local codes. Set pressure at 80 psi or as required to comply with local codes. Contractor is responsible to conduct pressure test on city mains before bidding on project.

3 PART 3 EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.
- C. Encase exterior cleanouts in concrete flush with grade. See Drawings for detail.

- D. Install approved potable water protection devices on plumbing lines where contamination of domestic water may occur; on main water supply, boiler feed water lines, janitor rooms, fire sprinkler system, premise isolation, irrigation systems, flush valves, interior and exterior hose bibs.
- E. Pipe relief from backflow preventer to nearest drain.
- F. Install water hammer arrestors on hot and cold water supply piping to each and every fixture.

END OF SECTION

SECTION 22 05 29 HANGERS AND SUPPORTS

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1 PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Pipe and equipment hangers and supports.
- B. Equipment bases and supports.
- C. Sleeves and seals.
- D. Flashing and sealing equipment and pipe stacks.

1.2 RELATED SECTIONS

- A. Section 22 07 00 – Piping Insulation.
- B. Section 22 11 00 – Plumbing Piping.

1.3 REFERENCES

- A. ASME B31.1 – Power Piping
- B. ASME B31.2 – Fuel Gas Piping
- C. ASME B31.5 – Refrigeration Piping
- D. ASME B31.9 – Building Services Piping
- E. ASTM F708 – Design and Installation of Rigid Pipe Hangers.
- F. MSS SP58 – Pipe Hangers and Supports – Materials, Design and Manufacturer.
- G. MSS SP69 – Pipe Hangers and Supports – Selection and Application.
- H. MSS SP89 – Pipe Hangers and Supports – Fabrication and Installation Practices.

2 PART 2 PRODUCTS

2.1 PIPE HANGERS AND SUPPORTS

- A. Plumbing Piping – DWV:
 - 1. Conform to ASME B31.9.
 - 2. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Malleable iron, adjustable swivel, split ring.
 - 3. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.

4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
 5. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
 6. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
 7. Vertical Support: Steel riser clamp.
 8. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
 9. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
- B. Plumbing Piping – Water:
1. Conform to ASME B31.9.
 2. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Carbon steel, adjustable swivel, split ring.
 3. Hangers for Cold Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
 4. Hangers for Hot Pipe Sizes 2 to 4 Inches: Carbon steel, adjustable, clevis.
 5. Hangers for Hot Pipe Sizes 6 Inches and Over: Adjustable steel yoke, cast iron roll, double hanger.
 6. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
 7. Multiple or Trapeze Hangers for Hot Pipe Sizes 6 Inches and Over: Steel channels with welded spacers and hanger rods, cast iron roll.
 8. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
 9. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
 10. Wall Support for Hot Pipe Sizes 6 Inches and Over: Welded steel bracket and wrought steel clamp with adjustable steel yoke and cast iron roll.
 11. Vertical Support: Steel riser clamp.
 12. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
 13. Floor Support for Hot Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
 14. Floor Support for Hot Pipe Sizes 6 Inches and Over: Adjustable cast iron roll and stand, steel screws, and concrete pier or steel support.
 15. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
- 2.2 ACCESSORIES
- A. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.
- 2.3 INSERTS

- A. Inserts: Malleable iron case of 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: 26 gauge thick galvanized steel.
- B. Metal Counterflashing: 22 gauge thick galvanized steel.
- C. Lead Flashing:
 - 1. Waterproofing: 5 lb/sq ft sheet lead
 - 2. Soundproofing: 1 lb/sq ft sheet lead.
- D. Flexible Flashing: 47 mil thick sheet; compatible with roofing.
- E. Caps: Steel, 22 gauge minimum; 16 gauge at fire resistant elements.

2.5 EQUIPMENT CURBS

- A. Fabrication: Welded 18 gauge galvanized steel shell and base, mitered 3 inch cant, installed wood nailer.

2.6 SLEEVES

- A. Sleeves for Pipes Through Non-fire Rated Floors: 18 gauge thick galvanized steel.
- B. Sleeves for Pipes Through Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Steel pipe or 18 gauge thick galvanized steel.
- C. Sleeves for Pipes Through Fire Rated and Fire Resistive Floors and Walls, and Fire Proofing: Prefabricated fire rated sleeves including seals, UL listed.
- D. Sleeves for Round Ductwork: Galvanized steel.
- E. Sleeves for Rectangular Ductwork: Galvanized steel or wood.
- F. Sealant: Acrylic.

3 PART 3 EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

3.2 INSERTS

- A. Provide inserts for placement in concrete formwork.
- B. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
- C. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
- D. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
- E. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut flush with top of slab.

3.3 PIPE HANGERS AND SUPPORTS

- A. Support horizontal piping as scheduled. All piping shall be adequately supported. All piping shall be installed with due regard to expansion and contraction. Use vibration dampers where required.
- B. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
- C. Place hangers within 12 inches of each horizontal elbow.
- D. Use hangers with 1-1/2 inch minimum vertical adjustment.
- E. All exposed vertical risers running near column shall be supported with beam clamps. Each line shall have supports not greater than 10'-0" on center, with additional provision that there be a support near top of riser. All supports shall be aligned.
- F. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- G. Support riser piping independently of connected horizontal piping.
- H. Provide sheet lead packing between hanger or support and piping.
- I. Design hangers for pipe movement without disengagement of supported pipe.
- J. Perforated strap iron and wire are not acceptable hanger materials.

3.4 EQUIPMENT BASES AND SUPPORTS

- A. Provide housekeeping pads of concrete, minimum 4 inches thick and extending 6 inches beyond supported equipment.
- B. Provide templates, anchor bolts, and accessories for mounting and anchoring equipment.
- C. Construct supports 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 counterflashing where piping and ductwork penetrate weather or waterproofed walls, floors, and roofs.
- B. Flash vent and soil pipes projecting 3 inches minimum above finished roof surface with lead worked 1 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, metal counterflash, 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 drains watertight to adjacent materials.
- E. Provide curbs for mechanical roof installations 14 inches minimum high above roofing surface. Flash and counterflash with sheet metal; seal watertight. Attach counterflashing mechanical equipment and lap base flashing on roof curbs. Flatten and solder joints.
- F. Adjust storm collars tight to pipe with bolts; caulk around top edge. Use storm collars above roof jacks. Screw vertical flange section to face of curb.

3.6 SLEEVES

- A. Set sleeves in position in formwork. Provide reinforcing around sleeves.
- B. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.
- C. Extend sleeves through floors 1 inch above finished floor level. Caulk sleeves.
- D. Where piping or ductwork penetrates floor, ceiling, or wall, close off space between pipe or duct and adjacent work with stuffing insulation and caulk.

Provide close fitting metal collar or escutcheon covers at both sides of penetration.

- E. Install chrome plated steel escutcheons at finished surfaces.

3.7 SCHEDULES

PIPE SIZE Inches	MAX. HANGER SPACING DIAMETER Feet	HANGER ROD Inches
1/2 to 1-1/4	6.5	3/8
1-1/2 to 2	10	3/8
2-1/2 to 3	10	1/2
4 to 6	10	5/8
8 to 12	14	7/8
14 and Over	20	1
PVC (All Sizes)	6	3/8

END OF SECTION

SECTION 22 05 53 PLUMBING IDENTIFICATION

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2	PART 2 PRODUCTS	1
2.1	NAMEPLATES	1
2.2	TAGS	1
2.3	STENCILS	2
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2.6	LOCKOUT DEVICES	3
3	PART 3 EXECUTION	3
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1 PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Nameplates.
- B. Tags.
- C. Stencils.
- D. Pipe Markers.

1.2 REFERENCES

- A. ASME A13.1 – Scheme for the Identification of Piping Systems.

1.3 SUBMITTALS FOR REVIEW

- A. Submit list of wording, symbols, letter size, and color coding for mechanical identification.
- B. Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
- C. Obtain Owner's approval for all identification materials before installing.

1.4 REGULATORY REQUIREMENTS

- A. Conform to NFPA 99 requirements for labeling and identification of gas piping systems and accessories.

2 PART 2 PRODUCTS

2.1 NAMEPLATES

- A. Description: Laminated three-layer plastic with engraved black letters on yellow background color.

2.2 TAGS

- A. Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inches square.
- B. Information Tags: Clear plastic with printed "Danger," "Caution," or "Warning" and message; size 3-1/4 x 5-5/8 inches with grommet and self-locking nylon ties.

2.3 STENCILS

- A. Stencils: With clean cut symbols and letters of following size:
 - 1. Up to 2 inch Outside Diameter of Insulation or Pipe: 1/2 inch high letters.
 - 2. 2-1/2 to 6 inches Outside Diameter of Insulation or Pipe: 1 inch high letters.
 - 3. Over 6 inches Outside Diameter of Insulation or Pipe: 1-3/4 inches high letters.
 - 4. Ductwork and Equipment: 1-3/4 inches high letters.
- B. Stencil Paint: Semi-gloss enamel, colors and lettering size conforming to ASME A13.1.

2.4 PIPE MARKERS

- A. Color and Lettering: Conform to ASME A13.1.
- B. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering. Larger sizes may have maximum sheet size with spring fastener.
- C. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.
- D. Plastic Underground Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.

2.5 PIPING IDENTIFICATION:

- A. Identify all above-ground piping and piping in tunnels by means of color coded bands and stencil and paint in accordance with the following tables: (NOTE: Not all systems may be used on this project.)

<u>Systems</u>	<u>Band Color</u>	<u>Label</u>
Domestic Cold Water	Light Blue	DOM-C-WTR
Domestic Hot Water Supply	Dark Blue	DOM-H-WTR SUP
Domestic Hot Water Return	Dark Blue	DOM-H-WTR RET
Chilled Water Supply	Light Green	CHS
Chilled Water Return	Light Green	CHR
Heating Water Supply	Dark Green	HWS
Heating Water Return	Dark Green	HWR
Steam	Light Gray	ST (*)
Condensate	Light Gray	COND
Deionized Water	Light Blue	DEION-WTR
Compressed Air	Black on Yellow	COMP_AIR

Vacuum	Black on White	VAC
Natural Gas	Yellow	GAS
Drain Lines	Black	DRAIN

* On label on steam lines, include the steam pressure involved within the parenthesis.

- B. Install color coded bands and stencils in accordance with the following specific instructions. Stencil and color band pipes at each valve to show proper identification of pipe contents. Where several valves exist on one header, mark only the header. Provide a black arrow marker at each pipe stencil pointing away from the stencil to indicate flow direction. Use a double-ended arrow marker when flow can be in either or both directions. Apply a pipe stencil, color band, and an arrow marker with 10' each side of each point of pipe penetration through walls, floors, or ceilings and at maximum spacing of 10' on exposed piping and 50' on concealed piping. Apply pipe identification on side of pipe providing the least obstructed view. On lines that are dark in color, provide white backgrounds for color bands, stencils, and arrow markers. Characters used in stencils shall be 2" high on lines 3" or more (including insulation) in diameter and 1" high on lines less than 3" in diameter. Color bands shall be 4" wide.

2.6 LOCKOUT DEVICES

- A. Anodized aluminum hasp with erasable label surface; size minimum 7-1/4 x 3 inches.
- B. Valve Lockout Devices: Lockable handle preventing access to valve operator, accepting lock shackle.

3 PART 3 EXECUTION

3.1 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.

3.2 INSTALLATION

- A. Install identifying devices after completion of coverings and painting.
- B. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive.
- C. Install labels with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer. For unfinished canvas covering, apply paint primer before applying labels.
- D. Install tags using corrosion resistant chain. Number tags consecutively by location.

- E. Install underground plastic pipe markers 6 to 10 inches below finished grade, directly above buried pipe.
- F. Identify air handling units, pumps, heat transfer equipment, tanks, and water treatment devices with plastic nameplates. Small devices, such as in-line pumps, may be identified with tags.
- G. Identify control panels and major control components outside panels with plastic nameplates.
- H. Identify valves in main and branch piping with tags.
- I. Tag automatic controls, instruments, and relays. Key to control schematic.
- J. Identify piping, concealed or exposed, with plastic pipe markers. Use tags on piping 3/4 inch diameter and smaller. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and tee, at each side of penetration of structure or enclosure, and at each obstruction.
- K. Identify ductwork with plastic nameplates. Identify with air handling unit identification number and area served. Locate identification at air handling unit, at each side of penetration of structure or enclosure, and at each obstruction.

END OF SECTION

SECTION 22 07 00 PIPING INSULATION

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1 PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Piping insulation.
- B. Jackets and accessories.

1.2 RELATED SECTIONS

- A. Section 22 05 53 – Plumbing Identification.
- B. Section 22 11 00 – Plumbing Piping: Placement of hangers and hanger inserts.

1.3 REFERENCES

- A. ASTM C547 – Standard Specification for Mineral Fiber Preformed Pipe Insulation.
- B. ASTM C552 – Standard Specification for Cellular Glass Thermal Insulation.
- C. ASTM C578 – Standard Specification for Preformed, Cellular Polystyrene Thermal Insulation.
- D. ASTM C591 – Standard Specification for Unfaced Preformed Rigid Cellular Polyurethane Thermal Insulation.
- E. ASTM C610 – Standard Specification for Expanded Perlite Block and Pipe Thermal Insulation.
- F. ASTM C921 – Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.
- G. ASTM D1056 – Standard Specification for Flexible Cellular Materials – Sponge or Expanded Rubber.
- H. ASTM D1667 – Standard Specification for Flexible Cellular Materials--Vinyl Chloride Polymers and Copolymers (Closed-Cell Foam).
- I. ASTM D1784 – Standard Specification for Rigid Poly (Vinyl Chloride) PVC Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
- J. ASTM D2842 – Standard Test Method for Water Absorption of Rigid Cellular Plastics.

- K. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
 - L. ASTM E96 – Standard Test Methods for Water Vapor Transmission of Materials.
 - M. NAIMA National Insulation Standards.
 - N. NFPA 255 – Standard Method of Test of Surface Burning Characteristics of Building Materials.
 - O. UL 723 – Standard for Test for Surface Burning Characteristics of Building Materials.
- 1.4 REGULATORY REQUIREMENTS
- A. Conform to maximum flame spread/smoke developed rating of 25/50 in accordance with NFPA 255.
- 1.5 DELIVERY, STORAGE, AND PROTECTION
- A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.
- 1.6 ENVIRONMENTAL REQUIREMENTS
- A. Maintain ambient conditions required by manufacturers of each product.
 - B. Maintain temperature before, during, and after installation for minimum of 24 hours.
- 2 PART 2 PRODUCTS
- 2.1 DOMESTIC HOT WATER LINES
- A. Vapor Barrier Lap Adhesive:
 - 1. Compatible with insulation.
- 2.2 DOMESTIC COLD WATER LINES
- A. Insulation: Owens–Corning Fiberglas ASJ/SSL–II molded sectional glass fiber pipe covering with an all service jacket (ASJ). Vapor seal all insulation.
 - B. Concealed Valves and Fittings: Preformed “Zeston” PVC covers over fiberglass insulation.
 - C. Exposed Valves and Fittings: Hamfab insulation fittings.

- D. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.

2.3 DRAIN LINES

- A. Manufacturer: Manville Type II "Aerotube".
 - 1. Substitutions: Permitted.
- B. Insulation: May be slit flange type.

2.4 REFRIGERATION SUCTION LINES

- A. Manufacturer: Manville Type II "Aerotube".
 - 1. Substitutions: Permitted.
- B. Insulation: Thread onto piping during fabrication and seal with adhesive.

3 PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that piping has been tested before applying insulation materials.
- B. Verify that surfaces are clean and dry, with foreign material removed.

3.2 INSTALLATION

- A. Install in accordance with NAIMA National Insulation Standards.
- B. Exposed Piping: Locate insulation and cover seams in least visible locations. For PVC piping installed in Plenum: Install fire wrap to comply with code.
- C. Insulated pipes conveying fluids below ambient temperature: Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, and expansion joints.
- D. Glass fiber insulated pipes conveying fluids below ambient temperature:
 - 1. Provide vapor barrier jackets, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
 - 2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.
- E. For hot piping conveying fluids 140 degrees F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.

- F. For hot piping conveying fluids over 140 degrees F, insulate flanges and unions at equipment.
- G. Glass fiber insulated pipes conveying fluids above ambient temperature:
 - 1. Provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples.
 - 2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.
- H. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions.
- I. Exterior Applications: Provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with jacket with seams located on bottom side of horizontal piping.
- J. Buried Piping: Provide factory fabricated assembly with inner all-purpose service jacket with self-sealing lap, and asphalt impregnated open mesh glass fabric, with one mil thick aluminum foil sandwiched between three layers of bituminous compound; outer surface faced with a polyester film.

3.3 SCHEDULES

- A. Plumbing Systems:
 - 1. Domestic Hot Water Supply:
 - a. Glass Fiber Insulation:
 - b. Thickness: 1 inch .
 - 2. Domestic Cold Water Supply In Areas Subject to Freezing:
 - a. Glass Fiber Insulation:
 - (a) Pipe Size Range: All sizes.
 - b. Thickness: 3/4 inch.
 - 3. Condensate Drain Lines:
 - a. Thickness: 3/8 inch.
 - 4. Refrigerant Suction:
 - a. Thickness: 3/4 inch.

END OF SECTION

SECTION 22 11 00 PLUMBING PIPING

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1 PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Pipe, pipe fittings, valves, and connections for piping systems.
 - 1. Sanitary sewer.
 - 2. Domestic water.
 - 3. Natural gas.

1.2 RELATED SECTIONS

- A. Section 22 05 53 – Plumbing Identification.
- B. Section 22 07 00 – Piping Insulation.

1.3 REFERENCES

- A. AGA Z21.22 – Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems.
- B. ASME B16.3 – Malleable Iron Threaded Fittings.
- C. ASME B31.1 – Power Piping.
- D. ASME B31.2 – Fuel Gas Piping.
- E. ASME B31.9 – Building Service Piping.
- F. ASTM A53 – Pipe, Steel, Black and Hot-Dipped Zinc Coated, Welded and Seamless.
- G. ASTM B32 – Solder Metal.
- H. ASTM B42 – Seamless Copper Pipe.
- I. ASTM B68 – Seamless Copper Tube (ASTM B68M – Seamless Copper Tube).
- J. ASTM B75 – Seamless Copper Tube (ASTM B75M – Seamless Copper Tube).
- K. ASTM B88 – Seamless Copper Water Tube (ASTM B88M – Seamless Copper Water Tube).
- L. ASTM B280 – Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.
- M. ASTM D1785 – Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.

- N. ASTM D2241 – Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
- O. ASTM D2466 – Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
- P. ASTM D2513 – Thermoplastic Gas Pressure Pipe, Tubing and Fittings.
- Q. ASTM D2564 – Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings.
- R. ASTM D2609 – Plastic Insert Fittings for Polyethylene (PE) Plastic Pipe.
- S. ASTM D2665 – Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings.
- T. ASTM D2729 – Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- U. ASTM D2855 – Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings.
- V. ASTM F679 – Poly (Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings.
- W. ASTM F708 – Design and Installation of Rigid Pipe Hangers.
- X. AWWA C651 – Disinfecting Water Mains.
- Y. AWWA C900 – Polyvinyl Chloride (PVC) Pressure Pipe, 4 in. Through 12 in. for Water Distribution.
- Z. MSS SP58 – Pipe Hangers and Supports – Materials, Design and Manufacturer.
- AA. MSS SP69 – Pipe Hangers and Supports – Selection and Application.
- BB. MSS SP-110 – Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.
- CC. NFPA 54 – National Fuel Gas Code.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with County of Tom Green and State of Texas requirements.
- B. Valves: Manufacturer's name and pressure rating marked on valve body.
- C. Identify pipe with marking including size, water pressure rating.

1.5 REGULATORY REQUIREMENTS

- A. Perform Work in accordance with State of Texas Requirements, and the 2015 International Plumbing Code.
- B. Conform to code for installation of backflow prevention devices.
- C. Provide certificate of compliance from the State of Texas indicating approval of installation of backflow prevention devices.

1.6 DELIVERY, STORAGE, AND PROTECTION

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- C. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Do not install underground piping when bedding is wet or frozen.

2 PART 2 PRODUCTS

2.1 SANITARY SEWER PIPING

- A. PVC Pipe: ASTM D3034 SDR 35.
 - 1. Fittings: PVC.
 - 2. Joints: ASTM F477, elastomeric gaskets.
- B. PVC Pipe: ASTM D2665 or ASTM D3034.
 - 1. Fittings: PVC.
 - 2. Joints: ASTM D2855, solvent weld with ASTM D2564 solvent cement.

2.2 WATER PIPING, BELOW GRADE

- A. Copper Tubing: ASTM B88, hard drawn, Type K.
 - 1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22 wrought copper and bronze.
 - 2. Joints: ASTM B32, solder, Grade 95TA.

2.3 WATER PIPING, ABOVE GRADE

- A. Copper Tubing: ASTM B88, Type L, hard drawn.

1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
2. Joints: ASTM B32, solder, Grade 95TA.

2.4 CONDENSATE DRAIN LINES

- A. Copper Tubing: ASTM B88, Type L, hard drawn.
1. Joints: ASTM B32, solder, Grade 95TA.

2.5 NATURAL GAS PIPING, BURIED BEYOND 5 FEET OF BUILDING (N/A)

- A. Steel Pipe: ASTM A53 Schedule 40 black.
1. Fittings: ASTM A234/A234M with AWWA C105 polyethylene jacket or double layer, half-lapped 10 mil polyethylene tape.
 2. Joints: ANSI B31.1.
- B. Polyethylene Pipe: ASTM D2513, SDR 11.5.
1. Fittings: ASTM D2683 or ASTM D2513 socket type.
 2. Joints: Fusion welded.

2.6 NATURAL GAS PIPING, BURIED WITHIN 5 FEET OF BUILDING (N/A)

- A. Steel Pipe: ASTM A53 Schedule 40 black.
1. Fittings: ASTM A234/A234M.
 2. Joints: ASME B31.1.
 3. Jacket: AWWA C105 polyethylene jacket or double layer, half-lapped 10 mil polyethylene tape.

2.7 NATURAL GAS PIPING, ABOVE GRADE (N/A)

- A. Steel Pipe: ASTM A53 Schedule 40 black.
1. Fittings: ASME B16.3, malleable iron, or ASTM A234/A234M.
 2. Joints: NFPA 54, threaded or welded to ANSI B31.1.

2.8 FLANGES, UNIONS, AND COUPLINGS

- A. Pipe Size 3 inches and Under:
1. Ferrous pipe: Class 150 malleable iron threaded unions.
 2. Copper tube and pipe: Class 150 bronze unions with soldered joints.
- B. Pipe Size Over 1 inch :
1. Ferrous pipe: Class 150 malleable iron threaded or forged steel slip-on flanges; preformed neoprene gaskets.
 2. Copper tube and pipe: Class 150 slip-on bronze flanges; preformed neoprene gaskets.
- C. Grooved and Shouldered Pipe End Couplings:

1. Housing: Malleable iron clamps to engage and lock, designed to permit some angular deflection, contraction, and expansion; steel bolts, nuts, and washers; galvanized for galvanized pipe.
 2. Sealing gasket: "C" shape composition sealing gasket.
- D. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.9 GLOBE VALVES

- A. Up To and Including 3 inches :
1. Manufacturers:
 - a. Grinnell or equal.
 2. MSS SP-80, Class 125 bronze body, bronze trim, handwheel, teflon disc, threaded ends.

2.10 BALL VALVES

- A. Manufacturer: Grinnell or equal.
- B. Construction, 2 inches and Smaller: Model 3810, three-piece body.

2.11 RELIEF VALVES

- A. Pressure Relief:
1. AGA Z21.22 certified, bronze body, teflon seat, steel stem and springs, automatic, direct pressure actuated.
- B. Temperature and Pressure Relief:
1. AGA Z21.22 certified, bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, temperature relief maximum 210 degrees F , capacity ASME SEC IV certified and labeled.

2.12 SOLENOID VALVES

- A. Remotely Controlled:
1. Butler and Land 8210 Series. Coordinate voltage with Control Contractor.
 2. Brass body, Type 3 general purpose enclosure.

2.13 FIRE STOP SYSTEMS

- A. General Purpose Fire Stopping Sealant:
1. Water based, nonslumping, premixed sealant with intumescent properties, rated for 3 hours per ASTM E814 and UL 1479.
- B. General Purpose Vibration Resistant Fire Stopping Sealant:

1. Silicone based, nonslumping, premixed sealant with intumescent properties, vibration and moisture resistant, rated for 3 hours per ASTM E814 and UL 1479.
- C. DWV Plastic Pipe Systems Fire Stopping Sealant:
 1. Silicone based, premixed sealant with intumescent properties, vibration and moisture resistant, rated for 3 hours per ASTM E814 and UL 1479 with metal collars.

3 PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that excavations are to required grade, dry, and not over-excavated.

3.2 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- D. Install piping to maintain headroom, conserve space, and not interfere with use of space.
- E. Group piping whenever practical at common elevations.
- F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- G. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings. Refer to Section 22 07 00.
- H. Establish elevations of buried piping outside the building to ensure not less than 2 ft of cover.

- I. Install vent piping penetrating roofed areas to maintain integrity of roof assembly.
- J. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- K. Provide support for utility meters in accordance with requirements of utility companies.
- L. Prepare exposed, unfinished pipe, fittings, supports, and accessories ready for finish painting.
- M. Excavate in accordance with Section 22 00 20 for work of this Section.
- N. Backfill in accordance with Section 22 00 20 work of this Section.
- O. Install bell and spigot pipe with bell end upstream.
- P. Install valves with stems upright or horizontal, not inverted.
- Q. Pipe vents from gas pressure reducing valves to outdoors and terminate in weather proof hood.
- R. Firewrap all PVC piping and venting in return air plenum spaces.
- S. Install water piping to ASME B31.9.

3.4 APPLICATION

- A. Use grooved mechanical couplings and fasteners only in accessible locations.
- B. Install unions downstream of valves and at equipment or apparatus connections.
- C. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.
- D. Install ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- E. Provide plug valves in natural gas systems for shut-off service.

3.5 ERECTION TOLERANCES

- A. Establish invert elevations, slopes for drainage to 1/4 inch per foot maximum and 1/8 inch per foot minimum. Maintain gradients.
- B. Slope water piping minimum 0.25 percent and arrange to drain at low points.

3.6 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Prior to starting work, verify system is complete, flushed and clean.
- B. Ensure Ph of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).
- C. Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, throughout system to obtain 50 to 80 mg/L residual.
- D. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.
- E. Maintain disinfectant in system for 24 hours.
- F. If final disinfectant residual tests less than 25 mg/L, repeat treatment.
- G. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.
- H. Take samples no sooner than 24 hours after flushing, from 5 percent of outlets and from water entry, and analyze in accordance with AWWA C651.

3.7 SERVICE CONNECTIONS

- A. Provide new sanitary sewer service or tie into existing sewer service as shown on drawings. Before commencing work check invert elevations required for sewer connections, confirm inverts and ensure that these can be properly connected with slope for drainage and cover to avoid freezing.
- B. Provide new water service complete with approved reduced pressure or double check backflow preventer and water meter with by-pass valves and pressure reducing valve or tie into existing water service valve as shown on drawings.

END OF SECTION

SECTION 22 42 00 PLUMBING FIXTURES

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1 PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Water closets.
- B. Urinals.
- C. Lavatories.
- D. Electric water fountain.
- E. Electric water heater.
- F. Recirculating pump.

1.2 RELATED SECTIONS

- A. Section 22 05 29 – Supports and Anchors.
- B. Section 22 11 00 – Plumbing Piping.
- C. Section 22 05 00 – Plumbing Specialties.

1.3 REFERENCES

- A. ARI 1010 – Drinking Fountains and Self-Contained Mechanically Refrigerated Drinking Water Coolers.
- B. ASME A112.6.1 – Supports for Off-the-Floor Plumbing Fixtures for Public Use.
- C. ASME A112.18.1 – Finished and Rough Brass Plumbing Fixture Fittings.
- D. ASME A112.19.2 – Vitreous China Plumbing Fixtures.
- E. ASME A112.19.5 – Trim for Water-Closet Bowls, Tanks, and Urinals.
- F. NFPA 70 – National Electrical Code.

1.4 SUBMITTALS FOR REVIEW

- A. Product Data: Provide catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years experience.

1.6 REGULATORY REQUIREMENTS

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., suitable for the purpose specified and indicated.

1.7 DELIVERY, STORAGE, AND PROTECTION

- A. Accept fixtures on site in factory packaging. Inspect for damage.
- B. Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

1.8 EXTRA MATERIALS

- A. Supply two sets of faucet washers, flush valve service kits and lavatory supply fittings.

2 PART 2 PRODUCTS

2.1 PLUMBING FIXTURE SCHEDULE

- A. Refer to drawings for complete plumbing fixture schedule.

2.2 SUBSTITUTIONS

- A. Substitutions permitted with Engineer's approval.

3 PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that walls and floor finishes are prepared and ready for installation of fixtures.
- B. Verify that electric power is available and of the correct characteristics.
- C. Confirm that millwork is constructed with adequate provision for the installation of counter top lavatories and sinks.

3.2 PREPARATION

- A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

3.3 INSTALLATION

- A. Install each fixture with trap, easily removable for servicing and cleaning.
- B. Provide chrome plated flexible supplies to fixtures with stops, reducers, and escutcheons.
- C. Install components level and plumb.
- D. Install and secure fixtures in place with wall carriers and bolts.
- E. Seal fixtures to wall and floor surfaces with sealant, color to match fixture.
- F. Solidly attach water closets to floor with lag screws. Lead flashing is not intended to hold fixture in place.

3.4 ADJUSTING

- A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

3.5 CLEANING

- A. Clean plumbing fixtures and equipment.

3.6 PROTECTION OF FINISHED WORK

- A. Do not permit use of fixtures.

3.7 SCHEDULES

- A. Fixture Heights: Install fixtures to heights above finished floor as indicated.
 - 1. Water Closet:
 - a. Standard: 15 inches to top of bowl rim.
 - b. Accessible: 17 1/2 inches to top of seat.
 - c. Children's Accessible: 15 inches to top of seat.
 - 2. Urinal:
 - a. Standard: 24 inches to top of bowl rim.
 - b. Accessible: 17 inches to top of bowl rim.
 - c. Children's Accessible: 14 inches to top of bowl rim.
 - 3. Lavatory:
 - a. Standard: 31 inches to top of basin rim.
 - b. Accessible: 34 inches to top of basin rim.
 - c. Children's Accessible: 30 inches to top of basin rim.
 - 4. Drinking Fountain:
 - a. Standard Adult: 40 inches to top of basin rim.
 - b. Accessible: 36 inches to top of spout.

c. Children's Accessible: 32 inches to top of spout.

B. Fixture Rough-In

	<u>Hot</u>	<u>Cold</u>	<u>Waste</u>	<u>Vent</u>
Water Closet:		1 inch	4 inch	2 inch
Urinal:		3/4 inch	2 inch	1-1/2 in
Lavatory:	1/2 inch	1/2 inch	2 inch	1-1/2 in
Drinking		1/2 inch	2 inch	1-1/2 in

END OF SECTION

SECTION 23 00 00 GENERAL PROVISIONS FOR HVAC

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1 PART 1 – GENERAL

1.1 SPECIAL NOTE

- A. The Architectural and Structural Plans and Specifications, including the supplements issued thereto, Information to Bidders, and other pertinent documents issued by the Owner, are a part of these specifications and the accompanying mechanical and electrical plans, and shall be complied with in every respect. All the above is included herewith, will be issued separately or is on file at the Owner's office, and shall be examined by all bidders. Failure to comply shall not relieve the Contractor of responsibility or be used as a basis for additional compensation due to omission of drawings. Where the Supplementary General Conditions conflict with the General Conditions, the Supplementary General Conditions shall govern.
- B. All work covered by this division of the specifications shall be accomplished in accordance with all applicable provisions of the contract documents and any addenda or directive which may be issued.
- C. The mechanical contractor shall familiarize himself with the General Provisions for Electrical, Section 26 00 00, and comply with those requirements which affect his work.

1.2 CHECKING DOCUMENTS

- A. The drawings and the specifications are numbered consecutively. The Contractor shall check the drawings and specifications thoroughly and shall notify the Owner of any discrepancies or omissions of sheets or pages. Upon notification, the Owner will promptly provide the Contractor with any missing portions of the drawings or specifications. No discrepancies or omissions of sheets or pages of the contract documents will relieve the Contractor of his duty to provide all work required by the complete contract documents.

1.3 QUALITY ASSURANCE:

- A. All plumbing work shall be in accordance with the requirements of the International Plumbing Code, 2015 Edition.
- B. All mechanical work shall be in accordance with the requirements of the International Mechanical Code, 2015 Edition.
- C. Buy American Act: Only domestic construction materials will be used by the Contractor, Subcontractors, materialmen, and suppliers in the performance of this contract.
- D. Equipment Vibration Tolerance:

1. After air balance work is completed and permanent drive sheaves are in place, perform field mechanical balancing and adjustments required to meet the specified vibration tolerance.
- E. Products Criteria:
1. Standard Products: Material and equipment shall be the standard products of a manufacturer regularly engaged in the manufacture of the products for at least 3 years. See other specification sections for any exceptions.
 2. Equipment Service: Products shall be supported by a service organization which maintains an adequate inventory of repair parts and is located within a one hundred mile radius of the site.
 3. Multiple Units: When two or more units of materials or equipment of the same type or class are required, these units shall be products of one manufacturer.
 4. Assembled Units: Manufacturers of equipment assemblies, which use components made by others, assume, complete responsibility for the final assembled product.
 5. Nameplates: Nameplate bearing manufacturer's name or identifiable trademark shall be securely affixed in a conspicuous place on equipment, or name or trademark cast integrally with equipment, stamped or otherwise permanently marked on each item of equipment.
- F. Manufacturer's Recommendations: Where installation procedures or any part thereof are required to be in accordance with the recommendations of the manufacturer of the material being installed, printed copies of these recommendations shall be furnished to the Architect prior to installation. Installation of the item will not be allowed to proceed until the recommendations are received. Failure to furnish these recommendations can be cause for rejection of the material.

1.4 LAWS, CODES AND ORDINANCES

- A. All work shall be executed in strict accordance with all local, state and national codes, ordinances and regulations governing the particular class of work involved, as interpreted by the inspecting authority. The Contractor shall be responsible for the final execution of the work under this heading to suit those requirements. Where these specifications and the accompanying drawings conflict with these requirements, the Contractor shall report the matter to the Owner, shall prepare any supplemental drawings required illustrating how the work may be installed so as to comply and, on approval, make the changes at no cost to the Owner. On completion of the various portions of the work the installation shall be tested by the constituted authorities, approved and,

on completion of the work, the Contractor shall obtain and deliver to the Owner a final certificate of acceptance.

1.5 TERMINOLOGY

- A. Whenever the words “furnish”, “provide”, “furnish and install,” “provide and install”, and/or similar phrases occur, it is the intent that the materials and equipment described be furnished, installed and connected under this Division of the Specifications, complete for operation unless specifically noted to the contrary.
- B. Where a material is described in detail, listed by catalogue number or otherwise called for, it shall be the Contractor’s responsibility to furnish and install the material.
- C. The use of the word “shall” conveys a mandatory condition to the contract.
- D. “This section” always refers to the section in which the statement occurs.
- E. “The project” includes all work in progress during the construction period.
- F. “Concealed” areas are those areas which cannot be seen by the building occupants from the floor with all building components in place.
- G. “Exposed” areas are all areas which are exposed to view by the building occupants including mechanical rooms.
- H. In describing the various items of equipment, in general, each item will be described singularly, even though there may be a multiplicity of identical or similar items.

1.6 ENGINEER’S STATUS DURING CONSTRUCTION:

- A. The work, from its commencement to its completion, shall be under the exclusive charge and control of the Contractor, and all risks in connection therewith shall be borne by the Contractor.
- B. The Engineer’s efforts during periodic site visits will be directed toward assisting the Architect in providing assurance for the Owner that the completed project will conform to the requirements of the contract documents, but the Engineers will not be responsible for the Contractor’s failure to perform the work in accordance with contract documents.
- C. The Engineer will make recommendations to the Architect regarding disapproval or rejection of work which, in his opinion, is defective, i.e.; is unsatisfactory, faulty or defective, or does not conform to the requirements of the contract documents. Failure on the part of the Engineer to recommend disapproval of or rejection of work, methods, or

acts or omissions of any kind shall never at any time be deemed to constitute acceptance or approval of the same.

1.7 GENERAL

- A. In general, the lines and ducts to be installed by the various trades under these specifications shall be run as indicated, as specified herein, as required by particular conditions at the site, and as required to conform to the generally accepted standards as to complete the work in a neat and satisfactorily workable manner. The following is a general outline concerning the running of various lines and ducts and is to be excepted where the drawings or conditions at the building necessitate deviating from these standards.
- B. All piping, conduit and ductwork for the mechanical and electrical trades shall be concealed in chases in finished areas, except as indicated on the drawings. Horizontal lines run in areas that have ceilings shall be run concealed in those ceilings, unless otherwise specifically indicated or directed.
- C. Piping, ductwork, conduits and raceways may be run exposed in machinery and equipment spaces, where serving as connections to motors and equipment items in finished rooms where exposed connections are required, and elsewhere as indicated on the drawings or required.
- D. All conduits in any space where they are exposed shall run parallel with the building walls. They shall enter the concealed areas perpendicular with the walls, ceilings or floors. Fittings shall be used where necessary to comply with this requirement.
- E. The Contractor shall thoroughly acquaint himself with the details of the construction and finishes before submitting his bid as no allowances will be made because of the Contractor's unfamiliarity with these details. Place all inserts in masonry walls while they are under construction. All concealed lines shall be installed as required by the pace of the general construction to precede that general construction.
- F. The mechanical and electrical plans do not give exact details as to elevations of lines and ducts, exact location, etc., and do not show all the offsets, control lines, pilot lines and other installation details. The Contractor shall carefully lay out his work at the site to conform to the architectural and structural conditions, to provide proper grading of lines, to avoid all obstruction, to conform to details of installation supplied by the manufacturers of the equipment to be installed, and thereby to provide an integrated, satisfactorily operating installation. Each Contractor shall verify that each item of mechanical equipment, each electrical panel, light fixture, and device, each grille or ceiling outlet, and each other item of work furnished by him shall fit into the available space before ordering same. Any required changes due to the Contractor's failure to verify that each item of his equipment will fit into

the available space shall be made by the Contractor furnishing the equipment, all at no additional cost to the Owner.

- G. The routing of piping, ductwork, conduits, etc., indicated on the drawings is approximate and where light fixtures or other items of work are to be recessed in ceiling, piping, ductwork, conduits, etc., shall be routed around the light fixtures or other items of work where there is not sufficient space for same to be routed above such item of work with the recessed item properly installed. Any required changes due to the Contractor's failure to properly coordinate his work with recessed items shall be made by the Contractor installing such piping, ductwork, conduits, etc., all at no additional cost to the Owner.
- H. The electrical plans show diagrammatically the locations of the various electrical outlets and apparatus and the method of circuiting and controlling them. Exact locations of these outlets and apparatus shall be determined by reference to the general plans and to all detail drawings, equipment drawings, roughing-in drawings, etc., by measurements at the building, and in cooperation with other sections, and in all cases shall be subject to the approval of the Owner. The Owner reserves the right to make any reasonable change in location of any outlet or apparatus before installation (within 10 feet of location shown on drawings) or after installation if an obvious conflict exists, without additional cost to the Owner.
- I. The Contractor shall submit working scale drawings of all his apparatus and equipment which in any way varies from these specifications and plans, which shall be checked by the Owner before the work is started, and interferences with the structural conditions shall be corrected by the Contractor before the work proceeds.
- J. Order of precedence shall be observed in laying out the pipe, ductwork, material, and conduit in order to fit the material into the space above the ceiling and in the chases and walls. The following order shall govern:
 - 1. Items affecting the visual appearance of the inside of the building such as lighting fixtures, diffusers, grilles, outlets, panelboards, etc. Coordinate all items to avoid conflicts at the site.
 - 2. Large ducts and pipes with critical clearances.
 - 3. Conduit, water lines, and other lines whose routing is not critical and whose function would not be impaired by bends and offsets.
- K. Piping, ducts, and conduits serving outlets on items of equipment shall be run in the most appropriate manner. Where the equipment has built-in chases, the lines shall be contained therein. Where the equipment is of the open type, the lines shall be run as close as possible to the underside of the top and in a neat and inconspicuous manner. All piping, ductwork, conduits and all other items of work supported from the structure above shall be installed as high as physically possible (not just

as convenient) considering all work required to be installed in the available space. If any such work is installed lower than it could have been installed, the Contractor shall furnish all labor, equipment, and materials to remove same and reinstall the work as high as possible, all at no additional cost to the Owner.

- L. Adequate provisions shall be provided for the replacement of all filters.
- M. In addition to insulation called for elsewhere in the specifications, all piping and equipment subject to condensation and/or whose normal operating surface temperature is below 70 degrees F or above 110 degrees F shall be insulated. All piping subject to condensation and/or whose operating temperature is below 70 degrees F shall be insulated same as specified elsewhere in the specifications for chilled water or refrigerant suction line piping. All piping with operating surface temperature above 110 degrees F shall be insulated same as specified elsewhere in the specifications for domestic hot water or steam piping. All insulation shall be provided by the particular Contractor who installs the particular equipment or piping system. All equipment shall be insulated and finished in a manner suitable for the conditions and as approved by the Engineers. Armaflex insulations shall not be permitted in breathing air spaces.
- N. Exceptions and inconsistencies in plans and specifications shall be brought to the Owner's attention before the contract is signed. Otherwise, the Contractor shall be responsible for any and all changes and additions that may be necessary to accommodate his particular apparatus, material, or equipment.
- O. The Contractor shall distinctly understand that the work described herein and shown on the accompanying drawings shall result in a finished and working job, and any item required to accomplish this intent shall be included whether specifically mentioned or not.
- P. Each bidder shall examine the plans and specifications for the General Construction. If these documents show any item requiring work under Division 15 or 16 and that work is not indicated on the respective "M", "P" or "E" drawings, he shall notify the Owner in sufficient time to clarify before bidding. If no notification is received, the Contractor is assumed to require no clarification, and shall install the work as indicated on the General Plans in accordance with the specifications.

1.8 DIMENSIONS

- A. Before ordering any material or doing any work, the Contractor shall verify all dimensions, including elevations, and shall be responsible for the correctness of the same. No extra charge 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 Owner for consideration before proceeding with the work.

1.9 INSPECTION OF SITE

- A. The accompanying plans do not indicate completely the existing mechanical and electrical installations. The bidders for the work under these sections of the specifications shall inspect the existing installations and thoroughly acquaint themselves with conditions to meet and the work to be accomplished in removing and codifying the existing work, and in installing the new work in the present building and underground serving to and from that structure. Failure to comply with this shall not constitute grounds for any additional payments in connection with removing or modifying any part of the existing installations and/or installing any new work.

1.10 ELECTRICAL WIRING

- A. All electric wiring of every character, both for power supply, for pilot and control, for temperature control, for communications, etc. will be done under Division 26 of these specifications. The Contractor for each section shall erect all his motors in place ready for connections. The Contractor, under Division 26, shall mount all the starters and controls, furnishing the supporting structures and any required outlet boxes.
- B. Every electrical current consuming device furnished as a part of this project, or furnished by the Owner and installed in this project, shall be completely wired up under Division 26. Verification of exact location, method of connection, number and size of wires required, voltage requirements, and phase requirements is the responsibility of the Contractor under Division 26. If conflicts occur between the drawings and the actual requirements, actual requirements shall govern.

1.11 MOTORS AND CONTROLS

- A. All motors furnished under any of the several sections of these specifications shall be of recognized manufacture, of adequate capacity for the loads involved and wound for the current characteristics shown on the electrical drawings. All motors shall conform to the standards of manufacture and performance of the National Electrical Manufacturer's Association as shown in their latest publications. They shall further be listed by Underwriters Laboratories.
- B. Unless otherwise noted, the Contractor under Division 16 shall furnish each motor with a starter and all controls of the types specified or required. The starters shall be of the totally enclosed type, of capacity rating within the required limits of the motors which they are to serve, shall be suitable for the motor current characteristics and shall provide thermal overload protection. All starters shall be of standard manufacture and performance as defined by the National Electrical Manufacturers' Association. They further shall be listed by Underwriters Laboratories. Provide overload protection in each phase wire.

- C. All motors larger than 1/3 horsepower shall be of a type that the power consumed is in approximate direct proportion to the load on the motor. At 50% of rated brake horsepower, the power consumed shall be approximately 50% of the power consumed at full load.

1.12 TESTING

- A. The Contractor under each division shall at his own expense perform the various tests as specified and required by the Owner and as required by the State and local authorities. The Contractor shall furnish all fuel and materials necessary for making test.

1.13 PAINTING

- A. Painting for Divisions 22, 23 and 26 shall be as follows:
 - 1. If the factory finish on any apparatus or equipment is marred, it shall be touched up and then given one coat of half-flat-half-enamel, followed by a coat of machinery enamel of a color to match the original. Paint factory prime surfaces.

1.14 SEALING AROUND PIPES, CONDUITS, DUCTS, ETC.

- A. The Contractor installing pipes, conduits, ducts, etc. shall seal all spaces between pipes and/or sleeves where they pierce walls, partitions or floors with Dow Corning No. 2000 fire resistant caulk. The packing shall effect a complete fire and/or air seal where pipes, conduits, ducts, etc., pierce walls, floors or partitions.

1.15 MECHANICAL COORDINATION DRAWINGS:

- A. Prepare and submit a set of coordination drawings showing major elements, components, and systems of mechanical equipment and materials in relationship with other building components. Prepare drawings to an accurate scale of 1/4"=1'-0" or larger. Indicate the locations of all equipment and materials, including clearances for installing and maintaining insulation, servicing and maintaining equipment, valve stem movement, and similar requirements. Indicate movement and positioning of large equipment into the building during construction.
- B. Prepare floor plans, reflected ceiling plans, elevations, sections, and details to conclusively coordinate and integrate all installations. Indicate locations where space is limited, 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. Mechanical equipment room layouts;
 - 2. Specific equipment installations, including:

- a. Pumps and air handling units
 - b. Temperature control panels
 - c. Work in pipe spaces, chases, trenches, and tunnels
 - d. Exterior wall penetrations
 - e. Ceiling plenums which contain piping, ductwork, or equipment in congested arrangement
 - f. Installations in mechanical riser shafts, at typical sections and crucial offsets and junctures
 - g. Pipe expansion loops
 - h. Numbered valve location diagrams
 - i. Manifold piping for multiple equipment units
- C. It shall be incumbent upon the Contractor to prepare special drawings as called for elsewhere herein or as directed by the Owner to coordinate the work under each section, to illustrate changes in his work, to facilitate its concealment in finished spaces to avoid obstructions or to illustrate the adaptability of any item of equipment which he proposes to use.
- D. These drawings shall be used in the field for the actual installation of the work. Unless otherwise directed, they shall not be submitted for approval but three copies shall be provided to the Owner for his information.

1.16 ROUGH-IN AND MAKE FINAL CONNECTION FOR EQUIPMENT

- A. The shop drawings for all equipment are hereby made a part of these specifications. The Contractor under each section of the specifications shall rough-in for the exact item to be furnished on the job, whether in another section of the specifications or by the Owner. The Contractor shall refer to all drawings and other sections of the specifications for the scope of work involved for the new equipment, and by actual site examination determine the scope of the required equipment connections for the Owner furnished equipment.
- B. Should any of the equipment furnished require connections of a nature different from that shown on the drawings, report the matter to the Owner and finally connect as directed by the Owner.
- C. Should any shop drawings not be available for equipment furnished under other contracts or by the Owner, the Contractor under each section of these specifications shall bid the work as detailed on the drawings.
- D. Minor differences in the equipment furnished and that indicated on the drawings will not constitute grounds for additional payment to the Contractor.

2 PART 2 PRODUCTS

2.1 MARKING OF PIPE

- A. The Contractor shall mark all accessible piping systems. The identification of a piping system shall be made by a positive identification

of the material content of the system by lettered legend, giving the name of the content in full or abbreviated form. This mark shall be conspicuously placed at frequent intervals on straight runs, close to all valves, at changes of direction and where pipes pass through walls, floors or ceilings. Arrows shall be used to indicate direction of flow.

- B. Markers shall be placed on piping at each connection to an item of equipment, and on each drop to an outlet. Markers shall be placed on each run of piping at intervals not exceeding 50 feet where exposed in a room and 25 feet when installed above removable ceilings, except that no exposed line shall enter a room without being identified therein. Marker on lines above removable ceilings shall be applied on the undersides of the lines and in other areas shall be applied to be most visible.
- C. Markers shall conform completely with "The Scheme for Identification of Piping Systems (ANSI A131 1981). Markers shall have ANSI specified color coded background, color of legend and legend letter size.
- D. Markers shall be equal to Seton Set Pipe Markers.

2.2 IDENTIFICATION AND LABELING

- A. The Contractor shall make it possible for the personnel operating and maintaining the equipment and systems in this project to readily identify the various pieces of equipment, valves, piping, etc., by marking them. All items of equipment such as fans, pumps, etc., shall be clearly marked using engraved nameplates as hereinafter specified. The item of equipment shall indicate the same number as shown on the drawings.
- B. Interior Equipment: All items of mechanical and electrical equipment shall be identified by the attachment of engraved nameplates constructed from laminated phenolic plastic, at least 1/16" thick, 3-ply, with black surfaces and white core. Engraving shall be condensed gothic, at least 1/2" high, appropriately spaced. Nomenclature on the label shall include the name of the item, its mark number, area, space, or equipment served, and other pertinent information.
- C. Exterior (Outdoor) Equipment: Brass nameplates, with engraved black filled letters, not less than 3/16-inch high riveted or bolted to the equipment.
- D. Valves:
 - 1. Tags for isolation (shut-off) valves concealed in interstitial space, above ceilings or in chases: Engraved black filled numbers and letters not less than 1/2 inch high for number designation, and not less than 1/4-inch for service designation on 19 gage 1-1/2 inches round brass disc, attached with brass "S" hook or brass chain.

3 PART 3 EXECUTION

3.1 PIPE AND EQUIPMENT SUPPORTS:

- A. Where hanger spacing does not correspond with joist or rib spacing, use structural steel channels secured directly to joist and rib structure that will correspond to the required hanger spacing, and then suspend the equipment and piping from the channels. Drill or burn holes in structural steel only with the prior approval of the Architect.
- B. Use chain, wire or strap hangers; wood for blocking stays and bracing; hangers suspended from piping above will not be permitted. Replace or thoroughly clean and red lead paint products that are rusty.
- C. Use hanger rods that are straight and vertical. Turnbuckles for vertical adjustments may be omitted where limited space prevents use. Provide a minimum of 1/2-inch clearance between pipe or pipe covering and adjacent work.

3.2 OPERATING INSTRUCTIONS

- A. The Contractor for each section of the work hereunder shall, in cooperation with the representatives of the manufacturers of the various equipment items, carefully instruct the Owner's representatives in the proper operation of each item of equipment and of each system. During the balancing and adjusting of systems, the Owner's representative shall be made familiar with all procedures.

3.3 OPERATING MANUALS

- A. Prepare and submit 3 copies of the operating manuals bound in hard covers. Three weeks prior to completion of the work, the Owner will check the manuals and any additional material necessary to complete the manuals shall be furnished and inserted by the Contractor.
- B. Manuals shall contain the following data:
 - 1. Catalogue data of all equipment.
 - 2. Shop drawings of all equipment.
 - 3. Wiring diagrams.
 - 4. Recommended maintenance schedule for equipment.
 - 5. Parts list for all items.
 - 6. Name and address of each vendor.
- C. In addition to the information required by Division 1 for Maintenance Data, include the following information.
 - 1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of all replaceable parts.

2. Manufacturer's printed operating procedures to include start-up, break-in, routine and normal operating instructions; regulation, control, stopping, shut-down, 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.

3.4 GUARANTEE

- A. Unless a longer guarantee is hereinafter called for, all work, material and equipment items shall be guaranteed for a period of one year after acceptance by the Owner. All defects in labor and materials occurring during this period, as determined by the Owner, shall be repaired and/or replaced to the complete satisfaction of the Owner. Guarantee shall be in writing and in triplicate.

3.5 COMPLETION REQUIREMENTS

- A. Before acceptance and final payment the Contractor must complete the following requirements:
 1. Submit Test and Balance Report.
 2. Perform final inspection and make all corrections necessary.
 3. Submit maintenance manuals, certificate of owner instruction, equipment warranties and receipt for loose items.

END OF SECTION

SECTION 23 00 10 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

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1 PART 1 – GENERAL

1.1 DESCRIPTION

- A. Related Work Specified Elsewhere:
 - 1. Construction Schedules.
 - 2. Project Record Documents.

1.2 SUBMITTALS

- A. Shop and Installation Drawings, Product Data and Samples as required.
- B. Prepare and submit, with construction schedule, a separate schedule listing dates when shop drawings, product data and any requested samples will be needed for each product.

1.3 GENERAL

- A. Requests for material substitutions must be received and approved prior to submission of shop drawings, said submittals and/or samples; reviewed by architect or engineer does not constitute acceptance of materials other than those originally specified.

1.4 SHOP DRAWINGS

- A. Original drawings, which illustrate portion of the work: Showing equipment, layout, setting or installation details. Deviation from Contract Drawings shall be marked in RED with an explanation of reason for change
- B. Prepared by a qualified detailer.
- C. Identify details by reference to sheet and detail number shown on contract drawings.
- D. Reference specification section and paragraph number(s) represented on the submitted drawings.
- E. Minimum Sheet Size: 8½" x 11".

1.5 PRODUCT DATA

- A. Manufacturer's standard schematic drawings:
 - 1. Modify drawings to delete information which is not applicable to project.

-
2. Supplement standard information to provide additional information applicable to project.
- B. Manufacturer's catalog sheets, brochures, diagrams, schedules, performance charts, illustrations, and other standard descriptive data.
1. Clearly mark each copy to identify pertinent materials, products or models.
 2. Show dimensions and clearance required.
 3. Shop performance characteristics and capacities.
 4. Show wiring diagrams and controls.
- C. Complete catalogs will not be acceptable. Manufacturer's regular catalog sheets will be acceptable if they completely indicate specification requirements. When manufacturer's catalog sheets are submitted, completely line out material not directly connected with subject.
1. Assemble in indexed brochure, catalog sheets of submittals containing more than five (5) different items or equipment.
- D. Reference specification section and paragraph number represented on data submitted.

1.6 CONTRACTOR'S RESPONSIBILITIES

- A. Review shop drawings, product data and samples prior to submission and certify with signature of reviewer
- B. Verify:
1. Field measurements.
 2. Field construction criteria.
 3. Catalog numbers and similar data.
 4. Quantities
- C. Coordinate each submittal with requirements of work and of contract documents.
- D. Contractor's responsibility for errors, omissions and deviations in submittals from requirements of contractor documents is not relieved by architect's review of submittals, unless architect gives written acceptance of specific deviations.

1. Notify architect in writing of deviations at the time of submittal.
 - E. Begin no work which requires submittals until return of submittals with architect's stamp and initials or signature indicating review.
 - F. After architect's / engineer's review, distribute copies.
- 1.7 SUBMISSION REQUIREMENTS
- A. Schedule submissions at least 15 days before dates reviewed submittals will be needed.
 - B. Submit a minimum of 5 copies of all submittals.
 - C. Accompany submittals with transmittal in duplicate, containing:
 1. Date.
 2. Project title and number.
 3. Contractor's name and address.
 4. The number of each shop drawings, product data and samples submitted.
 5. Notification of deviations from contract documents.
 6. Other pertinent data.
 - D. Submittals shall include:
 1. Date and revision date.
 2. Project title and number.
 3. The names of:
 - a. Architect.
 - b. Contractor.
 - c. Subcontractor.
 - d. Supplier.

- e. Manufacturer.
- f. Separate detailer when pertinent.
- 4. Identification of product or material.
- 5. Relation to adjacent structure or materials.
- 6. Field dimensions, clearly identified as such.
- 7. Specification section number.
- 8. Applicable standards, such as ASTM or Federal Specifications numbers.
- 9. A blank space, 3" x 3" for the architect's stamp.
- 10. Identification of deviations from contract documents in red ink include justification for deviation.
- 11. Contractor's stamp, initialed or signed, certifying to review of submittal, verification of field measurements and compliance with contract documents.

Failure to comply with the above requirements shall be grounds for rejection of submittal.

1.8 RESUBMISSION REQUIREMENTS

A. Shop Drawings:

1. Revise initial drawings as required and resubmit as specified for initial submittal.
2. Indicate on drawings any changes which have been made other than those requested by architect.
3. Product Data and Samples: Submit new data and samples as required for initial submittal.

1.9 DISTRIBUTION OF SUBMITTALS AFTER REVIEW

A. Distribute copies of Shop Drawings and Product Data which carry architect's stamp to:

1. Contractor's file.
2. Job-site file.
3. Record document's file.
4. Other prime contractors.
5. Subcontractor.
6. Supplier.
7. Fabricator.

B. Distribute samples as directed.

1.10 ARCHITECT'S / ENGINEER'S RESPONSIBILITIES

A. Review submittals with reasonable promptness.

B. Review for:

1. Design concept of project.
2. Information given in contract documents.

- 3. Architect or Engineer is not responsible for verification of quantities.
- C. Review of separate items does not constitute review of an assembly in which item functions.
- D. Affix stamp and initials or signature certifying the review of submittals.
- E. Return submittals to contractor for distribution.

END OF SECTION

SECTION 23 05 00 – HVAC GENERAL PROVISIONS

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1 PART 1 GENERAL

1.1 TERMS AND CONDITIONS

- A. The General Conditions, Supplementary General Conditions and Division 1 documents apply to work of this section.

1.2 SUMMARY

- A. It is intended that the air conditioning work indicated in the Specifications and/or on the drawings shall make up into working systems complete in every detail unless indicated otherwise.
- B. All materials and labor, whether specifically indicated or not, but incidental to the proper installation of the air conditioning work, shall be furnished complete in every detail unless indicated otherwise.
- C. Refer to the architectural, structural, and mechanical drawings for construction details, and coordinate work with that of other trades so as to avoid unnecessary delays or damage to any part of installation.
- D. This section includes the necessary labor, materials, equipment, etc., to complete the air conditioning work that is indicated in or required by the contract documents.
- E. Generally the air conditioning work includes, but is not limited to, the following:
1. Air Duct Work
 2. Acoustical Duct Liner
 3. External Insulation
 4. Registers
 5. Grilles
 6. Diffusers
 7. Air Devices
 8. Refrigerant Piping and Fittings
 9. Valves and Accessories
 10. Refrigerant Pipe Insulation
 11. Condensate Drain Piping and Fittings
 12. Condensate Drain Pipe Insulation
 13. Air Handling Units
 14. Auxiliary Drain Pans
 15. Condensing Units
 16. Roof Curbs
 17. Foundations
 18. Sleeves
 19. Escutcheons
 20. Flashings
 21. Hangers
 22. Aluminum Louvers

- 23. Fire Dampers
- 24. Exhaust Fans
- 25. Controls

F. CODES

- 1. Comply with International Mechanical Code, 2015 Edition, and the 2015 IECC.
- 2. Code requirements shall have precedence over drawings and specifications. Perform modifications to meet code requirements at no additional cost. Notify Architect of such modifications.

G. PERMITS

- 1. Obtain and pay for all permits and similar required charges incurred on account of the work.

H. DRAWINGS AND SPECIFICATIONS

- 1. Should any discrepancies exist between the Air Conditioning Specifications and the Air Conditioning Drawings, the Air Conditioning Specifications shall govern.
- 2. The drawings are diagrammatic, but shall be followed as closely as actual construction of the project will permit. Changes from these drawings necessary to fit the work of various trades, to conform to equipment actually being installed, or the rules of authorities having jurisdiction shall be made at no additional cost.
- 3. Verify the exact locations and route of the various items with respect to the Architectural details and work of other trades. The Architect reserves the right to make reasonable changes in location of any equipment, controls or air outlets before installation without additional cost.
- 4. Shop drawings for the air conditioning work shall be furnished by the Contractor if required by the Architect or other trades.

I. SUBMITTALS

- 1. Submit complete descriptive data, including manufacturer, catalog number, and complete physical and other characteristics for the following items:
 - a. Insulation – Pipe and Ductwork
 - b. Registers, Grilles, Diffusers, and Air Devices
 - c. Air Handling Units
 - d. Condensing Units
 - e. Roof Curbs
 - f. Aluminum Louvers
 - g. Fire Dampers
 - h. Exhaust Fans
 - i. HVAC Equipment
 - j. Controls

2. Individual descriptive data sheets and items shall be identified clearly by corresponding letters, numbers, etc. to match corresponding identifications on air conditioning plans before submittals will be approved.
3. Submittals shall be prepared in accordance with requirements of Division I.
4. Partial submittals are not acceptable and will be returned without review.
5. Submit data to Architect for approval before ordering equipment.
6. If original submission is not approved, revise the brochures and resubmit until a submission is approved.

J. VERIFICATION

1. Verification of any job site conditions affecting the air conditioning work shall be the responsibility of the Contractor performing the work of this section unless indicated otherwise.

K. WORKMANSHIP

1. Labor shall be performed by mechanics skilled in their particular trades.
2. Workmanship not in accordance with standard approved practices for installing the air conditioning work shall be made to comply with these practices.
3. The Contractor and his employees shall perform their work in a safe manner and maintain adequate protection for their work, the owners property and all persons on the site to avoid injury, damage, or loss.

2 PART 2 MATERIALS

2.1 AGE

- A. Materials for the air conditioning work must be new unless indicated otherwise.

2.2 STANDARDS

- A. All items of material and equipment for standards have been established shall be so listed and shall bear listing labels.

2.3 STORAGE AND HANDLING

- A. Store materials in a suitable location at the project site in manufacturer's original containers with labels intact.
- B. Protect stored material and finished work from damage.
- C. Damaged material or equipment shall be rejected and shall be replaced with undamaged items.

- D. Close all openings with caps or plugs during construction.

2.4 ELECTRICAL WORK

- A. Furnish and install all motors, thermostats, electric valves, and similar items.
- B. Power wiring and connections are specified in Division 26 and will be provided under the appropriated sections.
- C. Control wiring and wiring devices shall be provided under this Section.

2.5 MOTORS AND MOTOR STARTERS

- A. Motors
 - 1. General: Provide all motors generally in accordance with following except as otherwise specified under various equipment headings. Provide totally enclosed fan-cooled motors when exposed to weather.
 - 2. Three-phase Motors: Where designated on drawings, motors shall be standard, drip-proof, squirrel cage induction type, NEMA Design B, with Class B insulation, 1750 rpm 60 cycle, rated at the voltage and HP indicated on the drawings for continuous duty with 1.15 service factor at 40 degrees C ambient temperature. Motors 75 hp and larger shall be increment starting type. Provide grease-lubricated anti-friction bearings, conservatively rated for long life at maximum load conditions, including radial and thrust loading imposed by drive. Provide alemite fittings.
 - 3. Single-phase Motors: Motors shall be standard, drip-proof, 1750 rpm, 115/1/60 or 208/1/60 motors rated at indicated hp for continuous duty with 1.15 service factor at 40 degrees C ambient temperature. Motors 1/6 hp and larger shall be of capacitor start type; smaller motors of split-phase type and equipped with automatic thermal protectors. Provide grease-packed, sealed, anti-friction bearings, conservatively rated for long life at maximum load conditions, including loading imposed by drives.
 - 4. Motor Noise: Replace motor which, in opinion of Architect, is found to have unreasonable noise characteristics, either at time of original installation or during guarantee period, with new "extra quiet" motor, at no additional cost to Owner.
- B. Motor Starters: Except where otherwise noted, provide integral with the equipment or as specified under various equipment headings. Motor starters are included as part of work covered in DIVISION 26 - ELECTRICAL.

3 PART 3 EXECUTION

3.1 PROGRESS

- A. The air conditioning work shall progress with the other work so that no delays in construction are incurred.

3.2 SCHEDULING

- A. Schedule work and provide notice to permit inspection by the Architect and for Authorities having jurisdiction before the work is concealed. Installations shall be consistent in completeness and appearance whether enclosed or exposed. Any items which do not present a neat or workmanlike appearance shall be replaced at no additional cost.

3.3 CUTTING AND PATCHING

- A. Perform all cutting, patching and sleeving required for the work. No cuts shall be made that will weaken the structure.
- B. Perform all cutting and patching in accordance with the General Conditions and with Architect's approval.
- C. Coordinate the work of other trades so that air conditioning work is installed when space is accessible. Cutting and patching caused by failure to coordinate work shall be performed at no additional cost.
- D. At all points where piping penetrate the roof, this contractor shall flash and counterflash in an approved manner to obtain water tight construction at the penetration. Roof penetration shall be supervision of the roofing contractor.
- E. All sleeves, floor penetration, etc. shall be sealed solid with approved material immediately upon the filling of that opening with pipe or duct.

3.4 LAYOUT OF WORK

- A. Verify the exact location of equipment, controls and air outlets and route duct and piping with respect to Architectural details and work of other trades.
- B. Adjust piping and ductwork locations to clear light fixtures, piping and other obstructions.
- C. Drawings are diagrammatic and minor deviations to fit shall be anticipated.
- D. Conceal piping and ductwork in the building structure (except in equipment rooms) unless indicated otherwise and run neatly with building lines when exposed.

3.5 CHANGES

- A. Changes in price for the air conditioning work can only be made for changes in the original design intentions and only after written consent of the Architect.

3.6 CLEANING AND PAINTING

- A. Dispose of unused material, equipment, waste and rubbish.
- B. Remove all labels, dirt, paint, grease and stains from all exposed equipment installed under this contract to present a first class job suitable for occupancy.
- C. Clean and touch-up paint all equipment provided under this section that has paint damage. Touch-up paint colors shall match perfectly.

3.7 CERTIFICATE OF ACCEPTANCE

- A. Provide written certificates of acceptance from Authorities having jurisdiction before final inspection of the project.

3.8 INSPECTION

- A. Upon completion of the contract, there will be a substantial completion inspection of the complete installation. Prior to this inspection, all work under this section shall have been completed, and put in perfect operating condition.

3.9 GUARANTEES AND OPERATING INSTRUCTIONS

- A. Before project's final acceptance, the Contractor shall furnish to the Architect three bound sets of descriptive, dimensional and parts data for the following:
 - 1. Registers, Grilles, Diffusers and Air Devices
 - 2. Air Handling Units
 - 3. Condensing Units
 - 4. Exhaust Fans
 - 5. Controls
 - 6. Rooftop Heating/Cooling Units
- B. Each set of this literature shall be bound in a permanent type hard cover ring binder and shall be suitably indexed.
- C. Equipment manuals shall also include warranties, guarantees, and manufacturer's instruction shipped with equipment.
- D. Furnish all special servicing tools and keys to any locked equipment. These materials shall be furnished to the Owner through the Architect prior to final inspection.
- E. Furnish operating and maintenance data as specified herein for each product or system and include:

1. Name, address and telephone number of Subcontractor.
2. Description of unit and component parts.
3. Function, normal operating conditions.
4. Performance curves, engineering data and tests.
5. Complete nomenclature and commercial number of all replaceable parts.
6. Operating Procedures
 - a. Start-up, break-in, routine and normal operating instructions.
 - b. Regulation, control, stopping, shut-down and emergency instructions.
 - c. Summer and winter operating instructions.
 - d. Special operating instructions.
7. Maintenance Procedures:
 - a. Routine operations.
 - b. Guide to "trouble-shooting".
8. Parts Lists (Including Source).
9. Servicing and lubricating schedule: List of lubricant required.
10. Manufacturer's printed operating and maintenance instructions.
11. Description of sequence of operation by control manufacturer.
12. As installed control diagrams by controls manufacturer.
13. Instruction of Owner's Personnel:
 - a. Prior to final inspection fully instruct Owner's designated operating and maintenance personnel in the operation, adjustment, and maintenance of all products, equipment and systems.
 - b. Maintenance manual shall constitute the basis of instruction.
 - c. Review contents of manual with personnel in full detail to explain all aspects of operations and maintenance.

3.10 GENERAL GUARANTEES

- A. The Owner shall be guaranteed by the Contractor that any defects arising in the work within one year of the date of acceptance shall be corrected free of charge.

END OF SECTION

SECTION 23 05 29 HANGERS AND SUPPORTS

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1 PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Pipe and equipment hangers and supports.
- B. Equipment bases and supports.
- C. Sleeves and seals.
- D. Flashing and sealing equipment and pipe stacks.

1.2 RELATED SECTIONS

- A. Section 22 07 00 – Piping Insulation.
- B. Section 22 11 00 – Plumbing Piping.

1.3 REFERENCES

- A. ASME B31.1 – Power Piping
- B. ASME B31.2 – Fuel Gas Piping
- C. ASME B31.5 – Refrigeration Piping
- D. ASME B31.9 – Building Services Piping
- E. ASTM F708 – Design and Installation of Rigid Pipe Hangers.
- F. MSS SP58 – Pipe Hangers and Supports – Materials, Design and Manufacturer.
- G. MSS SP69 – Pipe Hangers and Supports – Selection and Application.
- H. MSS SP89 – Pipe Hangers and Supports – Fabrication and Installation Practices.

2 PART 2 PRODUCTS

2.1 PIPE HANGERS AND SUPPORTS

- A. Plumbing Piping – DWV:
 - 1. Conform to ASME B31.9.
 - 2. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Malleable iron, adjustable swivel, split ring.
 - 3. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.

4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
 5. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
 6. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
 7. Vertical Support: Steel riser clamp.
 8. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
 9. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
- B. Plumbing Piping – Water:
1. Conform to ASME B31.9.
 2. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Carbon steel, adjustable swivel, split ring.
 3. Hangers for Cold Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
 4. Hangers for Hot Pipe Sizes 2 to 4 Inches: Carbon steel, adjustable, clevis.
 5. Hangers for Hot Pipe Sizes 6 Inches and Over: Adjustable steel yoke, cast iron roll, double hanger.
 6. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
 7. Multiple or Trapeze Hangers for Hot Pipe Sizes 6 Inches and Over: Steel channels with welded spacers and hanger rods, cast iron roll.
 8. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
 9. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
 10. Wall Support for Hot Pipe Sizes 6 Inches and Over: Welded steel bracket and wrought steel clamp with adjustable steel yoke and cast iron roll.
 11. Vertical Support: Steel riser clamp.
 12. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
 13. Floor Support for Hot Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
 14. Floor Support for Hot Pipe Sizes 6 Inches and Over: Adjustable cast iron roll and stand, steel screws, and concrete pier or steel support.
 15. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
- 2.2 ACCESSORIES
- A. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.
- 2.3 INSERTS

- A. Inserts: Malleable iron case of 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: 26 gauge thick galvanized steel.
- B. Metal Counterflashing: 22 gauge thick galvanized steel.
- C. Lead Flashing:
 - 1. Waterproofing: 5 lb/sq ft sheet lead
 - 2. Soundproofing: 1 lb/sq ft sheet lead.
- D. Flexible Flashing: 47 mil thick sheet; compatible with roofing.
- E. Caps: Steel, 22 gauge minimum; 16 gauge at fire resistant elements.

2.5 EQUIPMENT CURBS

- A. Fabrication: Welded 18 gauge galvanized steel shell and base, mitered 3 inch cant, installed wood nailer.

2.6 SLEEVES

- A. Sleeves for Pipes Through Non-fire Rated Floors: 18 gauge thick galvanized steel.
- B. Sleeves for Pipes Through Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Steel pipe or 18 gauge thick galvanized steel.
- C. Sleeves for Pipes Through Fire Rated and Fire Resistive Floors and Walls, and Fire Proofing: Prefabricated fire rated sleeves including seals, UL listed.
- D. Sleeves for Round Ductwork: Galvanized steel.
- E. Sleeves for Rectangular Ductwork: Galvanized steel or wood.
- F. Sealant: Acrylic.

3 PART 3 EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

3.2 INSERTS

- A. Provide inserts for placement in concrete formwork.
- B. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
- C. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
- D. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
- E. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut flush with top of slab.

3.3 PIPE HANGERS AND SUPPORTS

- A. Support horizontal piping as scheduled. All piping shall be adequately supported. All piping shall be installed with due regard to expansion and contraction. Use vibration dampers where required.
- B. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
- C. Place hangers within 12 inches of each horizontal elbow.
- D. Use hangers with 1-1/2 inch minimum vertical adjustment.
- E. All exposed vertical risers running near column shall be supported with beam clamps. Each line shall have supports not greater than 10'-0" on center, with additional provision that there be a support near top of riser. All supports shall be aligned.
- F. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- G. Support riser piping independently of connected horizontal piping.
- H. Provide sheet lead packing between hanger or support and piping.
- I. Design hangers for pipe movement without disengagement of supported pipe.
- J. Perforated strap iron and wire are not acceptable hanger materials.

3.4 EQUIPMENT BASES AND SUPPORTS

- A. Provide housekeeping pads of concrete, minimum 4 inches thick and extending 6 inches beyond supported equipment.
- B. Provide templates, anchor bolts, and accessories for mounting and anchoring equipment.
- C. Construct supports 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 counterflashing where piping and ductwork penetrate weather or waterproofed walls, floors, and roofs.
- B. Flash vent and soil pipes projecting 3 inches minimum above finished roof surface with lead worked 1 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, metal counterflash, 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 drains watertight to adjacent materials.
- E. Provide curbs for mechanical roof installations 14 inches minimum high above roofing surface. Flash and counterflash with sheet metal; seal watertight. Attach counterflashing mechanical equipment and lap base flashing on roof curbs. Flatten and solder joints.
- F. Adjust storm collars tight to pipe with bolts; caulk around top edge. Use storm collars above roof jacks. Screw vertical flange section to face of curb.

3.6 SLEEVES

- A. Set sleeves in position in formwork. Provide reinforcing around sleeves.
- B. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.
- C. Extend sleeves through floors 1 inch above finished floor level. Caulk sleeves.
- D. Where piping or ductwork penetrates floor, ceiling, or wall, close off space between pipe or duct and adjacent work with stuffing insulation and caulk.

Provide close fitting metal collar or escutcheon covers at both sides of penetration.

- E. Install chrome plated steel escutcheons at finished surfaces.

3.7 SCHEDULES

PIPE SIZE Inches	MAX. HANGER SPACING DIAMETER Feet	HANGER ROD Inches
1/2 to 1-1/4	6.5	3/8
1-1/2 to 2	10	3/8
2-1/2 to 3	10	1/2
4 to 6	10	5/8
8 to 12	14	7/8
14 and Over	20	1
PVC (All Sizes)	6	3/8

END OF SECTION

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1 PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Nameplates.
- B. Tags.
- C. Stencils.
- D. Pipe Markers.

1.2 REFERENCES

- A. ASME A13.1 – Scheme for the Identification of Piping Systems.

1.3 SUBMITTALS FOR REVIEW

- A. Submit list of wording, symbols, letter size, and color coding for mechanical identification.
- B. Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
- C. Obtain Owner's approval for all identification materials before installing.

1.4 REGULATORY REQUIREMENTS

- A. Conform to NFPA 99 requirements for labeling and identification of gas piping systems and accessories.

2 PART 2 PRODUCTS

2.1 NAMEPLATES

- A. Description: Laminated three-layer plastic with engraved black letters on yellow background color.

2.2 TAGS

- A. Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inches square.
- B. Information Tags: Clear plastic with printed "Danger," "Caution," or "Warning" and message; size 3-1/4 x 5-5/8 inches with grommet and self-locking nylon ties.

2.3 STENCILS

- A. Stencils: With clean cut symbols and letters of following size:
 - 1. Up to 2 inch Outside Diameter of Insulation or Pipe: 1/2 inch high letters.
 - 2. 2-1/2 to 6 inches Outside Diameter of Insulation or Pipe: 1 inch high letters.
 - 3. Over 6 inches Outside Diameter of Insulation or Pipe: 1-3/4 inches high letters.
 - 4. Ductwork and Equipment: 1-3/4 inches high letters.
- B. Stencil Paint: Semi-gloss enamel, colors and lettering size conforming to ASME A13.1.

2.4 PIPE MARKERS

- A. Color and Lettering: Conform to ASME A13.1.
- B. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering. Larger sizes may have maximum sheet size with spring fastener.
- C. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.
- D. Plastic Underground Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.

2.5 PIPING IDENTIFICATION:

- A. Identify all above-ground piping and piping in tunnels by means of color coded bands and stencil and paint in accordance with the following tables:
(NOTE: Not all systems may be used on this project.)

<u>Systems</u>	<u>Band Color</u>	<u>Label</u>
Domestic Cold Water	Light Blue	DOM-C-WTR
Domestic Hot Water Supply	Dark Blue	DOM-H-WTR SUP
Domestic Hot Water Return	Dark Blue	DOM-H-WTR RET
Chilled Water Supply	Light Green	CHS
Chilled Water Return	Light Green	CHR
Heating Water Supply	Dark Green	HWS
Heating Water Return	Dark Green	HWR
Steam	Light Gray	ST (*)
Condensate	Light Gray	COND
Deionized Water	Light Blue	DEION-WTR
Compressed Air	Yellow	COMP_AIR

Vacuum	Yellow	VAC
Gas	Red	GAS
Drain Lines	Black	DRAIN

* On label on steam lines, include the steam pressure involved within the parenthesis.

- B. Install color coded bands and stencils in accordance with the following specific instructions. Stencil and color band pipes at each valve to show proper identification of pipe contents. Where several valves exist on one header, mark only the header. Provide a black arrow marker at each pipe stencil pointing away from the stencil to indicate flow direction. Use a double-ended arrow marker when flow can be in either or both directions. Apply a pipe stencil, color band, and an arrow marker with 10' each side of each point of pipe penetration through walls, floors, or ceilings and at maximum spacing of 10' on exposed piping and 50' on concealed piping. Apply pipe identification on side of pipe providing the least obstructed view. On lines that are dark in color, provide white backgrounds for color bands, stencils, and arrow markers. Characters used in stencils shall be 2" high on lines 3" or more (including insulation) in diameter and 1" high on lines less than 3" in diameter. Color bands shall be 4" wide.

2.6 LOCKOUT DEVICES

- A. Anodized aluminum hasp with erasable label surface; size minimum 7-1/4 x 3 inches.
- B. Valve Lockout Devices: Lockable handle preventing access to valve operator, accepting lock shackle.

3 PART 3 EXECUTION

3.1 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.

3.2 INSTALLATION

- A. Install identifying devices after completion of coverings and painting.
- B. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive.
- C. Install labels with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer. For unfinished canvas covering, apply paint primer before applying labels.
- D. Install tags using corrosion resistant chain. Number tags consecutively by location.

- E. Install underground plastic pipe markers 6 to 10 inches below finished grade, directly above buried pipe.
- F. Identify air handling units, pumps, heat transfer equipment, tanks, and water treatment devices with plastic nameplates. Small devices, such as in-line pumps, may be identified with tags.
- G. Identify control panels and major control components outside panels with plastic nameplates.
- H. Identify valves in main and branch piping with tags.
- I. Tag automatic controls, instruments, and relays. Key to control schematic.
- J. Identify piping, concealed or exposed, with plastic pipe markers. Use tags on piping 3/4 inch diameter and smaller. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and tee, at each side of penetration of structure or enclosure, and at each obstruction.
- K. Identify ductwork with plastic nameplates. Identify with air handling unit identification number and area served. Locate identification at air handling unit, at each side of penetration of structure or enclosure, and at each obstruction.

END OF SECTION

SECTION 23 05 93 TESTING, ADJUSTING, BALANCING AND COMMISSIONING

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1 PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Testing, adjustment, balancing and commissioning of mechanical systems.
- B. Measurement of final operating condition of HVAC systems.

1.2 AGENCY

- A. All work is included in this section and shall be part of the Contract Sum/Price. All work shall be performed by an Independent Testing Agency.

1.3 REFERENCES

- A. AABC – National Standards for Total System Balance.
- B. ADC – Test Code for Grilles, Registers, and Diffusers.
- C. ASHRAE 111 – Practices for Measurement, Testing, Adjusting, and Balancing of Building Heating, Ventilation, Air-conditioning, and Refrigeration Systems.
- D. NEBB – Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems.
- E. SMACNA – HVAC Systems Testing, Adjusting, and Balancing.
- F. 2015 International Energy Conservation Code.

1.4 SUBMITTALS

- A. Test Reports: Indicate data on forms containing information indicated in Schedules and Drawings.

2 PART 2 PRODUCTS

Not used

3 PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
 - 1. Systems are started and operating in a safe and normal condition.
 - 2. Temperature control systems are installed complete and operable.

3. Proper thermal overload protection is in place for electrical equipment.
 4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
 5. Duct systems are clean of debris.
 6. Fans are rotating correctly.
 7. Volume dampers are in place and open.
 8. Air coil fins are cleaned and combed.
 9. Access doors are closed and duct end caps are in place.
 10. Air outlets are installed and connected.
 11. Duct system leakage is minimized.
 12. Proper strainer baskets are clean and in place.
 13. Service and balance valves are open.
- B. Submit field reports. Report defects and deficiencies noted during performance of services which prevent system balance.
- C. Beginning of work means acceptance of existing conditions.

3.2 PREPARATION

- A. Provide instruments required for testing, adjusting, and balancing operations.
- B. Provide additional balancing devices as required.

3.3 INSTALLATION TOLERANCES

- A. Air Handling Systems: Adjust to within plus or minus 10 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.
- B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.

3.4 ADJUSTING

- A. A Licensed Engineer shall perform test described herein, tests being made in the presence of Architect or his representative and to his complete satisfaction.
- B. Ensure recorded data represents actual measured or observed conditions.
- C. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.

- D. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.
- E. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.
- F. Piping and ductwork shall be checked and the approved by the Architect before being concealed. The Architect shall be notified at least 24 hours prior to inspection time. No piping or ductwork shall be covered or concealed until approval has been obtained.
- G. After work is completed, entire job shall be tested under actual working pressures and conditions and valves and automatic attachments are to be properly set before job is turned over to Owner.

3.5 AIR SYSTEM PROCEDURE

- A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities.
- B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.
- C. Measure air quantities at air inlets and outlets.
- D. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.
- E. Use volume control devices to regulate air quantities only to extend that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.
- F. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.
- G. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.
- H. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.
- I. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.

3.6 SYSTEM TESTING AND BALANCING

- A. Testing and balancing shall be performed in complete accordance with AABC and/or N.E.B.B. Standards for Field Measurement and Instrumentation, Form No. 81266, Volume One. Testing and balancing shall be performed by the mechanical contractor.
- B. Instruments used for testing and balancing of systems must have been calibrated within a period of six months and been checked for accuracy prior to start of work.
- C. Five copies of the complete test report shall be submitted prior to final acceptance of the project.
- D. The Air Balance and Testing shall be performed in accordance with the following requirements.
 - 1. Test and adjust blower rpm to design requirements.
 - 2. Test and record all motor full load amperes and nameplate data.
 - 3. Make pilot tube traverse of main supply and obtain design cfm at fans.
 - 4. Test and record system static pressures, suction and discharge.
 - 5. Test and adjust system for design cfm recirculated air.
 - 6. Test and adjust system for design cfm outside air.
 - 7. Test and record entering air temperatures (db heating and cooling).
 - 8. Test and record entering air temperatures (wb cooling).
 - 9. Test and record leaving air temperatures (db heating and cooling).
 - 10. Test and record leaving air temperatures (wb cooling).
 - 11. Adjust all main supply and return air flows, and all fans to proper design cfm.
 - 12. Test and adjust each diffuser, grille and register to within 5% of design requirements.
 - 13. Identify each diffuser, grille and register as to location and area.
 - 14. Identify and list size, type, and manufacture of diffusers, grilles, registers, and all testing equipment. Use manufacturer's rating all equipment to make required calculations.
 - 15. In readings and test of diffusers, grilles, and registers, include required fpm velocity and test fpm velocity, and required cfm and test cfm after adjustments.
 - 16. Verify location and operation of all fusible link and smoke dampers, and record results.
 - 17. All air conditioning units shall be tested in both heating and cooling modes.
- E. As part of this contract the Mechanical Contractor shall make any changes in the pulleys, belts and dampers, as required for correct balance at no additional cost to the Owner.

3.7 COMMISSIONING

- A. In addition to the work listed above the Independent Testing Agency shall perform all commissioning work required by the 2015 IECC Section C 408.
 - 1. Conduct functional performance testing to include all modes and sequences of operation, redundant or automatic back-up mode, performance of alarms and mode of operation upon loss of power and restoration of power.
 - 2. Conduct functional performance testing to include HVAC control system and sequences of operation.
 - 3. Conduct functional performance testing to include air economizers to determine they operate in accordance with manufacturer's specifications and project requirements.
 - 4. Conduct functional performance testing to include hot water recirculation system and controls.
 - 5. Conduct functional performance testing to include duct leakage testing and building pressure testing of the Air Barrier.
- B. Submit Preliminary Commissioning Report for approval to the Engineer. This report shall identify all deficiencies found during testing and commissioning that have not yet been corrected. Also include any deferred test that cannot be performed due to climatic conditions and the estimated date the deferred tests shall be performed.
- C. Documentation shall be provided to the Building Owner within 90 days of Certificate of Occupancy and shall include:
 - 1. As-built drawings
 - 2. O & M Manuals
 - 3. System balancing report
 - 4. Final commissioning report

END OF SECTION

SECTION 23 07 00 DUCT INSULATION

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1 PART 1 GENERAL

1.1 WORK INCLUDED

- A. Duct thermal and acoustic insulation.

1.2 RELATED WORK

- A. Section 22 07 00: Piping and Equipment Insulation

1.3 JOB CONDITIONS

- A. Deliver material to job site in original non-broken factory packing, labeled with manufacture's density and thickness.
- B. Perform work at ambient and equivalent temperatures as recommended by the adhesive manufacturer.

2 PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Johns - Manville
- B. Armstrong
- C. Owens - Corning

2.2 GENERAL

- A. Adhesives and Insulation Materials: Composite fire and smoke hazard ratings maximum 25 for Flame Spread and 50 for Smoke Developed. Adhesives to be waterproof.

2.3 MATERIALS AND COMPONENTS

- A. Wrapped Ducts: Flexible fibrous glass insulation "K" value at 75 degrees F maximum 0.26 btu/in.sq.ft./degrees F/hr. with factory applied reinforced aluminum foil vapor barrier.
- B. Thermal and Acoustic Lining: Fiberglass insulation with "K" value at 75 degrees F maximum 0.25 btu/in.sq.ft./ degrees F/hr. absolute roughness of exposed surface not to exceed 0.0013, coated to prevent fiber erosion at air velocities up to 4,000 fpm, 1.5 lbs./cu.ft. minimum density.

3 PART 3 EXECUTION

3.1 PREPARATION

- A. Ensure insulation is continuous through inside walls. Pack around ducts with fire proof self-supporting insulation material, properly sealed.
- B. Thermal and Acoustic Lining:
 - 1. Apply to interior of supply and return ducts as indicated.
 - 2. For acoustically lined or internally insulated duct, outside duct dimensions are shown in parenthesis.
 - 3. Secure to ductwork with adhesive using 50% coverage and 12 gage impale anchor tabs on 16 inch centers; all leading edges shall have fasteners at each corner and @ 8" o.c. maximum.
 - 4. Use 1 inch thick insulation unless otherwise noted.
 - 5. Ducts with acoustic insulation do not require external insulation.
 - 6. All concealed rectangular ducts may be wrapped in lieu of internally lined at Contractor's option.
- C. Wrapped Diffuser Boots:
 - 1. Provide mechanical fasteners at 18" centers maximum, to secure insulation to ducts 24" wide and wider.
 - 2. Butt insulation and seal joints and breaks with 2 inch lap of foil adhered over joint.

3.2 INSULATION THICKNESS SCHEDULE

- A. Supply & Return Plenums 1.5" Liner & 2" Wrapped
- B. Supply & Return Ducts 1.5" Liner & 2" Wrapped
- C. Sheet Metal Take-Offs
and Boots to Diffusers 1.5" Wrapped

END OF SECTION

SECTION 23 31 00 DUCTWORK

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PART 1 GENERAL

1.1 WORK INCLUDED

- A. Supply and Return Ducts.
- B. Exhaust Ducts.

1.2 DEFINITIONS

- A. Duct sizes: Inside clear dimensions for ducts.
- B. For acoustically lined or internally insulated ducts, increase duct dimensions as required.

2 PART 2 PRODUCTS

2.1 MATERIALS

- A. Ducts: Galvanized steel lock forming quality, having zinc coating of 1.25 ounces per square foot for each side.
 - 1. Fasteners: Use rivets and bolts throughout; sheet metal screws accepted on low pressure ducts.
 - 2. Sealant: Water resistant, fire resistive, compatible with mating materials.

2.2 LOW PRESSURE SHEETMETAL DUCT

A. Rectangular Ducts:

Largest Duct Dimensions	Gauges of Metal
Up to 18"	No. 26 US Gauge
19" thru 36"	No. 24 US Gauge
37" thru 60"	No. 22 US Gauge
61" thru 96"	No. 20 US Gauge
96" and Up	No. 18 US Gauge

B. Round Ducts:

- 1. Round ducts shall be 26 gage minimum. All transverse joints shall be secured with a minimum of 3 sheet metal screws.
- 2. Exposed round ducts shall be 22 gage minimum.

C. Boots to air outlets, returns or exhausts may be Thermaflex M-KF, or approved equal flexible duct.

1. Lengths shall be 48" maximum.
 2. Seal duct at inlet and outlet connections with duct sealant.
 3. Secure coated steel wire helix to sheet metal with sheet metal band or neoprene ties.
 4. Seal insulation ends with foil tape – not duct tape.
- D. Provide and install splitter dampers or butterfly dampers as indicated. These dampers shall have blades of 16 gauge steel fastened to square operating rods.
- E. Butterfly dampers shall be the full width of the duct in which they are installed.
1. The operating rods shall be fittings with Young Regulators and the operating head shall be securely fastened in place so as to be exposed and accessible in the finished building.
 2. Young regulators shall be recessed type with coverplate flush with finish where installed in finished areas.
 3. In areas with lay-in ceiling, controllers shall be rod type with ball joint bracket and shall be accessible above ceiling.
 4. Operators on round ducts shall be 637 Ventlok with insulation under regulator and adjacent insulation thoroughly sealed with foil tape.
- F. To facilitate the final balancing of the air handling system, control devices shall be installed to control the quantity of air delivered by each individual outlet.
- G. The following bracing, or SMACNA equal bracing, shall apply:

Largest Duct Dimension	Type of Transverse Joint Connection	Intermediate Bracing
Up thru 18"	S slip or drive slip on 8'-0" maximum centers.	None
19" thru 36"	1" pocket lock or standing S on 4'-0" maximum centers.	None
19" thru 36"	1" pocket lock or standing S on 8'-0" maximum centers.	1"x1"x1/8" angle 48" max.spacing
37" thru 48"	1-1/2" pocket lock or 1-5/8" standing S on 4'-0" maximum centers.	None

49" thru 54"	1-1/2" pocket lock, 22 ga. 8'-0" maximum center.	1-1/2"x 1-1/2" x 1/8" angle 36" max. spacing
55" thru 72"	1-1/2" pocket lock, 20 ga. on 8'-0", max. centers reinforced with 1-1/2" x 1-1/2" 3/16" bar.	1-1/2"x1-1/2" x 1/4" angle 36" max. spacing
73" thru 96"	2" standing S, 20 ga., reinforced with 2"x2"x3/16" angle on 30" maximum centers.	None

- H. When ductwork is to remain exposed use 1/2" all-thread from structure and Unistrut P1000T support. Spacing shall be per Section 15090 Hangers & Supports.
- I. Where indicated, ductwork shall be lined with 1-1/2" density Johns-Manville, Lina-Coustic, or Fiberglass duct liner.
- J. Unless otherwise indicated, insulate all low velocity supply, return, exhaust and fresh air ducts constructed from galvanized steel. Insulation brand may be Manville, Owens Corning, or equal.

2.3 FLEXIBLE DUCT

- A. Flexible duct shall be a factory fabricated assembly consisting of an inner sleeve, insulation and an outer moisture barrier. The inner sleeve shall be constructed of a continuous vinyl-coated spring steel wire helix fused to a continuous layer of fiber glass impregnated and coated with vinyl. A 1-1/4 inch thick insulating blanket of fiber glass wool shall encase the inner sleeve and be sheathed with an outer moisture barrier of a reinforced Molar or neoprene laminate of low permeability. The flexible duct shall be rated for a maximum working velocity of 6000 FPM and shall be listed by the Underwriters' Laboratories under their UL-181 standards as a Class 1 duct and shall comply with NFPA Standard #90A. The flexible duct shall be Thermaflex M-KE for low pressure application.
- B. Flex duct shall not exceed 5'-0" in length or have more than 90 degree of bend. If longer duct is required, use round sheetmetal duct with 1-1/2" thick duct insulation to make-up the difference in length.

3 PART 3 - EXECUTION

3.1 FABRICATION

- A. Complete metal ducts within themselves with no single partition between ducts. Open corners are not acceptable.

- B. Lap metal ducts in direction of air flow. Hammer down edges and slips to leave smooth duct interior.
- C. Construct tees, bends, and elbows with radius of not less than 1-1/2 times width of duct on center line.
 - 1. Where not possible and where rectangular elbows used, provide double wall air foil type turning vanes.
- D. Increase duct sizes gradually, not exceeding 15 degrees divergence however possible. Maximum divergence upstream of equipment to be 30 degrees and 45 degrees convergence downstream.
- E. Rigidly construct metal ducts, with joints mechanically tight, substantially airtight, braced and stiffened so as not to breathe, rattle, vibrate, or sag. Seal all joints.
- F. Provide easements where low pressure ductwork conflicts with piping and structure. Where easements exceed 10% duct area, split into two ducts maintaining original duct area.
- G. Ducts shall be so constructed and installed as to be completely free from vibration under all conditions of operation.
- H. Round ducts, ells, and fittings shall have each transverse joint secured with a minimum of 3 sheetmetal screws.
 - 1. Each joint of round ducts and fittings shall be sealed with a double layer of 2" wide duct tape.
- I. Items not shown in detail or covered by detailed specifications shall be as set forth in the SMACNA publication, Low Velocity Duct Construction Standards.

3.2 INSTALLATION

- A. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.
- B. At each point where ducts pass through partitions, seal joints around duct with sheet metal flanges all around duct, secured to wall, on both sides of wall.
- C. Install supply and return grilles indicated and as required.
- D. All duct joints shall be reasonably airtight.
- E. Seal all transverse slip joints of all ducts. Sealant shall be heavy brush coat of Foster 30-02 or Hardcast 601. Exposed duct shall be sealed internal to joint. Do not insulate exposed duct.

END OF SECTION

SECTION 23 80 00 – HEATING, VENTILATION AND AIR CONDITIONING EQUIPMENT

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1 PART 1 GENERAL

1.1 SCOPE

- A. Unless specifically designated otherwise herein, this Contractor shall furnish and/ or install each and every item of equipment described in this section and/or shown on the plans, together with all components and incidentals, materials, labor, fees, transportation, tools, storage, cutting, patching, cleanup, etc. necessary to complete the work.
- B. Principal work is as follows
 1. Package Roof Top Units
 2. Complete supply, return and exhaust ductwork systems with grilles, registers, diffusers and balancing dampers.
 3. Thermal and Acoustical Insulation.
 4. Complete Control Systems.
 5. Equipment Start-Up, Testing, and Balancing.

1.2 ELECTRICAL

- A. The Mechanical Contractor shall:
 1. Furnish all control equipment, including motor starters, all control wiring, and all control wire installation.
 2. Supervise and check out all wiring for correct operation of connected equipment.
- B. Electrical Contractor will:
 1. Furnish all electrical power wiring external to equipment.
 2. Furnish and install all conduit and boxes.
- C. Electrical characteristics shall be as noted on plans.

1.3 PLUMBING

- A. Condensate drains from units to receptor shall be installed by Div 22 Contractor. Condensate drain piping shall be Schedule 40 PVC.
- B. Condensate drains shall be installed and run for complete and correctly operating systems.
 1. Run from unit to mop sink or as noted on plans with indirect connection.
 2. Install plugged cleanouts at each change in direction to allow cleaning.
 3. Provide insulation.
 4. Condensate piping shall connect to center of drain pan.
- C. Supervise and check out all piping for correct operation of connected equipment.

1.4 COORDINATION

- A. The Contractor shall do all cutting required, and shall be responsible for all patching. Coordinate all work with other trades before cutting any portion of building or area which will affect other trades.

1.5 SCHEDULING OF CONSTRUCTION

- A. Schedule construction operations so as to keep Owner in complete operation in all areas and at all times, except as specifically approved by Owner.
- B. Schedule connections into existing services for minimum of inconvenience to the Owner. All such connections that will disrupt services shall be specifically approved by the Owner prior to disconnecting any service.

2 PART 2 – EQUIPMENT AND MATERIALS

2.1 AIR CONDITIONING SYSTEMS

- A. Roof Top Units
 - 1. Unit shall be for rooftop installation, shall be for both cooling and heating with automatic control system, including all required controls and accessories.
 - 2. Unit shall have a 20-gage casing, 18-gauge pan, 16-gauge mounting channels, zinc-grip steel, bonderized, baked enamel finish and weatherized for outdoor installation. Unit shall be insulated with 1" thick, 1-1/2 lb./cu. ft. fiberglass. Unit shall be equipped with outside air economizer damper with enthalpy control.
 - 3. Cooling Section: Unit shall have hermetic compressor, with refrigerant-gas cooled high-torque motor, inherently protected, and externally spring mounted, with crankcase heater. Coils shall be constructed of 1/2" OD copper tubes, arranged in staggered rows mechanically expanded into aluminum fins spaced 12 per inch. Condenser fans shall be propeller type, with vertical discharge, direct connected to inherently protected motor and protected by heavy gauge wire guard. Evaporator blower shall be centrifugal type, resiliently mounted, and connected to inherently protected motor. Controls shall be mounted in unit with access through an easily removable panel. Controls shall be factory mounted and wired ready for field wiring. There shall be easily accessible channels for mounting, field-supplied 1" thick permanent, cleanable filters. Cooling system shall be equipped for operation down to 45 degrees F ambient air temperature.
 - 4. Heating Section: Shall be electric or gas as indicated on the drawings, UL or AGA approved for the application.

- B. Roof curbs shall be factory units with rigid insulation and nailer. Furnish curbs with bottom connections for all systems.
- C. Smoke detectors shall be Fenwall DH-400 AC/DC approved equal, furnished, installed, and wired completely.
 - 1. Interlock A/C Unit Fan Controls thru smoke detector auxiliary contact.
 - 2. Provide power to smoke detector from A/C control power. Provide transformer as required.
 - 3. Detectors shall be complete, with duct housing sample tubes, and remote indicator lamps.
 - 4. Mount detectors in return air stream, all per Manufacturer's Recommendations and Fire Marshal's Requirements.

2.2 FIRE DAMPERS

- A. Fire dampers shall be installed in supply, recirculation and exhaust ducts wherever such ducts pass through fire walls, and as required by National Fire Protection Association recommendations and applicable local codes. Fire dampers shall be constructed and tested in accordance with Underwriters Laboratory Standard UL-555. Fire dampers shall be operated by UL listed fusible link, 165 degrees F. Access panels shall be provided in duct enclosures or in general construction as required to permit access to duct for resetting the damper. Dampers are to have spring closure. Dampers shall have equivalent to Air Balance, Inc., "Fireseal". Equivalent dampers as made by Advanced Air, Ruskin Mfg. Co., Prefco, etc., may be used. Fire dampers shall be installed as per SMACNA manual. Damper shall be 100% free duct opening area type with steel sleeve and retaining angles.

2.3 CONTROL SYSTEM

- A. The HVAC Temperature Control Systems shall be furnished complete in all respects under Division 23 of the specifications. Controls shall consist of independent programmable thermostats that comply with the 2015 IECC. All unit controls and controls furnished as an integral part of the unit shall be furnished under this Section of the specification.
- B. All control wiring shall be color coded.
- C. Control Wiring shall be installed in conduit where required for physical protection of wiring.
- D. Sufficient relays and other protective devices shall be employed as required to eliminate feed-back in all control circuits.
- E. All low voltage wiring shall be provided by under Division 23 of the Specifications.

- F. Only line voltage interlock wiring or other line voltage wiring specifically specified in Division 26 or shown on the Electrical Drawings shall be provided by the Electrical Trades. Coordinate with electrical trades for portions of conduit systems provided under Division 26 of the specifications.
- G. The control systems shall be equivalent to the type indicated on the drawings, and the contractor shall provide and install all components and wiring required to effect a complete and operating system.

2.4 EXHAUST FANS

- A. Provide exhaust fans as scheduled and as noted.
- B. Equal fans by Cook, Acme, Greenheck or Penn are approved.

2.5 GRILLES AND REGISTERS

- A. Registers, grilles, and diffusers shall be surface mounted steel type, as manufactured by Titus or equal. Ceiling devices shall be off-white to match ceiling. Wall grilles and registers shall be off-white, or painted as directed by the Architect, except where noted otherwise on the drawings. Where fire rated air devices are required they shall be steel and UL listed for their intended use.
- B. Equipment and materials shall be as specified on the drawings.
- C. All diffusers and registers shall have opposed blade dampers where access to volume dampers is difficult after building is finished.
- D. All grilles, registers and ceiling outlets shall be selected to provide a noise criteria no greater than 25. Grilles, registers, and outlet sizes shown on the drawings are minimum sizes; and where larger sizes are required to comply with the above noise criteria, larger grilles, registers and ceiling outlets shall be furnished and installed at no additional cost to the Owner. It shall be the Contractor's responsibility to arrange for any additional space required for such larger grilles, registers and ceiling outlets.
- E. Paint all surfaces above (or behind) perforated return air grilles or other open spaced air outlet devices with flat black paint. All piping, conduits, ductwork, structural members shall be painted. Make sure that no nonpainted surfaces are visible to a person standing on the room side and viewing through the device.
- F. Diffusers and grilles designated for maximum security type shall be constructed of heavy gauge aluminum or stainless steel designed specifically for installation in such environment. All exposed mounting hardware shall be tamperproof. Provide clamping ring for ceiling mounted devices.

- G. Other equal Manufacturers: Airmate, J and J, Metal Aire, Carnes, and other equals.

2.6 FAN CONNECTIONS

- A. At all points where ducts connect to fans, provide and install flexible connections. These connections are to be long enough to permit a minimum separation of 3" between duct and fan or unit housing with at least 1" slack in the flexible material itself.
- B. These flexible connections shall be made using Ventfab canvas that has been chemically treated to make it fire resistant, waterproof, mildew-resistant, and practically air-tight, and shall weigh approximately 30 oz. per sq. yd. before treating.

2.7 FRESH AIR INTAKE AND EXHAUST OUTLET

- A. Fresh air intake and exhaust outlet shall be fabricated as noted.

3 PART 3 EXECUTION

3.1 INSPECTION

- A. Examine all areas and conditions under which work of this Section will be installed. Correct conditions detrimental to the proper and timely completion of the work. Do not proceed until unsatisfactory conditions have been corrected.

3.2 HVAC SYSTEM LAYOUT

- A. Lay out the HVAC system in careful coordination with the drawings. Follow the general layout shown on the drawings in all cases except where other work may interfere. Lay out all pipes to fall within partition, walls or roof cavities, and do not require furring other than as shown on the drawings. Coordinate locations of registers, grilles, and diffusers with ceiling layout and other building components.

3.3 INSTALLATION GENERAL

- A. Install all HVAC components to clear all beams and obstructions.
- B. Provide sleeves for all piping and ducts passing through concrete masonry walls, roofs, and floors. Sleeves shall be of sufficient size to clear by 1/4" all around. Sleeves shall be cut off flush with wall face or below floors and shall extend 6" above the floor or roof. Sleeves around pipe passing through ground floor or outside walls shall be caulked water tight with oakum and plastic cement. Chrome plated brass escutcheons

shall be provided wherever pipes pass through floors, walls, and ceilings of finished areas.

3.4 AIR DUCT WORK

- A. Air ducts shall installed as indicated on the drawings and coordinated with the work of the other trades. Check all drawings for exact locations to prevent interferences.
- B. Splitter dampers shall be furnished and installed where indicated on the drawings and as required at each branch for air distribution control to the respective branches. Provide chrome plated concealed damper regulators for ducts exposed to view. A sheet metal wear plate shall be attached to the top and bottom of the duct to prevent damper tearing duct liner. Provide end bearings on all dampers.
- C. Flashing and counterflashing shall be furnished and installed at all ducts passing through roof and exterior walls to the satisfaction of the Architect.
- D. Flexible air duct connections shall be furnished and installed as indicated on the drawings. Flexible air duct runs to diffusers shall not exceed 5 feet.
- E. Seal visible openings and audible air leaks at operating conditions. Leakage shall be in accordance with section 4 of SMACNA HVAC Air Duct Leakage Test Manual. Additional care shall be taken with ducts involved in smoke purge systems. Such duct shall be sealed in accordance with SMACNA medium pressure duct system requirements.

3.5 PIPING SUPPORTS

- A. Provide all pipe supports required. Horizontal runs of pipe in the building shall be rigidly supported to building structures with adjustable swivel couplings and rod type hangers for sizes #4 and smaller. Perforated strap hangers will not be permitted in any part of the work. Pipe hangers and supports shall be located near change of directions and at points required to properly support piping. Spacing or hangers and supports shall not exceed the following maximum distances between supports:

<u>Pipe Size</u>	<u>Span</u>
1/2" and smaller	5'-0"
1 1/8"	7'-0"
All Plastic piping	4'-0"

- B. Provide sheet metal "saddles" at each pipe hanger or support for insulated piping to prevent damage to insulation.

3.6 EQUIPMENT AND OUTLET LOCATION

- A. Locations for equipment and outlets for the HVAC work shall be determined by the Architect. Install in accordance with manufacturer's instructions.

3.7 EXHAUST FANS

- A. Install exhaust fans and related accessories as indicated on the drawings.

3.8 CONTROL DAMPERS

- A. Assemble multiple section dampers with required interconnecting linkage and extend required number of shafts through duct for external mounting of damper motors.

3.9 PIPING AND ACCESSORIES

- A. Installation: Joints in copper tubing shall be brazed with silver solder as hereinbefore specified. Surplus brazing material shall be removed at all joints in lines not insulated.
- B. Surface Preparation: Prior to insulation installation, clean and dry exterior surfaces of pipe, fittings and valves.

3.10 REFRIGERANT

- A. When installation is completed, the Contractor shall thoroughly test for leaks, make the system tight, apply a deep vacuum, and fully charge them with refrigerant. Upon completion of the operating tests, he shall replace any oil or refrigerant lost during the test operations. Upon acceptance Contractor shall leave the systems fully charged.

END OF SECTION

SECTION 26 00 00 GENERAL PROVISIONS FOR ELECTRICAL

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1 PART 1 GENERAL

1.1 SPECIAL NOTE

- A. The Architectural and Structural Plans and Specifications, including the supplements issued thereto, Information to Bidders, and other pertinent documents issued by the Owner, are a part of these specifications and the accompanying mechanical and electrical plans, and shall be complied with in every respect. All the above is included herewith, will be issued separately or is on file at the Owner's office, and shall be examined by all bidders. Failure to comply shall not relieve the Contractor of responsibility or be used as a basis for additional compensation due to omission of drawings. Where the Supplementary General Conditions conflict with the General Conditions, the Supplementary General Conditions shall govern.
- B. All work covered by this division of the specifications shall be accomplished in accordance with all applicable provisions of the contract documents and any addenda or directive which may be issued.

1.2 CHECKING DOCUMENTS

- A. The drawings and the specifications are numbered consecutively. The Contractor shall check the drawings and specifications thoroughly and shall notify the Owner of any discrepancies or omissions of sheets or pages. Upon notification, the Owner will promptly provide the Contractor with any missing portions of the drawings or specifications. No discrepancies or omissions of sheets or pages of the contract documents will relieve the Contractor of his duty to provide all work required by the complete contract documents.

1.3 QUALITY ASSURANCE:

- A. All plumbing work shall be in accordance with the requirements of the International Plumbing Code, 2015 Edition.
- B. All mechanical work shall be in accordance with the requirements of the International Mechanical Code, 2015 Edition.
- C. All electrical work shall be in accordance with the requirements of the National Electrical Code, 2014 Edition. All work shall comply with the 2015 International Energy Conservation Code.
- D. Buy American Act: Only domestic construction materials will be used by the Contractor, Subcontractors, materialmen, and suppliers in the performance of this contract.
- E. Products Criteria:

1. Standard Products: Material and equipment shall be the standard products of a manufacturer regularly engaged in the manufacture of the products for at least 3 years. See other specification sections for any exceptions.
 2. Equipment Service: Products shall be supported by a service organization which maintains an adequate inventory of repair parts and is located within a one hundred mile radius of the site.
 3. Multiple Units: When two or more units of materials or equipment of the same type or class are required, these units shall be products of one manufacturer.
 4. Assembled Units: Manufacturers of equipment assemblies, which use components made by others, assume, complete responsibility for the final assembled product.
 5. Nameplates: Nameplate bearing manufacturer's name or identifiable trademark shall be securely affixed in a conspicuous place on equipment, or name or trademark cast integrally with equipment, stamped or otherwise permanently marked on each item of equipment.
- F. Manufacturer's Recommendations: Where installation procedures or any part thereof are required to be in accordance with the recommendations of the manufacturer of the material being installed, printed copies of these recommendations shall be furnished to the Architect prior to installation. Installation of the item will not be allowed to proceed until the recommendations are received. Failure to furnish these recommendations can be cause for rejection of the material.

1.4 LAWS, CODES AND ORDINANCES

- A. All work shall be executed in strict accordance with all local, state and national codes, ordinances and regulations governing the particular class of work involved, as interpreted by the inspecting authority. The Contractor shall be responsible for the final execution of the work under this heading to suit those requirements. Where these specifications and the accompanying drawings conflict with these requirements, the Contractor shall report the matter to the Owner, shall prepare any supplemental drawings required illustrating how the work may be installed so as to comply and, on approval, make the changes at no cost to the Owner. On completion of the various portions of the work the installation shall be tested by the constituted authorities, approved and, on completion of the work, the Contractor shall obtain and deliver to the Owner a final certificate of acceptance.

1.5 TERMINOLOGY

- A. Whenever the words "furnish", "provide", "furnish and install," "provide and install", and/or similar phrases occur, it is the intent that the

materials and equipment described be furnished, installed and connected under this Division of the Specifications, complete for operation unless specifically noted to the contrary.

- B. Where a material is described in detail, listed by catalogue number or otherwise called for, it shall be the Contractor's responsibility to furnish and install the material.
- C. The use of the word "shall" conveys a mandatory condition to the contract.
- D. "This section" always refers to the section in which the statement occurs.
- E. "The project" includes all work in progress during the construction period.
- F. "Concealed" areas are those areas which cannot be seen by the building occupants from the floor with all building components in place.
- G. "Exposed" areas are all areas which are exposed to view by the building occupants including mechanical rooms.
- H. In describing the various items of equipment, in general, each item will be described singularly, even though there may be a multiplicity of identical or similar items.

1.6 ENGINEER'S STATUS DURING CONSTRUCTION:

- A. The work, from its commencement to its completion, shall be under the exclusive charge and control of the Contractor, and all risks in connection therewith shall be borne by the Contractor.
- B. The Engineer's efforts during periodic site visits will be directed toward assisting the Architect in providing assurance for the Owner that the completed project will conform to the requirements of the contract documents, but the Engineers will not be responsible for the Contractor's failure to perform the work in accordance with contract documents.
- C. The Engineer will make recommendations to the Architect regarding disapproval or rejection of work which, in his opinion, is defective, i.e.; is unsatisfactory, faulty or defective, or does not conform to the requirements of the contract documents. Failure on the part of the Engineer to recommend disapproval of or rejection of work, methods, or acts or omissions of any kind shall never at any time be deemed to constitute acceptance or approval of the same.

1.7 GENERAL

- A. In general, the lines and ducts to be installed by the various trades under these specifications shall be run as indicated, as specified herein, as required by particular conditions at the site, and as required to conform

to the generally accepted standards as to complete the work in a neat and satisfactorily workable manner. The following is a general outline concerning the running of various lines and ducts and is to be excepted where the drawings or conditions at the building necessitate deviating from these standards.

- B. All piping, conduit and ductwork for the mechanical and electrical trades shall be concealed in chases in finished areas, except as indicated on the drawings. Horizontal lines run in areas that have ceilings shall be run concealed in those ceilings, unless otherwise specifically indicated or directed.
- C. Piping, ductwork, conduits and raceways may be run exposed in machinery and equipment spaces, where serving as connections to motors and equipment items in finished rooms where exposed connections are required, and elsewhere as indicated on the drawings or required.
- D. All conduits in any space where they are exposed shall run parallel with the building walls. They shall enter the concealed areas perpendicular with the walls, ceilings or floors. Fittings shall be used where necessary to comply with this requirement.
- E. The Contractor shall thoroughly acquaint himself with the details of the construction and finishes before submitting his bid as no allowances will be made because of the Contractor's unfamiliarity with these details. Place all inserts in masonry walls while they are under construction. All concealed lines shall be installed as required by the pace of the general construction to precede that general construction.
- F. The mechanical and electrical plans do not give exact details as to elevations of lines and ducts, exact location, etc., and do not show all the offsets, control lines, pilot lines and other installation details. The Contractor shall carefully lay out his work at the site to conform to the architectural and structural conditions, to provide proper grading of lines, to avoid all obstruction, to conform to details of installation supplied by the manufacturers of the equipment to be installed, and thereby to provide an integrated, satisfactorily operating installation. Each Contractor shall verify that each item of mechanical equipment, each electrical panel, light fixture, and device, each grille or ceiling outlet, and each other item of work furnished by him shall fit into the available space before ordering same. Any required changes due to the Contractor's failure to verify that each item of his equipment will fit into the available space shall be made by the Contractor furnishing the equipment, all at no additional cost to the Owner.
- G. The routing of piping, ductwork, conduits, etc., indicated on the drawings is approximate and where light fixtures or other items of work are to be recessed in ceiling, piping, ductwork, conduits, etc., shall be routed around the light fixtures or other items of work where there is not sufficient space for same to be routed above such item of work with the

recessed item properly installed. Any required changes due to the Contractor's failure to properly coordinate his work with recessed items shall be made by the Contractor installing such piping, ductwork, conduits, etc., all at no additional cost to the Owner.

- H. The electrical plans show diagrammatically the locations of the various electrical outlets and apparatus and the method of circuiting and controlling them. Exact locations of these outlets and apparatus shall be determined by reference to the general plans and to all detail drawings, equipment drawings, roughing-in drawings, etc., by measurements at the building, and in cooperation with other sections, and in all cases shall be subject to the approval of the Owner. The Owner reserves the right to make any reasonable change in location of any outlet or apparatus before installation (within 10 feet of location shown on drawings) or after installation if an obvious conflict exists, without additional cost to the Owner.
- I. The Contractor shall submit working scale drawings of all his apparatus and equipment which in any way varies from these specifications and plans, which shall be checked by the Owner before the work is started, and interferences with the structural conditions shall be corrected by the Contractor before the work proceeds.
- J. Order of precedence shall be observed in laying out the pipe, ductwork, material, and conduit in order to fit the material into the space above the ceiling and in the chases and walls. The following order shall govern:
 - 1. Items affecting the visual appearance of the inside of the building such as lighting fixtures, diffusers, grilles, outlets, panelboards, etc. Coordinate all items to avoid conflicts at the site.
 - 2. Large ducts and pipes with critical clearances.
 - 3. Conduit, water lines, and other lines whose routing is not critical and whose function would not be impaired by bends and offsets.
- K. Piping, ducts, and conduits serving outlets on items of equipment shall be run in the most appropriate manner. Where the equipment has built-in chases, the lines shall be contained therein. Where the equipment is of the open type, the lines shall be run as close as possible to the underside of the top and in a neat and inconspicuous manner. All piping, ductwork, conduits and all other items of work supported from the structure above shall be installed as high as physically possible (not just as convenient) considering all work required to be installed in the available space. If any such work is installed lower than it could have been installed, the Contractor shall furnish all labor, equipment, and materials to remove same and reinstall the work as high as possible, all at no additional cost to the Owner.
- L. Adequate provisions shall be provided for the replacement of all filters.

- M. In addition to insulation called for elsewhere in the specifications, all piping and equipment subject to condensation and/or whose normal operating surface temperature is below 70 degrees F or above 110 degrees F shall be insulated. All piping subject to condensation and/or whose operating temperature is below 70 degrees F shall be insulated same as specified elsewhere in the specifications for chilled water or refrigerant suction line piping. All piping with operating surface temperature above 110 degrees F shall be insulated same as specified elsewhere in the specifications for domestic hot water or steam piping. All insulation shall be provided by the particular Contractor who installs the particular equipment or piping system. All equipment shall be insulated and finished in a manner suitable for the conditions and as approved by the Engineers. Armaflex insulations shall not be permitted in breathing air spaces.
- N. Exceptions and inconsistencies in plans and specifications shall be brought to the Owner's attention before the contract is signed. Otherwise, the Contractor shall be responsible for any and all changes and additions that may be necessary to accommodate his particular apparatus, material, or equipment.
- O. The Contractor shall distinctly understand that the work described herein and shown on the accompanying drawings shall result in a finished and working job, and any item required to accomplish this intent shall be included whether specifically mentioned or not.
- P. Each bidder shall examine the plans and specifications for the General Construction. If these documents show any item requiring work under Division 22, 23 or 26 and that work is not indicated on the respective "M", "P" or "E" drawings, he shall notify the Owner in sufficient time to clarify before bidding. If no notification is received, the Contractor is assumed to require no clarification, and shall install the work as indicated on the General Plans in accordance with the specifications.

1.8 DIMENSIONS

- A. Before ordering any material or doing any work, the Contractor shall verify all dimensions, including elevations, and shall be responsible for the correctness of the same. No extra charge 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 Owner for consideration before proceeding with the work.

1.9 INSPECTION OF SITE

- A. The accompanying plans do not indicate completely the existing mechanical and electrical installations. The bidders for the work under these sections of the specifications shall inspect the existing installations and thoroughly acquaint themselves with conditions to met and the work to be accomplished in removing and codifying the existing work, and in

installing the new work in the present building and underground serving to and from that structure. Failure to comply with this shall not constitute grounds for any additional payments in connection with removing or modifying any part of the existing installations and/or installing any new work.

1.10 ELECTRICAL WIRING

- A. All electric wiring of every character, both for power supply, for pilot and control, for temperature control, for communications, etc. will be done under Division 26 of these specifications. The Contractor for each section shall erect all his motors in place ready for connections. The Contractor, under Division 26, shall mount all the starters and controls, furnishing the supporting structures and any required outlet boxes.
- B. Every electrical current consuming device furnished as a part of this project, or furnished by the Owner and installed in this project, shall be completely wired up under Division 26. Verification of exact location, method of connection, number and size of wires required, voltage requirements, and phase requirements is the responsibility of the Contractor under Division 26. If conflicts occur between the drawings and the actual requirements, actual requirements shall govern.

1.11 MOTORS AND CONTROLS

- A. All motors furnished under any of the several sections of these specifications shall be of recognized manufacture, of adequate capacity for the loads involved and wound for the current characteristics shown on the electrical drawings. All motors shall conform to the standards of manufacture and performance of the National Electrical Manufacturer's Association as shown in their latest publications. They shall further be listed by Underwriters Laboratories.
- B. Unless otherwise noted, the Contractor under Division 16 shall furnish each motor with a starter and all controls of the types specified or required. The starters shall be of the totally enclosed type, of capacity rating within the required limits of the motors which they are to serve, shall be suitable for the motor current characteristics and shall provide thermal overload protection. All starters shall be of standard manufacture and performance as defined by the National Electrical Manufacturers' Association. They further shall be listed by Underwriters Laboratories. Provide overload protection in each phase wire.
- C. All motors larger than 1/3 horsepower shall be of a type that the power consumed is in approximate direct proportion to the load on the motor. At 50% of rated brake horsepower, the power consumed shall be approximately 50% of the power consumed at full load.

1.12 TESTING

- A. The Contractor under each division shall at his own expense perform the various tests as specified and required by the Owner and as required by the State and local authorities. The Contractor shall furnish all fuel and materials necessary for making test.

1.13 PAINTING

- A. Painting for Divisions 22, 23 and 26 shall be as follows:
 - 1. If the factory finish on any apparatus or equipment is marred, it shall be touched up and then given one coat of half-flat-half-enamel, followed by a coat of machinery enamel of a color to match the original. Paint factory prime surfaces.

1.14 SEALING AROUND PIPES, CONDUITS, DUCTS, ETC.

- A. The Contractor installing pipes, conduits, ducts, etc. shall seal all spaces between pipes and/or sleeves where they pierce walls, partitions or floors with Dow Corning No. 2000 fire resistant caulk. The packing shall effect a complete fire and/or air seal where pipes, conduits, ducts, etc., pierce walls, floors or partitions.

1.15 GENERAL

- A. The contractor shall provide all labor, equipment, materials, etc. and shall perform all operations in connection with the installation of electrical work in accordance with these contract documents.
- B. The contractor shall execute all work specified or indicated on accompanying drawings. Contractor shall provide all equipment necessary and usually furnished in connection with such work and systems, whether or not specifically mentioned.
- C. Every contractor shall be responsible for all his work fitting into place in a satisfactory and neat workmanlike manner in every particular to the approval of the owner.
- D. Confer with the general contractor and other contractors regarding the location and size of pipes, equipment, fixtures, conduit, ducts, openings, switches, outlets, etc., that there be no interferences between the installation or progress of the work of any contractor on the project.
- E. The electrical drawings are diagrammatic and shall be followed as closely as actual construction of the building and the work of other trades will allow. All changes from drawings necessary to make the work of each contractor conform to the building construction and the work of other trades shall be done at the appropriate contractor's expense.

- F. Should any bidder consider that any requirement of these specifications and drawings will make the effective operation of any portion or the whole installation impossible, or if he feels a vital component has been omitted, he must describe in his bid changes he deems necessary. Failure to do so shall be considered as an agreement on the part of the bidder to guarantee the effective operation of the installation.
- G. All equipment shall be installed complete with all necessary fittings, supports, accessories, etc., as necessary for a complete installation, providing the desired function. All equipment shall be installed in accordance with manufacturer's recommended procedure unless specifically stated otherwise.
- H. Nothing in these specifications or drawings shall be construed as directing any contractor from deviating from any legally binding code or ordinance.

1.16 SUBMITTALS

- A. Sequence: The contractor is required to submit four copies of the following types of information:
 - 1. Prior to ordering equipment: shop drawings/ component data.
 - 2. At the end of the project before final inspection: maintenance manuals, warranties, certificate of owner's instruction and a certificate of receipt of loose items.
- B. Maintenance manuals shall include shop drawings, wiring diagrams, operating instructions, lubrication instructions, maintenance instructions, parts lists, and test reports.

2 PART 2 PRODUCTS

- A. PRODUCT LISTING
 - 1. When two or more items of same material or equipment are required, they shall be of the same manufacturer. Product manufacturer uniformity does not apply to raw materials, bulk materials, wire, conduit, fittings, sheet metal, steel bar stock, welding rods, solder, fasteners, motors for dissimilar equipment units, and similar items used in work, except where indicated otherwise.
 - 2. Provide products which are compatible within systems and other connected items.
- B. NAMEPLATE DATA
 - 1. Provide permanent operational data nameplate on each item of power operated equipment. Indicate manufacturer, product name, model number, serial number, capacity, operating and power

characteristics, labels of tested compliances, and similar essential data. Locate nameplates in an accessible location.

3 PART 3 EXECUTION

3.1 OPENINGS AND SLEEVES IN CONSTRUCTION

- A. Most openings required in wall, floor, roof, ceiling, etc., construction for electrical work will be provided by the general contractor in accordance with information furnished by the electrical contractor. All sleeves, inserts, forms, etc., required for openings shall be furnished by the contractor requiring same. The electrical contractor shall be responsible for their size, fabrication and location. Where new work has been installed previous to this request, the general contractor will do the necessary cutting and patching at the expense of the electrical contractor.

3.2 PROTECTING SITE

- A. Provide adequate barricades, signs, torches, etc. as required during progress of the work. Observe all applicable regulations respecting safety provisions.
- B. Protect utilities, trees, shrubbery, fences, poles, sidewalks, curbs and all other property and surface structures from damage. Any items which are damaged shall be restored by the contractor at his own expense.

3.3 MECHANICAL-ELECTRICAL COORDINATION

- A. Unless otherwise specified the electrical contractor will furnish and install all conduit, wiring, disconnects, starter, overloads, holding coils, remote pushbutton stations, control switches, and pilot lights for all electrically operated mechanical equipment, including final connections.
- B. The mechanical contractor shall provide and connect wiring for all control devices such as thermostats, pressure sensors, humidistats, etc., associated with the mechanical equipment, and shall install those items which due to their method of operation must be connected or integrated into the equipment. Items not attached to mechanical equipment, conduit, duct or piping shall be installed by the electrical contractor. All wiring for mechanical control shall be provided and installed by the mechanical contractor. The mechanical contractor is responsible for coordinating his requirements with the electrical contractor. Control diagrams shall be provided by the mechanical contractor.
- C. Each contractor shall consult with the electrical contractor before ordering or installing electrical equipment and shall be responsible to insure the equipment installed is of proper size and type.
- D. After wiring is completed by the electrical contractor, each mechanical contractor shall inspect the appropriate wiring before motors are

operated. If any discrepancies are discovered, the mechanical contractor shall notify the owner in writing. The owner shall arrange to have changes made as required.

3.4 MOUNTING HEIGHTS TO COMPLY WITH ADA REGULATIONS

- A. Install all electrical components regulated by ADA regulations at heights required in areas of the building which comply with ADA regulations. Coordinate the height of any component not listed below.
- B. Electrical Components:
 - 1. Light Switches: 48" max. (measured to top of box).
 - 2. Receptacles and Telephone Jacks: 18" min. (measured from floor to center of box).
 - 3. Thermostats: 48" max. (measured from floor to top of box).
 - 4. Audio/Visual Warning Devices: 80" max. (measured from floor to center of device).

3.5 STRUCTURAL CONDITIONS

- A. These specifications and the drawings accompanying same are intended to cover an installation which will not interfere with the structural design of the building, which will fit into the several available spaces, and which will insure a complete and satisfactory mechanical and electrical system.
- B. Each bidder shall carefully examine the plans for all branches of the work and shall be responsible for the proper fitting of his material and apparatus into the building.
- C. Should the particular equipment which any bidder proposes to install require other space conditions than those shown on the drawings, he shall arrange for such space with the Architect before submitting his bid. Should changes become necessary on account of failure to comply with this clause, the Contractor shall make such necessary changes at his (the Contractor's) own expense.

3.6 OWNER INSTRUCTIONS

- A. Each contractor shall instruct the owner's representative in the operation and maintenance of each system. Instruction periods shall be at the convenience of the owner. Submit a letter signed by the owner certifying satisfactory completion of instructional activities.

3.7 FINAL INSPECTION

- A. Final inspection will be made only after the contractor certifies in writing that the work is 100% complete.
- B. A representative from each contractor and sub-contractor shall be present and be prepared to assist the owner in performing the inspection.

- C. A report describing incomplete or unacceptable work will be reviewed with the contractor. The contractor shall then certify to the owner in writing that such unacceptable or incomplete work is 100% corrected.

3.8 PROJECT CLOSEOUT

- A. Before final application for payment will be accepted, contractor must complete the following requirements:
 - 1. Final inspection performed and all corrections made.
 - 2. Submittal of maintenance manuals, certificate of owner instruction, equipment warranties and receipt for loose items.

3.9 COMMISSIONING

- A. Contractor shall employ an independent testing agency to perform the commissioning required in Section C 408 of the 2015 IECC.
 - 1. Compliance with the power allowance for lighting fixtures shall be documented.
 - 2. Commissioning of the lighting controls installed on the project shall be performed. This includes occupancy sensors and controls, time switch controls and daylight responsive controls. All parts of the lighting control and switching system shall be documented to be fully operational in accordance with the plans and specifications.

END OF SECTION

SECTION 26 00 10 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

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1 PART 1 – GENERAL

1.1 DESCRIPTION – Documents to be submitted for approval before construction

1.2 SUBMITTALS

- A. Shop and Installation Drawings, Product Data and Samples as required.
- B. Prepare and submit, with construction schedule, a separate schedule listing dates when shop drawings, product data and any requested samples will be needed for each product.

1.3 GENERAL

- A. Requests for material substitutions must be received and approved prior to submission of shop drawings, said submittals and/or samples; reviewed by architect or engineer does not constitute acceptance of materials other than those originally specified.

1.4 SHOP DRAWINGS

- A. Original drawings, which illustrate portion of the work: Showing equipment, layout, setting or installation details. Deviation from Contract Drawings shall be marked in RED with an explanation of reason for change
- B. Prepared by a qualified detailer.
- C. Identify details by reference to sheet and detail number shown on contract drawings.
- D. Reference specification section and paragraph number(s) represented on the submitted drawings.
- E. Minimum Sheet Size: 8½" x 11".

1.5 PRODUCT DATA

- A. Manufacturer's standard schematic drawings:
 - 1. Modify drawings to delete information which is not applicable to project.
 - 2. Supplement standard information to provide additional information applicable to project.
- B. Manufacturer's catalog sheets, brochures, diagrams, schedules, performance charts, illustrations, and other standard descriptive data.

1. Clearly mark each copy to identify pertinent materials, products or models.
 2. Show dimensions and clearance required.
 3. Shop performance characteristics and capacities.
 4. Show wiring diagrams and controls.
- C. Complete catalogs will not be acceptable. Manufacturer's regular catalog sheets will be acceptable if they completely indicate specification requirements. When manufacturer's catalog sheets are submitted, completely line out material not directly connected with subject.
1. Assemble in indexed brochure, catalog sheets of submittals containing more than five (5) different items or equipment.
- D. Reference specification section and paragraph number represented on data submitted.

1.6 CONTRACTOR'S RESPONSIBILITIES

- A. Review shop drawings, product data and samples prior to submission and certify with signature of reviewer
- B. Verify:
1. Field measurements.
 2. Field construction criteria.
 3. Catalog numbers and similar data.
 4. Quantities
- C. Coordinate each submittal with requirements of work and of contract documents.
- D. Contractor's responsibility for errors, omissions and deviations in submittals from requirements of contractor documents is not relieved by architect's review of submittals, unless architect gives written acceptance of specific deviations.
1. Notify architect in writing of deviations at the time of submittal.
- E. Begin no work which requires submittals until return of submittals with architect's stamp and initials or signature indicating review.
- F. After architect's / engineer's review, distribute copies.

1.7 SUBMISSION REQUIREMENTS

- A. Schedule submissions at least 15 days before dates reviewed submittals will be needed.
- B. Submit a minimum of 5 copies of all submittals.
- C. Accompany submittals with transmittal in duplicate, containing:
 - 1. Date.
 - 2. Project title and number.
 - 3. Contractor's name and address.
 - 4. The number of each shop drawings, product data and samples submitted.
 - 5. Notification of deviations from contract documents.
 - 6. Other pertinent data.
- D. Submittals shall include:
 - 1. Date and revision date.
 - 2. Project title and number.
 - 3. The names of:
 - a. Architect.
 - b. Contractor.
 - c. Subcontractor.
 - d. Supplier.
 - e. Manufacturer.
 - f. Separate detailer when pertinent.

4. Identification of product or material.
5. Relation to adjacent structure or materials.
6. Field dimensions, clearly identified as such.
7. Specification section number.
8. Applicable standards, such as ASTM or Federal Specifications numbers.
9. A blank space, 3" x 3" for the architect's stamp.
10. Identification of deviations from contract documents in red ink include justification for deviation.
11. Contractor's stamp, initialed or signed, certifying to review of submittal, verification of field measurements and compliance with contract documents.

Failure to comply with the above requirements shall be grounds for rejection of submittal.

1.8 RESUBMISSION REQUIREMENTS

A. Shop Drawings:

1. Revise initial drawings as required and resubmit as specified for initial submittal.
2. Indicate on drawings any changes which have been made other than those requested by architect.
3. Product Data and Samples: Submit new data and samples as required for initial submittal.

1.9 DISTRIBUTION OF SUBMITTALS AFTER REVIEW

A. Distribute copies of Shop Drawings and Product Data which carry architect's stamp to:

1. Contractor's file.
2. Job-site file.
3. Record document's file.
4. Other prime contractors.
5. Subcontractor.
6. Supplier.
7. Fabricator.

B. Distribute samples as directed.

1.10 ARCHITECT'S / ENGINEER'S RESPONSIBILITIES

A. Review submittals with reasonable promptness.

B. Review for:

1. Design concept of project.
2. Information given in contract documents.

- 3. Architect or Engineer is not responsible for verification of quantities.
- C. Review of separate items does not constitute review of an assembly in which item functions.
- D. Affix stamp and initials or signature certifying the review of submittals.
- E. Return submittals to contractor for distribution.

END OF SECTION

SECTION 26 00 20 SITE UTILITIES

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1 PART 1 GENERAL

1.1 NOTE

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

1.2 SUBMITTALS

- A. Submit manufacturer's data on all materials.

1.3 SCOPE

- A. Perform all layout, trenching, excavation, backfill, shoring and similar work and provide and install all materials and appurtenances necessary for the installation and final connection of all utilities.

1.4 EXISTING UTILITIES

- A. Prior to beginning work, manually locate and stake all utility lines existing at the site. If utilities are to remain in place, provide adequate means of support and protection during earthwork operations.
- B. The Contractor shall not rely solely on the scale drawings in determining the scope of the work.
- C. The drawings are not certified surveys and are not guaranteed for accuracy of location or elevation of existing lines or completeness. Before bidding, each bidder shall be personal examination of the project satisfy himself as to the existing conditions which prevail.
- D. Reasonable differences in actual jobsite dimensions and the drawings shall not be considered justification for a change in the contract sum.

2 PART 2 PRODUCTS

2.1 MATERIALS

- A. All piping materials for every purpose shall be furnished and installed as hereinafter specified.
- B. All pipe and fittings shall be new and unused unless specifically indicated otherwise.
- C. Underground steel piping shall be factory coated pipe "X-Tru-Coat" or epoxy coated pipe with fittings wrapped with a double thickness of 3M Scotch "51" vinyl tape over pipe and fittings.

2.2 SANITARY SEWER

- A. PVC Plastic Pipe and Fittings: ASTM D3034 type PSM with a maximum SDR of 35 with elastomeric joints complying with ASTM D3212.

2.3 WATER LINES

- A. PVC Piping:
 - 1. Lines 1-1/2" and smaller shall be Schedule 80, ASTM D1785 with tapered ends, with solvent weld fittings.
 - 2. Lines 2" and larger shall be ASTM D2241, SDR 26 with tapered ends, with elastomeric gasket bell and socket fittings conforming to requirements of AWWA C900, IPS dimensions only. Reaction blocking shall conform to NFPA 24.

2.4 GAS LINES

- A. Plastic Gas Piping: Polyethylene, Type III, Grade 3, (PE 3406-3408), resin conforming to ASTM D1248-7A, pipe construction conforming to ASTM D2513 (SDR 11).
- B. Mechanical Joints: Where steel lines connect to plastic lines 2" and smaller in size, use Continental Style 5 extra heavy duty malleable iron couplings with stiffeners.
- C. Flanges: Where steel lines valves or accessories connect to plastic lines 2-1/2" and larger, use polyethylene and steel flat face flanges with full face gaskets.
- D. Casing: Encase plastic lines under streets in schedule 40 galvanized steel pipe extending 36" beyond paving.
- E. Service Risers: Wayne Manufacturing compression service riser with anode and built-in stiffener.

2.5 EXTERIOR CLEANOUTS

- A. Provide and install cleanouts in exterior sewer lines where shown or as required by ordinance but not greater than 80 ft. apart. Cleanouts shall consist of a concrete encased special fitting with sewer pipes extending therefrom upward, terminating in a concrete slab. A brass countersunk cleanout ferrule shall be set on this slab in such manner as to be flush with finished grade and to provide access, through its cover, to the cleanout. Cleanouts shall be the same size as the sewer, up to 6" in size, and 4" on 6" and larger sizes.

2.6 GATE VALVES IN EXTERIOR WATER LINES

- A. Buried Valves: Buried valves shall meet the requirements of AWWA standard C500-61. Design working pressure shall be 175 psi and the valves shall be double disc gate valves with non-rising stems. Valves

shall have mechanical joint ends except where flanged ends are shown on the drawings. Valve stems shall be furnished with O-ring seals. All valves shall open by turning counter clockwise.

- B. Valve Boxes: Cast iron valve boxes shall be furnished for each underground valve. 6" cast iron pipe sections shall be used for box extensions where required. Each box shall have a cast iron cover and shall have a flange type base, approximately 4" larger in diameter than the outside diameter of the barrel and provided with a locking device as shown on the drawings. Anchor valve boxes with a flush 18"x18"x8" reinforced concrete collar.
- C. Extension Stems: Extension stems shall be provided for all buried valves where the top of the operating nut is 36" or more below finished grade. Top of the extension stems shall be not more than 18" below finished grade.
- D. Collar: Provide a protective concrete collar, square, dimension equal to valve cover frame plus 12" and no less than 8" thickness. Use 3,000 PSI concrete with reinforcing. Set top of cover flush with finish paving and 1" above finish grade level.

3 PART 3 EXECUTION

3.1 LAYOUT OF UTILITY LINES

- A. Before starting excavation Contractor shall:
 - 1. Uncover and determine the elevation at beginning and end terminals of each line.
 - 2. Compute and verify depth of all lines and grade of sewer lines and submit figures in writing.
 - 3. Stake route of each line.
 - 4. Arrange utility connections with authorities.
 - 5. Locate and identify any conflicting underground structures and adjust grade or routing to accommodate installation of the lines.

3.2 LAYING PIPE

- A. Lay pipe to the lines and profiles required by conditions at the site and the drawings. Keep pipe trenches free of water and dry during the bedding, laying and jointing operations. Install fittings and valves at the required locations, with joints centered and with valve stems vertical. Handle pipe carefully to avoid damage to dimensioned ends. Remove pipe with damaged ends which cannot be suitably repaired. Keep interior of piping and accessories clean.

- B. Proximity of Water and Sewer Lines: Unless otherwise required by drawings, lay parallel water lines and sewer lines in separate trenches at least 5 feet apart. Insofar as possible place water line at a higher elevation than the sewer. Where water lines and sewer lines cross each other, the water line shall be at least 3 feet above the sewer, or if this is not possible, amount of clearance between the lines may be reduced to 12" out to out clearance provided the sewer line is cast iron for at least 10 feet on each side of the water line.

3.3 EXCAVATION FOR OUTSIDE UTILITIES

- A. The Contractor shall perform any excavations of every description and of whatever substances encountered, to the depths indicated on the drawings and/or required for the installation of his work.
- B. Trench Width: The minimum width of the trench shall be the outside diameter of the pipe plus 12" and the maximum width shall be the outside diameter of the pipe plus 18". The trenching equipment shall be maintained on a sufficiently level road bed to provide substantially vertical trench walls from bottom of trench to the top of the trench.
- C. Trench Excavation: The trench shall be excavated to the depth required so as to provide a uniform and continuous bearing and support for the pipe on solid and undisturbed ground. There shall be no classification of or extra payment for excavated materials, and all materials encountered shall be excavated as required.
- D. Bury: Nonmetallic pipe shall be buried with 36" minimum cover, metallic pipe shall have minimum 24" cover.
- E. Bracing and Sheeting: Open-cut trenches shall be sheeted and braced as required by OSHA and the State of Texas Open Trench Act as may be necessary for the safety of the workmen or protection of property. This provision shall be strictly enforced for all trenches greater than 5 feet in depth.
- F. Barricades and Safety Provisions: To protect persons for injury and to avoid property damage, adequate barricades, construction signs, warning lights and guards as required shall be placed and maintained during progress of the construction work. All material, piles, equipment, pipe, and open trenches that may serve as hazards to vehicular or pedestrian traffic shall be protected by barricades or fences and warning lights.

3.4 BACKFILLING

- A. The trenches shall not be backfilled until all required tests are performed and until the utilities systems as installed conform to the requirements specified hereinafter. The trenches shall be carefully backfilled with the excavation materials approved for backfilling, consisting of earth, loam, sandy clay, sand and gravel, soft shale, or other approved materials free from large clods of earth or stones deposited in thoroughly and carefully

rammed 6" layers, until the pipe has a cover of not less than one foot for water mains and two feet where possible for other lines.

- B. The remainder of the backfill material shall then be thrown into the trench, moistened and tamped in one foot layers. Blasted rock, broken concrete or pavement, and large boulders shall not be used as backfill material. Settling the backfill with water will be permissible and will be a requirement when so directed. Any trenches improperly backfilled or where settlement occurs, shall be reopened to the depth required for proper compaction, then refilled and mounded over, and smoothed off.
- C. Open trenches across roadways or other areas to be paved shall be backfilled as specified above, except that the entire depth of the trench shall be backfilled in 6" layers, each layer moistened and compacted to a density at least equal to that of the surrounding earth in such manner as to permit the rolling and compaction of the filled trench together with the adjoining earth to provide the required bearing value, so that paving of the area can proceed immediately after backfilling is completed. Along all other portions of the trenches, the ground shall be graded to a reasonable uniformity and the mounding over the trenches left in a uniform and neat condition.

3.5 OPENING AND RECLOSING PAVEMENT

- A. Where excavation requires the opening of existing walks, streets, drives or other existing pavement, that pavement shall be cut as required to install new lines and to make new connections to existing lines. The sizes of the cut shall be held to a minimum, consistent with the work to be completed and when the excavation has been backfilled, the paving shall be patched, using materials to match those cut out. The patches shall thoroughly bond with the original surfaces and shall be level with them. Quality of the patch shall be equal to or better than adjacent paving.

3.6 UTILITY SERVICES

- A. Water Service: The contractor shall arrange with the city for a new meter and water service at the point(s) shown on the drawings. Refer to the drawings for details. Pay any charges levied by the city for this connection.
- B. Sanitary Sewer: If necessary, the contractor shall arrange with the city for sewer service at the point shown on the drawings. Pay any charges levied by the city for this connection. Refer to the drawings for details.
- C. Gas: Connect to existing riser on existing gas meter. Provide service valves at each service point. Refer to the drawings for details. Refer to Section 22 00 20.
- D. Electricity: The contractor shall arrange with the electric utility company for new work as shown on the drawings. Pay any charges levied by the

utility for this connection. Refer to the drawings for details and Section 26 27 00. The electrical meter and mast shall be replaced for this project.

3.7 TESTING

- A. Sewer: Prior to testing for leakage the trench shall be backfilled up to at least the lower half of the pipe. If required, sufficient additional backfill shall be placed to prevent pipe movement during testing, leaving the joints uncovered to permit inspection. Visible leaks encountered shall be corrected. Test shall be made by filling the line to be tested with water so that a head of at least 10 feet is provided above the top of the pipe at the upper end of the pipe line to be tested. The filled line shall be allowed to stand not less than 4 hours.
- B. Water Lines Soldered or Flanged: Test under hydrostatic pressure of 150 PSIG for 4 hours with no leaks and no pressure drop.
- C. Gas: Before backfilling, test under air pressure at 15 PSIG for 24 hours. There shall be no pressure drop, except for correction for temperature variation. If any pressure drop occurs, soap test every joint, correct the leaks and retest.

END OF SECTION

SECTION 26 05 10 BUILDING WIRE AND CABLE

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1 PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Building wire and cable.
- B. Nonmetallic-sheathed cable.
- C. Direct burial cable.
- D. Service entrance cable.
- E. Armored cable.
- F. Metal clad cable.
- G. Intercom/Speaker cable.
- H. Telephone cable.
- I. Computer cable
- J. Television cable
- K. Wiring connectors and connections.

1.2 RELATED SECTIONS

- A. Section 26 05 53 – Electrical Identification.
- B. Section 27 20 00 – Communications and Computer Systems.

1.3 REFERENCES

- A. NECA Standard of Installation (National Electrical Contractors Association).
- B. NETA ATS – Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
- C. NFPA 70 – National Electrical Code, Governing Edition.
- D. TIA/EIA Standards 568, 568-A, 569, 570, 606, 607

1.4 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years experience.

1.5 REGULATORY REQUIREMENTS

- A. Conform to NFPA 70, Governing or Latest Edition as applicable.
- B. Furnish products listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

1.6 PROJECT CONDITIONS

- A. Verify that field measurements are as indicated.
- B. Conductor sizes are based on copper. All power wiring shall be stranded.
- C. Wire and cable routing indicated is approximate unless dimensioned.

1.7 COORDINATION

- A. Where wire and cable destination is indicated and routing is not shown, determine exact routing and lengths required.

2 PART 2 PRODUCTS

2.1 BUILDING WIRE

- A. Description: Single conductor insulated stranded wire.
- B. Conductor: Copper.
- C. Insulation Voltage Rating: 600 volts.
- D. Insulation: NFPA 70, Type THHN/THWN.

2.2 NONMETALLIC-SHEATHED CABLE

- A. Description: NFPA 70, Type NMC.
- B. Conductor: Copper.
- C. Insulation Voltage Rating: 600 volts.

2.3 DIRECT BURIAL CABLE

- A. Description: NFPA 70, Type UF.
- B. Conductor: Copper.

- C. Insulation Voltage Rating: 600 volts.
- D. Insulation Temperature Rating: 90 degrees C.
- E. Use only if specifically permitted on drawing sheets.
- F. Underground Warning Tape: 4-inch wide plastic tape, colored red with suitable warning legend describing buried electrical lines.

2.4 SERVICE ENTRANCE CABLE

- A. Description: NFPA 70, Type SE or USE.
- B. Conductor: Copper.
- C. Insulation Voltage Rating: 600 volts.
- D. Insulation: Type RHH or XHHW or THHN.

2.5 ARMORED CABLE

- A. Not allowed on this project.

2.6 METAL CLAD CABLE

- A. Not allowed on this project.

2.7 INTERCOM/SPEAKER CABLE

- A. Description: UL Listed Type CL2.
- B. Conductor: Copper.
- C. Insulation Voltage Rating: 300 volts.
- D. Temperature Range: -20 deg C to 105 deg C.
- E. Insulation Material: PVC, plenum rated.
- F. Size: 22 gauge, single pair.
- G. Aluminum Foil Shield.
- H. Raceway: required.

2.8 TELEPHONE CABLE (N/A)

- A. Description: Belden type 9566 or equal or CAT-3 or equal.
- B. Conductor: Copper.
- C. Insulation Voltage Rating: 300 volts.
- D. Insulation material: PVC.
- E. Size 24 gauge, 3 pair minimum.
- F. Unshielded
- G. Raceway: Required.

2.9 COMPUTER CABLE (SECTION 27 20 00 HAS PRECEDENCE)

- A. Description: EIA/TIA 568 Belden type 1583A or equal, non-plenum rated. Provide CAT-6 or as noted on the drawings. Verify category of cable before bidding on the project.
- B. Conductor: Copper.
- C. Insulation Rating: 300 volts.
- D. Insulation Material: PVC, blue, plenum rated.
- E. Size: 24 gauge, 4 pair twisted.
- F. The Contractor shall install all computer cabling and terminations.
- G. Unshielded.
- H. Raceway: Required.
- I. Termination: At work area, terminate each 4 pair cable in an eight pin, modular jack. Connectors to be 100-ohm UTP outlets.

2.10 TELEVISION CABLE (SECTION 27 20 00 HAS PRECEDENCE)

- A. Description: 75 ohm coaxial cable, Belden type 9104 or equal, RG-59.
- B. Conductor: Copper.
- C. Insulation: Gas Injected, plenum rated.
- D. Jacket: PVC, black.
- E. Size: 18 gauge

- F. Shielded.
- G. Raceway: required.

2.11 SECURITY SYSTEM CABLING (SECTION 27 20 00 HAS PRECEDENCE)

A. ALARM

- 1. Door Contact: 22 ga. / 2 pair Belden
- 2. Motion Detector: 22 ga. / 4 pair Belden
- 3. Glass Break Detector: 22 ga. / 4 pair Belden
- 4. Keypad: 22 ga. / 4 pair or 18 ga. / 4 pair for longer runs Belden.
Must be Fire Wire if any fire is involved.
- 5. Zone Expander: 22 ga. / 4 pair Belden
- 6. Wireless Expander: 22 ga. / 4 pair Belden
- 7. Siren: 22 ga. / 2 pair Belden, must be Fire Wire if any fire is involved.
- 8. A/C Power: 22 ga. / 4 pair Belden, must be Fire Wire if any fire is involved.

B. ACCESS CONTROL

- 1. Mag Lock: 18 ga. / 2 pair
- 2. Door Strike: 18 ga. / 2 pair
- 3. Contact: 22 ga. / 2 pair
- 4. Reader: CAT-5e or 22 ga. / 6 pair
- 5. Request to Exit Button: 22 ga. / 4 pair
- 6. Request to Exit Motion: 22 ga. / 4 pair
- 7. Kantech KT-300 Link to other KT-300 panels: CAT-5e
- 8. Touch Crash Exit Bar: 22 ga. / 4 pair

C. CCTV

- 1. Camera - Analog: RG-59 Coax paired with 18 ga. / 2 pair Siamese wire
- 2. Camera - IP: CAT-6
- 3. Camera Power: 18 ga. / 2 pair
- 4. Other Monitors: RG-59 Coax or RG-6 Coax
- 5. Microphones: 18 ga. / 2 pair shielded with ground

D. STRUCTURED CABLE

- 1. Ethernet: CAT-6
- 2. Telephone: CAT-6
- 3. CATV: RG-6 Coax

E. Conductor: Copper.

F. Jacket: PVC, Color as determined by Owner.

3 PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that interior of building has been protected from weather.
- B. Verify that mechanical work likely to damage wire and cable has been completed.
- C. Verify that raceway installation is complete and supported.

3.2 PREPARATION

- A. Completely and thoroughly swab raceway before installing wire.

3.3 WIRING METHODS

- A. Concealed Dry Interior Locations: Use only building wire, THHN insulation, in raceway.
- B. Exposed Dry Interior Locations: Use only building wire, Type THHN insulation, in raceway.
- C. Wet or Damp Interior Locations: Use only building wire, Type THWN insulation, in raceway.
- D. Exterior Locations: Use only building wire, Type THWN insulation, in raceway.
- E. Underground Installations: Use only building wire, Type THWN insulation, in raceway.
- F. Use wiring methods indicated.

3.4 INSTALLATION

- A. Route wire and cable as required to meet Project Conditions.
- B. Install cable in accordance with the NECA "Standard of Installation."
- C. Use stranded conductor for all feeders and branch circuits.
- D. Use stranded conductors for control circuits.
- E. Use conductor not smaller than 12 AWG for power and lighting circuits.
- F. Use conductor not smaller than 16 AWG for control circuits.

- G. Increase wire size by one wire size for branch circuits that are longer than 75 feet.
- H. Increase wire size by two wire sizes for branch circuits that are longer than 200 feet.
- I. Pull all conductors into raceway at same time.
- J. Use suitable wire pulling lubricant for building wire 4 AWG and larger.
- K. Protect exposed cable from damage.
- L. Support cables above accessible ceiling, using spring metal clips. Do not rest cable on ceiling panels.
- M. Use suitable cable fittings and connectors.
- N. Neatly train and lace wiring inside boxes, equipment, and panelboards. Provide cable ties every 12 inches minimum to keep wiring neatly trained.
- O. Clean conductor surfaces before installing lugs and connectors.
- P. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
- Q. Use wedget connectors for copper conductor splices and taps, 6 AWG and larger. Tape uninsulated conductors and connector with electrical tape to 150 percent of insulation rating of conductor.
- R. Use solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.
- S. Use insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.
- T. Trench and backfill for direct burial cable installation. Install warning tape along entire length of direct burial cable, within 6 inches of grade.
- U. Identify and color code wire and cable under provisions of Section 26 05 53. Identify each conductor with its circuit number or other designation.
- V. Seal all penetrations of fire rated walls.
- W. All Computer Cabling drops shall be 295 feet or less, color-coded according to TIA/EIA 568, Section 10.2.1.1.3 and shall have no bends tighter than 6 times the OD of cable.

- X. TV terminations to be mounted in a standard cable face plate at height noted on the drawings. Provide 120- volt receptacle within 12 inches of face plate at same height.

3.5 FIELD QUALITY CONTROL

- A. Inspect and test in accordance with NETA ATS, except Section 4.
- B. Perform inspections and tests listed in NETA ATS, Section 7.3.1.
- C. Computer cable shall meet requirements of TIA/EIA 568-A. Any cables failing test shall be replaced at contractor's expense.

END OF SECTION

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1 PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Grounding electrodes and conductors.
- B. Equipment grounding conductors.
- C. Bonding.

1.2 REFERENCES

- A. NETA ATS – Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems (International Electrical Testing Association).
- B. NFPA 70 – National Electrical Code.

1.3 GROUNDING SYSTEM DESCRIPTION

- A. Metal underground water pipe.
- B. Metal frame of the building.
- C. Rod electrodes.

1.4 PERFORMANCE REQUIREMENTS

- A. Grounding System Resistance: 10 ohms.

1.5 SUBMITTALS FOR CLOSEOUT

- A. Project Record Documents: Record actual grounding system resistance of components and grounding electrodes.

1.6 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70.
- B. Products: Listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

2 PART 2 PRODUCTS

2.1 ROD ELECTRODES

- A. Material: Copper-clad steel.

B. Diameter: 3/4 inch.

C. Length: 10 feet.

2.2 EXOTHERMIC CONNECTIONS

A. Manufacturers:
1. Erico Cadweld.

2.3 WIRE

A. Material: Stranded copper.

B. Foundation Electrodes: 2/0 AWG.

C. Grounding Electrode Conductor: Size to meet NFPA 70 requirements.

3 PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that final backfill and compaction has been completed before driving rods.

3.2 INSTALLATION

A. Install rod electrodes at service entrance and dry type transformers 25 KVA or larger. Install additional rod electrodes to a maximum of three (3) to achieve specified resistance to ground. Bond all electrodes together with #2 copper grounding conductor connected to service entrance grounding electrode.

B. Provide grounding electrode conductor and connect to reinforcing steel in foundation footing.

C. Provide bonding to meet Regulatory Requirements.

D. Bond together metal siding not attached to grounded structure; bond to ground.

E. Equipment Grounding Conductor: Provide separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.

F. Isolated Grounding Conductor: From designated panel grounding bar, run isolated ground conductor continuously back to service entrance grounding electrode. Bond with exothermic weld.

3.3 FIELD QUALITY CONTROL

- A. Inspect and test in accordance with NETA ATS, except Section 4.
- B. Perform inspections and tests listed in NETA ATS, Section 7.13.

END OF SECTION

SECTION 26 05 29 SUPPORTING DEVICES

1	PART 1 GENERAL	1
1.1	SECTION INCLUDES	1
1.2	REFERENCES	1
1.3	REGULATORY REQUIREMENTS	1
2	PART 2 PRODUCTS	1
2.1	PRODUCT REQUIREMENTS.....	1
3	PART 3 EXECUTION	1
3.1	INSTALLATION	2

1 PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Conduit and equipment supports.
- B. Anchors and fasteners.

1.2 REFERENCES

- A. NECA Standard of Installation (National Electrical Contractors Association).
- B. NFPA 70 – National Electrical Code.

1.3 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70.
- B. Products: Listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

2 PART 2 PRODUCTS

2.1 PRODUCT REQUIREMENTS

- A. Materials and Finishes: Corrosion resistant.
- B. Select materials, sizes, and types of anchors, fasteners and supports to carry the loads of equipment and conduit, including weight of wire in conduit.
- C. Anchors and Fasteners:
 - 1. Concrete Structural Elements: Use expansion anchors and preset inserts.
 - 2. Steel Structural Elements: Use beam clamps, spring steel clips, steel ramset fasteners, and welded fasteners.
 - 3. Concrete Surfaces: Use self-drilling anchors and expansion anchors.
 - 4. Hollow Masonry, Plaster, and Gypsum Board Partitions: Use toggle bolts and hollow wall fasteners.
 - 5. Solid Masonry Walls: Use expansion anchors and preset inserts.
 - 6. Sheet Metal: Use sheet metal screws.
 - 7. Wood Elements: Use wood screws.

3 PART 3 EXECUTION

3.1 INSTALLATION

- A. Locate and install anchors, fasteners, and supports in accordance with NECA "Standard of Installation".
 - 1. Do not fasten supports to pipes, ducts, mechanical equipment, or conduit.
 - 2. Do not use powder-actuated anchors without permission from Owner.
 - 3. Do not drill or cut structural members without permission from Owner.
- B. Fabricate supports from structural steel or formed steel members. Rigidly weld members or use hexagon-head bolts to present neat appearance with adequate strength and rigidity. Use spring lock washers under all nuts.
- C. Install surface-mounted cabinets and panelboards with minimum of four anchors.
- D. In wet and damp locations use galvanized steel channel supports to stand cabinets and panelboards 1 inch off wall.
- E. Use sheet metal channel to bridge studs above and below cabinets and panelboards recessed in hollow partitions.

END OF SECTION

SECTION 26 05 33 CONDUIT

1	PART 1 GENERAL	1
1.1	SECTION INCLUDES	1
1.2	RELATED SECTIONS	1
1.3	REFERENCES	1
1.4	DESIGN REQUIREMENTS	2
1.5	PROJECT RECORD DOCUMENTS.....	2
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1.8	PROJECT CONDITIONS	2
2	PART 2 PRODUCTS	3
2.1	CONDUIT REQUIREMENTS	3
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2.7	NONMETALLIC CONDUIT	4
2.8	NONMETALLIC TUBING	4
3	PART 3 EXECUTION	5
3.1	INSTALLATION	5
3.2	INTERFACE WITH OTHER PRODUCTS	6

1 PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Metal conduit.
- B. Flexible metal conduit.
- C. Liquidtight flexible metal conduit.
- D. Electrical metallic tubing.
- E. Nonmetal conduit.
- F. Electrical nonmetallic tubing.
- G. Flexible nonmetallic conduit.
- H. Fittings and conduit bodies.

1.2 RELATED SECTIONS

- A. Section 26 05 34 – Boxes.
- B. Section 26 05 26 – Grounding and Bonding.
- C. Section 26 05 29 – Supporting Devices.
- D. Section 26 05 53 – Electrical Identification.

1.3 REFERENCES

- A. ANSI C80.1 – Rigid Steel Conduit, Zinc Coated.
- B. ANSI C80.3 – Electrical Metallic Tubing, Zinc Coated.
- C. ANSI C80.5 – Rigid Aluminum Conduit.
- D. ANSI/NEMA FB 1 – Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
- E. ANSI/NFPA 70 – National Electrical Code.
- F. NECA "Standard of Installation."

- G. NEMA RN 1 – Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.
- H. NEMA TC 2 – Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80).
- I. NEMA TC 3 – PVC Fittings for Use with Rigid PVC Conduit and Tubing.

1.4 DESIGN REQUIREMENTS

- A. Conduit Size: ANSI/NFPA 70.
- B. All cabling, both power rated and low voltage, shall be installed in conduit or cable tray.

1.5 PROJECT RECORD DOCUMENTS

- A. Accurately record actual routing of conduits larger than 2 inches.

1.6 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle Products to site.
- B. Accept conduit on site. Inspect for damage.
- C. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.
- D. Protect PVC conduit from sunlight.

1.8 PROJECT CONDITIONS

- A. Verify that field measurements are as shown on Drawings.
- B. Verify routing and termination locations of conduit prior to rough-in.

- C. Conduit routing is shown on Drawings in approximate locations unless dimensioned. Route as required to complete wiring system.

2 PART 2 PRODUCTS

2.1 CONDUIT REQUIREMENTS

- A. Minimum Size: 3/4 inch unless otherwise specified.
- B. Underground Installations:
 - 1. More than Five Feet from Foundation Wall: Use thickwall nonmetallic conduit.
 - 2. Within Five Feet from Foundation Wall: Use rigid steel conduit or intermediate metal conduit.
 - 3. In or Under Slab on Grade: Use rigid steel conduit, intermediate metal conduit, Schedule 40 PVC conduit.
 - 4. Minimum Size: 3/4 inch.
- C. Outdoor Locations, Above Grade: Use rigid steel, or intermediate metal conduit.
- D. In Slab Above Grade:
 - 1. Use rigid steel conduit, intermediate metal conduit, or Schedule 40 PVC conduit. No PVC conduit to extend above concrete.
 - 2. Maximum Size Conduit in Slab: 3/4 inch; 1/2 inch for conduits crossing each other.
- E. Wet and Damp Locations: Use schedule 80 PVC conduit or PVC coated rigid conduit.
- F. Dry Locations:
 - 1. Concealed: Use rigid steel, intermediate metal conduit or electrical metallic tubing throughout project.
 - 2. Exposed: Use rigid steel, intermediate metal conduit or electrical metallic tubing throughout project.

2.2 METAL CONDUIT

- A. Rigid Steel Conduit: ANSI C80.1.
- B. Rigid Aluminum Conduit: ANSI C80.5.
- C. Intermediate Metal Conduit (IMC): Rigid steel.
- D. Fittings and Conduit Bodies: ANSI/NEMA FB 1; material to match conduit.

2.3 PVC COATED METAL CONDUIT

- A. Manufacturers:
 - 1. Robroy Plasti-Bond REDH₂OT PVC coated conduit.
 - 2. Substitutions of approved equals permitted.
- B. Description: NEMA RN 1; rigid steel conduit with external PVC coating, 40 mil thick. Use in highly corrosive areas.
- C. Fittings and Conduit Bodies: ANSI/NEMA FB 1; steel fittings with external PVC coating to match conduit.

2.4 FLEXIBLE METAL CONDUIT

- A. Manufacturers:
 - 1. Hubbell PolyTuff I with nonmetallic liquidtight connectors.
 - 2. Substitutions of approved equals permitted.
- B. Description: Interlocked steel construction. Maximum length of 6' for final connections to equipment.
- C. Fittings: ANSI/NEMA FB 1.

2.5 LIQUIDTIGHT FLEXIBLE METAL CONDUIT

- A. Description: Interlocked steel construction with PVC jacket. Maximum length of 6' for final connections to equipment.
- B. Fittings: ANSI/NEMA FB 1.

2.6 ELECTRICAL METALLIC TUBING (EMT)

- A. Description: ANSI C80.3; galvanized tubing.
- B. Fittings and Conduit Bodies: ANSI/NEMA FB 1; compression steel type for all applications.

2.7 NONMETALLIC CONDUIT

- A. Manufacturers:
 - 1. Carlon Plus 40 and Plus 80 rigid PVC conduit.
 - 2. Substitutions of approved equals permitted.
- B. Description: NEMA TC 2; Schedule 40 and Schedule 80 PVC.
- C. Fittings and Conduit Bodies: NEMA TC 3.

2.8 NONMETALLIC TUBING

- A. Note: Conduit type ENT is NOT allowed.

2.9 TYPE MC AND AC CABLE

- A. Type MC and Type AC cable are NOT allowed.

3 PART 3 EXECUTION

3.1 INSTALLATION

- A. Install conduit in accordance with NECA "Standard of Installation."
- B. Install nonmetallic conduit in accordance with manufacturer's instructions.
- C. Arrange supports to prevent misalignment during wiring installation.
- D. Support conduit using steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers. In all cases, conduit supports shall be commercially available, conform to code spacing requirements and be recommended by the manufacturer. Galvanized wire, baling wire and pipe strapping are not allowed.
- E. Group related conduits; support using conduit rack. Construct rack using steel channel; provide space on each for 25 percent additional conduits.
- F. Fasten conduit supports to building structure and surfaces under provisions of Section 26 05 29.
- G. Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports
- H. Do not attach conduit to ceiling support wires.
- I. Arrange conduit to maintain headroom and present neat appearance.
- J. Route conduit parallel and perpendicular to walls.
- K. Route conduit installed above accessible ceilings parallel and perpendicular to walls.
- L. Route conduit in and under slab from point-to-point.

- M. Maintain adequate clearance between conduit and piping.
- N. Maintain 12 inch clearance between conduit and surfaces with temperatures exceeding 104 degrees F.
- O. Cut conduit square using saw or pipecutter; de-burr cut ends.
- P. Bring conduit to shoulder of fittings; fasten securely.
- Q. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum.
- R. Use conduit hubs or sealing locknuts to fasten conduit to sheet metal boxes in damp and wet locations.
- S. Install no more than equivalent of three 90 degree bends between boxes. Use conduit bodies to make sharp changes in direction, as around beams. Use factory elbows for bends in metal conduit larger than 2 inch size.
- T. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.
- U. Provide suitable fittings to accommodate expansion and deflection where conduit crosses control and expansion joints.
- V. Provide suitable pull string in each empty conduit except sleeves and nipples.
- W. Use suitable caps to protect installed conduit against entrance of dirt and moisture.
- X. Ground and bond conduit under provisions of Section 26 05 26.
- Y. Identify conduit under provisions of Section 26 05 53.

3.2 INTERFACE WITH OTHER PRODUCTS

- A. Install conduit to preserve fire resistance rating of partitions and other elements.

- B. Route conduit through roof openings for piping and ductwork or through suitable roof jack with pitch pocket. Coordinate location with roofing installation.

END OF SECTION

SECTION 26 05 34 BOXES

1	PART 1 GENERAL	1
1.1	SECTION INCLUDES	1
1.2	RELATED SECTIONS	1
1.3	REFERENCES	1
1.4	REGULATORY REQUIREMENTS	1
2	PART 2 PRODUCTS	1
2.1	OUTLET BOXES	1
2.2	PULL AND JUNCTION BOXES.....	2
3	PART 3 EXECUTION	2
3.1	EXAMINATION	2
3.2	INSTALLATION	2
3.3	INTERFACE WITH OTHER PRODUCTS	3
3.4	ADJUSTING.....	4
3.5	CLEANING	4

1 PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Wall and ceiling outlet boxes.
- B. Floor boxes.
- C. Pull and junction boxes.

1.2 RELATED SECTIONS

- A. Section 26 06 20 – Wiring Devices: Wall plates in finished areas.
- B. Section 26 05 53 – Electrical Identification.

1.3 REFERENCES

- A. NECA – Standard of Installation.
- B. NEMA FB 1 – Fittings and Supports for Conduit and Cable Assemblies.
- C. NEMA OS 1 – Sheet-steel Outlet Boxes, Device Boxes, Covers, and Box Supports.
- D. NEMA OS 2 – Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports.
- E. NEMA 250 – Enclosures for Electrical Equipment (1000 Volts Maximum).
- F. NFPA 70 – National Electrical Code.

1.4 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70.
- B. Provide Products listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

2 PART 2 PRODUCTS

2.1 OUTLET BOXES

- A. Sheet Metal Outlet Boxes: NEMA OS 1, galvanized steel.
 - 1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; include 1/2 inch male fixture studs where required.

- B. Nonmetallic Outlet Boxes: NEMA OS 2.
- C. Cast Boxes: NEMA FB 1, Type FD, aluminum. Provide gasketed cover by box manufacturer. Provide threaded hubs.
- D. Wall Plates for Finished Areas: As specified in Section 16140.

2.2 PULL AND JUNCTION BOXES

- A. Sheet Metal Boxes: NEMA OS 1, galvanized steel.
- B. Hinged Enclosures: As specified in Drawings.

3 PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify locations of floor boxes and outlets prior to rough-in.

3.2 INSTALLATION

- A. Install boxes in accordance with NECA "Standard of Installation."
- B. Install in locations as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections and compliance with regulatory requirements.
- C. Set wall mounted boxes at elevations to accommodate mounting heights indicated.
- D. Electrical boxes are shown on Drawings in approximate locations unless dimensioned. Adjust box location up to 10 feet if required to accommodate intended purpose.
- E. Orient boxes to accommodate wiring devices oriented as specified in Section 26 06 20.
- F. Maintain headroom and present neat mechanical appearance.
- G. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.
- H. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.

- I. Install boxes to preserve fire resistance rating of partitions and other elements.
- J. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes.
- K. Locate outlet boxes to allow luminaires positioned as shown on reflected ceiling plan.
- L. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.
- M. Use flush mounting outlet box in finished areas.
- N. Do not install flush mounting box back-to-back in walls; provide minimum 6 inches separation. Provide minimum 24 inches separation in acoustic rated walls.
- O. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.
- P. Use stamped steel bridges to fasten flush mounting outlet box between studs.
- Q. Install flush mounting box without damaging wall insulation or reducing its effectiveness.
- R. Use adjustable steel channel fasteners for hung ceiling outlet box.
- S. Do not fasten boxes to ceiling support wires.
- T. Support boxes independently of conduit.
- U. Use gang or sectional box where more than one device is mounted together.
- V. Use gang box with plaster ring for single device outlets.
- W. Use cast outlet box in exterior locations and wet locations.
- X. Use cast floor boxes for installations in slab on grade; formed steel boxes are acceptable for other installations.
- Y. Large Pull Boxes: Use hinged enclosure in interior dry locations, surface-mounted cast metal box in other locations.

3.3 INTERFACE WITH OTHER PRODUCTS

- A. Coordinate installation of outlet box for equipment connected under other sections of this specification.

3.4 ADJUSTING

- A. Adjust flush-mounting outlets to make front flush with finished wall material.
- B. Install knockout closures in unused box openings.

3.5 CLEANING

- A. Clean interior of boxes to remove dust, debris, and other material.
- B. Clean exposed surfaces and restore finish.

END OF SECTION

SECTION 26 05 53 ELECTRICAL IDENTIFICATION

1 PART 1 GENERAL..... 1

1.1 SECTION INCLUDES 1

1.2 REFERENCES 1

1.3 SUBMITTALS FOR REVIEW..... 1

1.4 REGULATORY REQUIREMENTS 1

2 PART 2 PRODUCTS 1

2.1 NAMEPLATES AND LABELS 1

2.2 WIRE MARKERS 1

2.3 UNDERGROUND WARNING TAPE 3

3 PART 3 EXECUTION 3

3.1 PREPARATION..... 3

3.2 INSTALLATION 3

1 PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Nameplates and labels.
- B. Wire and cable markers.
- C. Conduit markers.

1.2 REFERENCES

- A. NFPA 70 – National Electrical Code.

1.3 SUBMITTALS FOR REVIEW

- A. Product Data: Provide catalog data for nameplates, labels, and markers.

1.4 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70.
- B. Products: Listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

2 PART 2 PRODUCTS

2.1 NAMEPLATES AND LABELS

- A. Nameplates: Engraved three-layer laminated plastic, white letters on black background.
- B. Locations:
 - 1. Each electrical distribution and control equipment enclosure.
 - 2. Communication cabinets.
- C. Letter Size:
 - 1. 1/8 inch letters for identifying individual equipment and loads.
 - 2. 1/4 inch letters for identifying grouped equipment and loads.
- D. Labels: Embossed adhesive tape, with 3/16 inch white letters on black background. Use only for identification of individual wall switches and receptacles, control device stations.

2.2 WIRE MARKERS

- A. Description: Cloth tape, split sleeve, or tubing type wire markers.
- B. Locations: Each conductor at panelboard gutters, pull boxes, outlet and junction boxes, and each load connection.
- C. Legend:
 - 1. Power and Lighting Circuits: Branch circuit or feeder number indicated.
 - 2. Control Circuits: Control wire number indicated on schematic and interconnection diagrams.
 - 3. Phase.
- D. All conductors and branch circuits shall be color coded as herein specified and strictly in accordance with Article 210 of the National Electric Code.
- E. All conductors connected to a 120/208 volt power distribution system shall be color coded as follows:
 - Phase 1 – Black
 - Phase 2 – Red
 - Phase 3 – Blue
 - Neutral – White
 - Ground – Green
- F. All conductors connected to a 277/480 volt power distribution systems shall be color coded as follows:
 - Phase 1 – Brown
 - Phase 2 – Yellow
 - Phase 3 – Purple
 - Neutral – Grey
 - Ground – Green
- G. All conductors larger than No. 6 may be color coded by taping of black conductors with the proper color tape where exposed in panel boxes, junction boxes, terminal boxes, etc.
- H. All conductors intended solely for grounding of equipment and devices shall be green unless indicated on the drawings to be bare. Green colored conductors shall not be used for other than grounding purposes. All conductors No. 6 and smaller shall be of the colors hereinbefore specified without exceptions. Under no circumstances shall green or white be used for any conductors other than for ground or grounded neutral conductors, respectively. Where 3-phase circuits are connected to 3-phase motors, temporary connections shall be made at motor terminals to determine proper rotation and any reversing of phases shall

be done at the motor terminals in order to maintain proper color coding of phase conductors.

2.3 UNDERGROUND WARNING TAPE

- A. Description: 6-inch wide x 4-mil thick minimum plastic tape, colored red with suitable warning legend describing buried electrical lines.
- B. Location: Along length of each underground conduit.

3 PART 3 EXECUTION

3.1 PREPARATION

- A. Degrease and clean surfaces to receive nameplates and labels.

3.2 INSTALLATION

- A. Install nameplate and label parallel to equipment lines.
- B. Secure nameplate to equipment front using screws or adhesive.
- C. Secure nameplate to inside surface of door on panelboard that is recessed in finished locations.
- D. Identify underground conduits using one underground warning tape per trench at 12 inches below finished grade.
- E. Operational Identification and warnings: Wherever reasonably required to ensure safe and efficient operation and maintenance of electrical systems, and electrically connected mechanical systems and general systems, and to prevent misuse by unauthorized personnel, install self-adhesive plastic signs or similar equivalent identification, instruction or warnings on switches, outlets and other controls, devices and covers of electrical enclosures.
- F. All junction boxes shall be labeled to designate circuits contained within each box.

END OF SECTION

SECTION 26 06 20 WIRING DEVICES

1	PART 1 GENERAL	1
1.1	SECTION INCLUDES	1
1.2	RELATED SECTIONS	1
1.3	REFERENCES	1
1.4	QUALIFICATIONS	1
1.5	REGULATORY REQUIREMENTS	1
1.6	EXTRA MATERIALS	1
2	PART 2 PRODUCTS	1
2.1	WALL SWITCHES	1
2.2	RECEPTACLES	2
2.3	WALL PLATES	2
3	PART 3 EXECUTION	3
3.1	EXAMINATION	3
3.2	PREPARATION.....	3
3.3	INSTALLATION	3
3.4	INTERFACE WITH OTHER PRODUCTS	3
3.5	FIELD QUALITY CONTROL	4
3.6	ADJUSTING.....	4
3.7	CLEANING	4

1 PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Wall switches.
- B. Receptacles.
- C. Device plates and decorative box covers.

1.2 RELATED SECTIONS

- A. Section 26 05 34 – Boxes.

1.3 REFERENCES

- A. NECA – Standard of Installation.
- B. NEMA WD 1 – General Requirements for Wiring Devices.
- C. NEMA WD 6 – Wiring Device -- Dimensional Requirements.
- D. NFPA 70 – National Electrical Code.

1.4 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years experience.

1.5 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70.
- B. Provide Products listed and classified by Underwriters Laboratories, Inc., as suitable for the purpose specified and indicated.

1.6 EXTRA MATERIALS

- A. Furnish two of each style, size, and finish wall plate.

2 PART 2 PRODUCTS

2.1 WALL SWITCHES

- A. Single Pole Switch:
 - 1. Hubbell HBL 1201 color as noted on drawings. Verify color with Architect before ordering.

- B. Double Pole Switch:
 - 1. Hubbell HBL 1222, color as noted on drawings. Verify color with Architect before ordering.
- C. Three-way Switch:
 - 1. Hubbell HBL 1203 color as noted on drawings. Verify color with Architect before ordering.
- D. Substitutions: Approved equals.
- E. Ratings: In all cases match branch circuit and load characteristics.

2.2 RECEPTACLES

- A. Duplex Convenience Receptacle:
 - 1. Hubbell 2162 mounted at 18" AFF except where otherwise noted. Color as noted on drawings. Verify color with Architect before ordering.
- B. GFCI Receptacle:
 - 1. Hubbell GF5262 color as noted on drawings. Verify color with Architect before ordering.
- C. Telephone Jack:
 - 1. Hubbell 5110813 Category 5e Jack.
- D. IG Receptacle:
 - 1. Hubbell IG5262 color as noted on drawings. Verify color with Architect before ordering. Provide receptacle with distinctive triangle mark. Do not install orange colored receptacles.
- E. Emergency Receptacle:
 - 1. If required on project, all emergency receptacles shall be red in color with red wall plates.
- F. Substitutions: Approved equals.

2.3 WALL PLATES

- A. Decorative Switch Cover Plate:
 - 1. Brushed stainless steel is to be used unless otherwise noted on drawings. Verify with Architect before ordering.
- B. Weatherproof Cover Plate: Gasketed cast metal with hinged gasketed device cover.
 - 1. Hubbell WPSF26.
 - 2. Substitutions: permitted.
- C. Decorative Receptacle Plate:

1. Brushed stainless steel is to be used unless otherwise noted on drawings. Verify with Architect before ordering.

3 PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that outlet boxes are installed at proper height.
- B. Verify that wall openings are neatly cut and will be completely covered by wall plates.
- C. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

3.2 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean debris from outlet boxes.

3.3 INSTALLATION

- A. Install in accordance with NECA "Standard of Installation."
- B. Install devices plumb and level.
- C. Install switches with OFF position down.
- D. Install receptacles with grounding pole on bottom.
- E. Connect wiring device grounding terminal to branch circuit equipment grounding conductor.
- F. Install decorative plates on switch, receptacle, and blank outlets in finished areas.
- G. Connect wiring devices by wrapping conductor around screw terminal.
- H. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.
- I. Coordinate outlet locations with Architect where outlet should be installed behind equipment.

3.4 INTERFACE WITH OTHER PRODUCTS

- A. Coordinate locations of outlet boxes provided under Section 16130 to obtain mounting heights specified and indicated on drawings.
- B. Install wall switch 48 inches above finished floor to top of switch.
- C. Install convenience receptacle 18 inches above finished floor unless noted otherwise.
- D. Install convenience receptacle 10 inches above counter unless noted otherwise.
- E. Install telephone jack 18 inches above finished floor.

3.5 FIELD QUALITY CONTROL

- A. Inspect each wiring device for defects.
- B. Operate each wall switch with circuit energized and verify proper operation.
- C. Verify that each receptacle device is energized.
- D. Test each receptacle device for proper polarity.
- E. Test each GFCI receptacle device for proper operation.
- F. Verify that each telephone jack is properly connected and circuit is operational.
- G. Verify that indicated computer jacks are properly connected and operational.
- H. Verify that television jacks are properly connected and operational.

3.6 ADJUSTING

- A. Adjust devices and wall plates to be flush and level.
- B. Patch any holes, uneven edges, or imperfections showing around the device.

3.7 CLEANING

- A. Clean exposed surfaces to remove splatters and restore finish.

END OF SECTION

SECTION 26 24 00 PANELBOARDS

1	PART 1 GENERAL	1
1.1	SECTION INCLUDES	1
1.2	RELATED SECTIONS	1
1.3	REFERENCES	1
1.4	SUBMITTALS FOR REVIEW.....	1
1.5	SUBMITTALS FOR CLOSEOUT.....	1
1.6	REGULATORY REQUIREMENTS	2
1.7	MAINTENANCE MATERIALS	2
2	PART 2 PRODUCTS	2
2.1	DISTRIBUTION PANELBOARDS	2
2.2	BRANCH CIRCUIT PANELBOARDS.....	3
2.3	LOAD CENTERS	3
3	PART 3 EXECUTION	4
3.1	INSTALLATION	4
3.2	FIELD QUALITY CONTROL	4
3.3	ADJUSTING.....	4

1 PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Distribution panelboards.
- B. Branch circuit panelboards.
- C. Load centers.

1.2 RELATED SECTIONS

- A. Section 26 05 26 – Grounding and Bonding.
- B. Section 26 05 53 – Electrical Identification.

1.3 REFERENCES

- A. NECA Standard of Installation (published by the National Electrical Contractors Association).
- B. NEMA AB1 – Molded Case Circuit Breakers.
- C. NEMA ICS 2 – Industrial Control Devices, Controllers and Assemblies.
- D. NEMA KS1 – Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).
- E. NEMA PB 1 – Panelboards.
- F. NEMA PB 1.1 – Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.
- G. NETA ATS – Acceptance Testing Specifications for Electrical Power Distribution Equipment (published by the International Electrical Testing Association).
- H. NFPA 70 – National Electrical Code.

1.4 SUBMITTALS FOR REVIEW

- A. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, circuit breaker and fusible switch arrangement and sizes.

1.5 SUBMITTALS FOR CLOSEOUT

- A. Record actual locations of panelboards and record actual circuiting arrangements in project record documents.
- B. Maintenance Data: Include spare parts listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

1.6 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70.
- B. Products: Listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

1.7 MAINTENANCE MATERIALS

- A. Furnish two each panelboard key.

2 PART 2 PRODUCTS

2.1 DISTRIBUTION PANELBOARDS

- A. Manufacturers:
 - 1. Square D Type I-LINE or approved equal.
- B. Description: NEMA PB 1, circuit breaker type. Feeder breakers are to have individual plug-in mounting. Panel is to accept future breakers designed to attach directly to the vertical bus bars without the use of special kits, or special mounting modules.
- C. Panelboard Bus: Copper, ratings as indicated. Provide copper ground bus in each panelboard.
- D. Minimum integrated short circuit rating: 22,000 amps symmetrical on 240 volt or 208 volt applications.
- E. Fusible Switch Assemblies: NEMA KS 1, quick-make, quick-break, load interrupter enclosed knife switch with externally operable handle. Provide interlock to prevent opening front cover with switch in ON position. Handle lockable in OFF position. Fuse clips: Designed to accommodate Class R fuses.
- F. Molded Case Circuit Breakers: NEMA AB 1, circuit breakers with integral thermal and instantaneous magnetic trip in each pole. Provide circuit breakers UL listed as Type HACR for air conditioning equipment branch circuits.

- G. Molded Case Circuit Breakers with Current Limiters: NEMA AB 1, circuit breakers with replaceable current limiting elements, in addition to integral thermal and instantaneous magnetic trip in each pole.
- H. Circuit Breaker Accessories: Trip units and auxiliary switches as indicated.
- I. Enclosure: NEMA PB 1, Type 1.
- J. Cabinet Front: Surface type, fastened with hinge and latch, finished in manufacturer's standard gray enamel.

2.2 BRANCH CIRCUIT PANELBOARDS

- A. Manufacturers:
 - 1. Square D Type NF for 480 volt and NQ for 240 or 208 volt or approved equal.
- B. Description: NEMA PB1, circuit breaker type, lighting and appliance branch circuit panelboard. All lighting panels are to be of the same manufacture as distribution panels.
- C. Panelboard Bus: Copper, ratings as indicated. Provide copper ground bus in each panelboard.
- D. Minimum Integrated Short Circuit Rating: 10,000 amperes rms symmetrical for 240 or 208 volt panelboards; 22,000 amperes rms symmetrical for 480 volt panelboards.
- E. Molded Case Circuit Breakers: NEMA AB 1, bolt-on type thermal magnetic trip circuit breakers, with common trip handle for all poles, listed as Type HID for high intensity discharge lighting circuits, Type HACR for air conditioning equipment circuits, Class A ground fault interrupter circuit breakers where scheduled. Do not use tandem circuit breakers.
- F. Enclosure: NEMA PB 1, Type 1.
- G. Cabinet Box: 6 inches deep, 20 inches wide.
- H. Cabinet Front: Surface cabinet front with concealed trim clamps, concealed hinge, metal directory frame, and flush lock all keyed alike. Finish in manufacturer's standard gray enamel.

2.3 LOAD CENTERS – MAY ONLY BE USED FOR RESIDENTIAL APPLICATIONS

- A. Manufacturers:
 - 1. Square D Type QO Loadcenters or approved equal.

- B. Description: Circuit breaker load center, with bus ratings as indicated. Load centers are to be of the same manufacture as distribution panels.
- C. Minimum Integrated Short Circuit Rating: 10,000 amperes rms symmetrical.
- D. Molded Case Circuit Breakers: NEMA AB 1, plug-on type thermal magnetic trip circuit breakers, with common trip handle for all poles, listed as Type HID for high intensity discharge lighting circuits, Class A ground fault interrupter circuit breakers where indicated. Do not use tandem circuit breakers.
- E. Enclosure: General Purpose.
- F. Box: Surface type with door, and pull ring and latch. Finish in manufacturer's standard gray enamel.

3 PART 3 EXECUTION

3.1 INSTALLATION

- A. Install panelboards in plumb accordance with NEMA PB 1.1 and the NECA "Standard of Installation."
- B. Height: 6 feet to top of panelboard; install panelboards taller than 6 feet with bottom no more than 4 inches above floor.
- C. Provide filler plates for unused spaces in panelboards.
- D. Provide typed circuit directory for each branch circuit panelboard. Revise directory to reflect circuiting changes required to balance phase loads.
- E. Provide engraved plastic nameplates under the provisions of Section 16195.
- F. Ground and bond panelboard enclosure according to Section 26 05 26.

3.2 FIELD QUALITY CONTROL

- A. Inspect and test in accordance with NETA ATS, except Section 4.
- B. Perform inspections and tests listed in NETA ATS, Section 7.4 for switches, Section 7.5 for circuit breakers.

3.3 ADJUSTING

- A. Measure steady state load currents at each panelboard feeder; rearrange circuits in the panelboard to balance the phase loads to within 20 percent of each other. Maintain proper phasing for multi-wire branch circuits.

END OF SECTION

SECTION 26 27 00 UTILITY SERVICE ENTRANCE

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1.4	SYSTEM DESCRIPTION	1
1.5	QUALITY ASSURANCE	1
1.6	REGULATORY REQUIREMENTS	1
2	PART 2 PRODUCTS	1
2.1	UTILITY METERS	1
2.2	UTILITY METER BASE.....	1
2.3	CT CABINET	2
2.4	MAIN OUTDOOR DISCONNECT SWITCH	2
3	PART 3 EXECUTION	2
3.1	EXAMINATION	2
3.2	PREPARATION.....	2
3.3	INSTALLATION	2

1 PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Arrangement with Utility Company for permanent electric service including payment of Utility Company charges for service.
- B. Overhead service entrance is existing and will be reworked by AEP.

1.2 RELATED SECTIONS

- A. Section 26 05 33 – Conduit.
- B. Section 26 05 26 – Grounding and Bonding.

1.3 REFERENCES

- A. ANSI/NFPA 70 – National Electrical Code.

1.4 SYSTEM DESCRIPTION

- A. Utility Company: AEP Co., San Angelo, Texas

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with Utility Company written requirements.
- B. Maintain one copy of each document on site.

1.6 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

2 PART 2 PRODUCTS

2.1 UTILITY METERS

- A. Meters will be furnished by Contractor.

2.2 UTILITY METER BASE

- A. Meter base will be furnished by Contractor. Contractor shall install new meter and mast on building. Secure mast to building.

2.3 CT CABINET

- A. CT Cabinet will not be required. Verify with Utility Company.

2.4 MAIN OUTDOOR DISCONNECT SWITCH

- A. Shall be provided in Panel MDP next to new meter..

3 PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that service equipment is ready to be connected and energized.

3.2 PREPARATION

- A. Make arrangements with Utility Company to obtain permanent electric service to the Project.
- B. Coordinate location of Utility Company's facilities to ensure proper access is available.

3.3 INSTALLATION

- A. Install service entrance conduits in mast to connect to overhead service conductors.
- B. Install main outdoor panelboard for each service entering a building.

END OF SECTION

SECTION 26 28 00 CIRCUIT AND MOTOR DISCONNECTS

1	PART 1 GENERAL	1
1.1	NOTE	1
1.2	SUBMITTALS	1
1.3	MANUALS.....	1
1.4	SCOPE.....	1
2	PART 2 PRODUCTS	1
2.1	DISCONNECT SWITCHES	1
3	PART 3 EXECUTION	1
3.1	INSTALLATION	1

1 PART 1 GENERAL

1.1 NOTE

- 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 SUBMITTALS

- A. Provide complete catalog data and drawings on all items of equipment.

1.3 MANUALS

- A. Include all submittal data in the operation and maintenance manuals.

1.4 SCOPE

- A. Provide all labor, material, equipment, and service necessary for and incidental to the complete electrical distribution system.

2 PART 2 PRODUCTS

2.1 DISCONNECT SWITCHES

- A. Unless otherwise noted or required, all disconnect switches shall be UL listed and shall meet NEMA Standard KS1-1983 for Type HD heavy duty switches. Switches shall be unfused unless noted otherwise; quick make, quick break; in NEMA 3R enclosures if exposed to the weather; elsewhere in NEMA 1 general purpose enclosures unless special enclosures are required. All motor circuit switches shall be horsepower rated.
- B. Switches shall be Square D or equivalent. 20 amp, single pole disconnects shall be equal 2510 KG-1. Three pole disconnects shall be equal to Square D class 3110.
- C. Where space does not permit use of the above specified switches, such as within weatherproof fan housings, etc., use suitable horsepower rated tumbler switches as unfused disconnects.
- D. Where disconnect switches are used to disconnect starters, provide auxiliary poles in switches as required to disconnect all auxiliary control circuits in starters.

3 PART 3 EXECUTION

3.1 INSTALLATION

- A. Install disconnects on unistrut rack for roof mounted equipment. Do not install solely on stubbed conduit.

END OF SECTION

SECTION 26 51 00 LUMINAIRES

1	PART 1 GENERAL	1
1.1	SECTION INCLUDES	1
1.2	REFERENCES	1
1.3	SUBMITTALS FOR REVIEW	1
1.4	SUBMITTALS FOR CLOSEOUT	1
1.5	QUALIFICATIONS	2
1.6	REGULATORY REQUIREMENTS	2
1.7	EXTRA PRODUCTS	2
2	PART 2 PRODUCTS	2
2.1	LUMINAIRES	2
2.2	EMERGENCY LIGHTING UNITS	2
2.3	EXIT SIGNS	2
2.4	LAMPS	3
2.5	MOTION DETECTORS	3
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3.1	INSTALLATION	3
3.2	FIELD QUALITY CONTROL	4
3.3	ADJUSTING	4
3.4	CLEANING	4
3.5	DEMONSTRATION AND INSTRUCTIONS	4
3.6	PROTECTION OF FINISHED WORK	5
3.7	COMMISSIONING	5

1 PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Interior luminaires and accessories.
- B. Exterior luminaires and accessories.
- C. Emergency lighting units.
- D. Exit signs.
- E. Ballasts.
- F. Fluorescent lamp emergency power supply.
- G. Lamps.
- H. Luminaire accessories.
- I. Motion Detectors (occupancy sensors).

1.2 REFERENCES

- A. ANSI C78.379 – Electric Lamps – Incandescent and High-Intensity Discharge Reflector Lamps – Classification of Beam Patterns.
- B. ANSI C82.1 – Ballasts for Fluorescent Lamps – Specifications.
- C. ANSI C82.4 – Ballasts for High-Intensity Discharge and Low Pressure Sodium Lamps (Multiple Supply Type).
- D. NEMA WD 6 – Wiring Devices–Dimensional Requirements.
- E. NFPA 70 – National Electrical Code.
- F. NFPA 101 – Life Safety Code.

1.3 SUBMITTALS FOR REVIEW

- A. Shop Drawings: Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.
- B. Product Data: Provide dimensions, ratings, and performance data.

1.4 SUBMITTALS FOR CLOSEOUT

- A. Submit manufacturer's operation and maintenance instructions for each product.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years experience.
- B. ALL DIMMING SYSTEM PANELS, CONTROLS, BALLASTS AND OCCUPANCY SENSORS SHALL BE ALL MANUFACTURED BY THE SAME MANUFACTURER FOR WARRANTY PURPOSES, NO EXCEPTIONS.

1.6 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70.
- B. Conform to requirements of NFPA 101.
- C. Products: Listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

1.7 EXTRA PRODUCTS

- A. Furnish two of each plastic lens type.
- B. Furnish one replacement lamps for each lamp type.
- C. Furnish one replacement motion detector for each sensor type.

2 PART 2 PRODUCTS

2.1 LUMINAIRES

- A. Manufacturers:
 - 1. Lithonia.
 - 2. Hubbell.
 - 3. Cooper.
- B. Size and Type: As scheduled.

2.2 EMERGENCY LIGHTING UNITS

- A. Furnish products as specified in schedules.

2.3 EXIT SIGNS

- A. Furnish products as specified in schedules.

2.4 LAMPS

- A. Lamp Types: LED for all fixtures. Refer to schedules.
- B. Reflector Lamp Beam Patterns: ANSI C78.379.
- C. All lamps shall be 4000 deg K Exterior and 4000 deg K Interior unless otherwise noted on the schedule.

2.5 MOTION DETECTORS

- A. Manufacturers:
 - 1. Lutron
 - 2. ALL DIMMING SYSTEM PANELS, CONTROLS, BALLASTS AND OCCUPANCY SENSORS SHALL BE ALL MANUFACTURED BY THE SAME MANUFACTURER FOR WARRANTY PURPOSES, NO EXCEPTIONS.
- B. Size and Type: Dual Technology combining passive infrared and ultrasonic technologies. Unit to provide user-specified time delay, adjustable sensitivity, LED display. Occupancy sensor shall control lighting in the sensed area only. Ceiling or wall-mount as shown on the drawings.
- C. Power Supply: Capable of switching a 20 amp ballast load. Power supply shall be capable of parallel wiring without regard to AC phases on primary.

3 PART 3 EXECUTION

3.1 INSTALLATION

- A. Install suspended luminaires using pendants supported from swivel hangers. Provide pendant length required to suspend luminaire at indicated height.
- B. Support luminaires larger than 2 x 4 foot size independent of ceiling framing.
- C. Locate recessed ceiling luminaires as indicated on reflected ceiling plan.
- D. Install surface mounted luminaires and exit signs plumb and adjust to align with building lines and with each other. Secure to prevent movement.

- E. Install wall mounted luminaires, emergency lighting units and exit signs at height as indicated on Drawings.
- F. Install accessories furnished with each luminaire.
- G. Connect luminaires, emergency lighting units and exit signs to branch circuit outlets provided under Section 26 05 34 and 26 06 20.
- H. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.
- I. Bond products and metal accessories to branch circuit equipment grounding conductor.
- J. Install specified lamps in each emergency lighting unit, exit sign, and luminaire.
- K. Locate and aim occupancy sensor in correct location for coverage of room. The contractor shall provide additional sensors if required to properly cover the room. Connect switch leg through power supply of sensor for correct operation.

3.2 FIELD QUALITY CONTROL

- A. Operate each luminaire after installation and connection. Inspect for proper connection and operation.

3.3 ADJUSTING

- A. Aim and adjust luminaires as indicated.
- B. Position exit sign directional arrows as indicated.
- C. Position motion detectors as required to minimize false operation.

3.4 CLEANING

- A. Clean electrical parts to remove conductive and deleterious materials.
- B. Remove dirt and debris from enclosures.
- C. Clean photometric control surfaces as recommended by manufacturer.
- D. Clean finishes and touch up damage.

3.5 DEMONSTRATION AND INSTRUCTIONS

A. Demonstrate luminaire operation for a minimum of two hours.

3.6 PROTECTION OF FINISHED WORK

A. Relamp luminaires that have failed lamps at Substantial Completion.

3.7 COMMISSIONING

A. Provide full and complete commissioning of the entire lighting system and controls.

END OF SECTION

SECTION 27 20 00 COMMUNICATIONS AND COMPUTER SYSTEMS

1	PART 1 GENERAL	1
1.1	SECTION INCLUDES	1
1.2	RELATED SECTIONS	1
1.3	REFERENCES	1
1.4	SYSTEM DESCRIPTION	1
1.5	QUALIFICATIONS	1
1.6	REGULATORY REQUIREMENTS	1
1.7	MAINTENANCE SERVICE	2
1.8	EXTRA MATERIALS	2
2	PART 2 PRODUCTS	2
2.1	WIRE AND CABLE	2
2.2	WIRING DEVICES	2
2.3	WIRING CLOSETS	2
2.4	PATCH PANELS	2
3	PART 3 EXECUTION	2
3.1	INSTALLATION	2

1 PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Equipment mounting.
- B. Premises wiring and outlets.

1.2 RELATED SECTIONS

- A. Section 26 05 33 – Conduit.
- B. Section 26 05 10 – Building Wire and Cable

1.3 REFERENCES

- A. EIA/TIA-568 – Commercial Building Wiring Standard.
- B. EIA/TIA-569 – Commercial Building Standard for Telecommunication Pathways and Spaces.
- C. T-568B – Standard for Computer Wiring.
- D. NFPA 70 – National Electrical Code.

1.4 SYSTEM DESCRIPTION

- A. Backbone Pathway: Conform to EIA/TIA 569.
- B. Horizontal Pathway: Conform to EIA/TIA 569.
- C. Premises Wiring: Complete from equipment to each outlet, using wire and cable as specified. All work contained in this entire Specifications Section 27 20 00 shall be performed by Contractor. Contractor shall also provide coordination for installation of the data system, all power for all related systems, backboxes and conduit as required.

1.5 QUALIFICATIONS

- A. Installer: Contractor.

1.6 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70.
- B. Furnish Products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and indicated.

1.7 MAINTENANCE SERVICE

- A. Furnish service and maintenance of premises wiring for one year from Date of Substantial Completion.

1.8 EXTRA MATERIALS

- A. Provide two of each type of outlet jack.

2 PART 2 PRODUCTS

2.1 WIRE AND CABLE

- A. Refer to Section 26 05 10 for complete description of all cables.

2.2 WIRING DEVICES

- A. Computer terminations: Leviton Quick Port modules or equal.
- B. Telephone terminations: Leviton Quick Port modules or equal.
- C. Television terminations: Leviton Quick Port modules or equal. Provide one module for RG-59 coaxial connector in 1 port wall plate.

2.3 WIRING CLOSETS

- A. Wiring closets to contain jack strips mounted minimum of 84" AFF at location shown on plans. Provide one RJ-45 connector per cable. Locate 120 volt receptacle adjacent to jack strip.

2.4 PATCH PANELS

- A. The transmission properties of internally wired connecting devices shall meet or exceed those specified in TIA/EIA 568, Section 12.2.6.2.
- B. Standard interface jack and plugs shall meet the requirements of TIA/EIA-TSB-31, Ref B 1.37.
- C. Interface jacks shall be eight pin jacks with pin/pair assignments according to the 568A designation with applicable color code combinations. These pin/pair assignments to be compatible with ISDN BRI (ISO 8877), Ref B 1.24.

3 PART 3 EXECUTION

3.1 INSTALLATION

- A. Install wire and cable in accordance with manufacturer's instructions and in accordance with EIA/TIA 568. Insure that standard T-568B is adhered to for all data cabling installations.
- B. Support raceways, backboards, and cabinets. Install termination backboards and cabinets plumb, and attach securely to building wall at each corner.
- C. Install polyethylene pulling string in each empty telephone conduit.
- D. Install data cable and other cable as required to each box serving telephone or computer outlets. Install data cable from outlet to electrical room to location of computer hub.
- E. All communications and computer outlets to have minimum 1" conduit stubbed to 6" above ceiling.

END OF SECTION



Interior Lighting Compliance Certificate

Project Information

Energy Code: 2015 IECC
 Project Title: North Branch Library - Tom Green County
 Project Type: New Construction

Construction Site: 3001 N. Chadbourne San Angelo, TX 76903	Owner/Agent: Don Killam Tom Green County Library System San Angelo, TX 325-234-1231	Designer/Contractor: Paul Wilkerson PowerSystems Firm #F-6257 P.O. Box 2863 San Angelo, TX 76902 325.659.2235
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Additional Efficiency Package(s)

Reduced interior lighting power. Requirements are implicitly enforced within interior lighting allowance calculations.

Allowed Interior Lighting Power

A Area Category	B Floor Area (ft ²)	C Allowed Watts / ft ²	D Allowed Watts (B X C)
1-Retail	4218	1.13	4783
Total Allowed Watts =			4783

Proposed Interior Lighting Power

A Fixture ID : Description / Lamp / Wattage Per Lamp / Ballast	B Lamps/ Fixture	C # of Fixtures	D Fixture Watt.	E (C X D)
1-Retail				
LED: A: 2'x2' troffer recessed: Other:	1	16	39	624
LED: A1: 2'x2' troffer recessed: Other:	1	3	29	87
LED: A2: 2'x2' troffer recessed: Other:	1	4	29	116
LED: B: 4" suspended pendant: Other:	1	44	57	2508
LED: D: wide beam recessed downlight: Other:	1	8	16	124
LED: D1: 2" recessed downlight: Other:	1	35	11	385
LED: E: recessed flush mount: Other:	1	5	8	40
LED: F: recessed perimeter direct: Other:	1	2	62	124
Total Proposed Watts =				4008

Interior Lighting PASSES: Design 16% better than code

Interior Lighting Compliance Statement

Compliance Statement: The proposed interior lighting design represented in this document is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed interior lighting systems have been designed to meet the 2015 IECC requirements in COMcheck Version 4.1.5.1 and to comply with any applicable mandatory requirements listed in the Inspection Checklist.

Paul R. Wilkerson, PE
Name - Title

Paul Wilkerson PE
Signature

July 07, 2021
Date



Exterior Lighting Compliance Certificate

Project Information

Energy Code: 2015 IECC
 Project Title: North Branch Library - Tom Green County
 Project Type: New Construction
 Exterior Lighting Zone: 2 (Light industrial area with limited nighttime use)

Construction Site: 3001 N. Chadbourne San Angelo, TX 76903	Owner/Agent: Don Killam Tom Green County Library System San Angelo, TX 325-234-1231	Designer/Contractor: Paul Wilkerson PowerSystems Firm #F-6257 P.O. Box 2863 San Angelo, TX 76902 325.659.2235
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Allowed Exterior Lighting Power

A Area/Surface Category	B Quantity	C Allowed Watts / Unit	D Tradable Wattage	E Allowed Watts (B X C)
Other door (not main entry)	3 ft of door	20	Yes	60
Main entry	3 ft of door	20	Yes	60
Entry canopy	563 ft2	0.25	Yes	141
Total Tradable Watts (a) =				261
Total Allowed Watts =				261
Total Allowed Supplemental Watts (b) =				600

- (a) Wattage tradeoffs are only allowed between tradable areas/surfaces.
- (b) A supplemental allowance equal to 600 watts may be applied toward compliance of both non-tradable and tradable areas/surfaces.

Proposed Exterior Lighting Power

A Fixture ID : Description / Lamp / Wattage Per Lamp / Ballast	B Lamps/ Fixture	C # of Fixtures	D Fixture Watt.	E (C X D)
<u>Other door (not main entry) (3 ft of door width): Tradable Wattage</u>				
LED: XA: WALL MOUNT LUMINAIRE: Other:	1	5	34	170
LED: XD: EXTERIOR WALL MOUNT SIGN LIGHT: Other:	1	1	20	20
<u>Main entry (3 ft of door width): Tradable Wattage</u>				
LED: XCE: EMERGENCY WALL MOUNT: Other:	1	1	10	10
<u>Entry canopy (563 ft2): Tradable Wattage</u>				
LED: XB: hydro beam direct strip: Other:	1	3	42	126
Total Tradable Proposed Watts =				326

Exterior Lighting PASSES: Design 62% better than code

Exterior Lighting Compliance Statement

Compliance Statement: The proposed exterior lighting design represented in this document is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed exterior lighting systems have been designed to meet the 2015 IECC requirements in COMcheck Version 4.1.5.1 and to comply with any applicable mandatory requirements listed in the Inspection Checklist.

Paul R. Wilkerson, PE

Name - Title

Paul Wilkerson PE

Signature

July 07, 2021

Date



Mechanical Compliance Certificate

Project Information

Energy Code: 2015 IECC
 Project Title: North Branch Library - Tom Green County
 Location: San Angelo, Texas
 Climate Zone: 3b
 Project Type: New Construction

Construction Site:
 3001 N. Chadbourne
 San Angelo, TX 76903

Owner/Agent:
 Don Killam
 Tom Green County Library System
 San Angelo, TX
 325-234-1231

Designer/Contractor:
 Paul Wilkerson
 PowerSystems
 Firm #F-6257
 P.O. Box 2863
 San Angelo, TX 76902
 325.659.2235

Additional Efficiency Package(s)

Reduced interior lighting power. Requirements are implicitly enforced within interior lighting allowance calculations.

Mechanical Systems List

Quantity System Type & Description

- 2 HVAC 7.5T (Single Zone):
 Heating: 1 each - Central Furnace, Gas, Capacity = 125 kBtu/h
 Proposed Efficiency = 81.00% Et, Required Efficiency: 80.00 % Et or 78% AFUE
 Cooling: 1 each - Single Package DX Unit, Capacity = 86 kBtu/h, Air-Cooled Condenser, Air Economizer
 Proposed Efficiency = 12.00 EER, Required Efficiency: 11.00 EER + 12.6 IEER
 Fan System: FAN SYSTEM 1 -- Compliance (Motor nameplate HP method) : Passes

 Fans:
 FAN 1 Supply, Constant Volume, 3000 CFM, 1.5 motor nameplate hp, 0.8 fan efficiency grade
- 1 Storage Water Heater 1:
 Electric Storage Water Heater, Capacity: 30 gallons
 Proposed Efficiency: 1.20 SL, %/h (if > 12 kW), Required Efficiency: 1.20 SL, %/h (if > 12 kW)

Mechanical Compliance Statement

Compliance Statement: The proposed mechanical design represented in this document is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed mechanical systems have been designed to meet the 2015 IECC requirements in COMcheck Version 4.1.5.1 and to comply with any applicable mandatory requirements listed in the Inspection Checklist.

Paul R. Wilkerson, PE
 Name - Title

Paul Wilkerson PE
 Signature

July 07, 2021
 Date



Inspection Checklist

Energy Code: 2015 IECC

Requirements: 100.0% were addressed directly in the COMcheck software

Text in the "Comments/Assumptions" column is provided by the user in the COMcheck Requirements screen. For each requirement, the user certifies that a code requirement will be met and how that is documented, or that an exception is being claimed. Where compliance is itemized in a separate table, a reference to that table is provided.

Section # & Req.ID	Plan Review	Complies?	Comments/Assumptions
C103.2 [PR2] ¹	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the mechanical systems and equipment and document where exceptions to the standard are claimed. Load calculations per acceptable engineering standards and handbooks.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C103.2 [PR3] ¹	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the service water heating systems and equipment and document where exceptions to the standard are claimed. Hot water system sized per manufacturer's sizing guide.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C103.2 [PR4] ¹	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the interior lighting and electrical systems and equipment and document where exceptions to the standard are claimed. Information provided should include interior lighting power calculations, wattage of bulbs and ballasts, transformers and control devices.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C103.2 [PR8] ¹	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the exterior lighting and electrical systems and equipment and document where exceptions to the standard are claimed. Information provided should include exterior lighting power calculations, wattage of bulbs and ballasts, transformers and control devices.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C406 [PR9] ¹	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the additional energy efficiency package options.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.

Additional Comments/Assumptions:

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)
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1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)
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Section # & Req.ID	Footing / Foundation Inspection	Complies?	Comments/Assumptions
C403.2.4.5, C403.2.4.6 [FO9] ³	Snow/ice melting system sensors for future connection to controls. Freeze protection systems have automatic controls installed.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Exception: Requirement does not apply.

Additional Comments/Assumptions:

1 High Impact (Tier 1)	2 Medium Impact (Tier 2)	3 Low Impact (Tier 3)
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Section # & Req.ID	Plumbing Rough-In Inspection	Complies?	Comments/Assumptions
C404.5, C404.5.1, C404.5.2 [PL6] ³	Heated water supply piping conforms to pipe length and volume requirements. Refer to section details.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Exception: Requirement does not apply.
C404.5, C404.5.1, C404.5.2 [PL6] ³	Heated water supply piping conforms to pipe length and volume requirements. Refer to section details.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C404.6.3 [PL7] ³	Pumps that circulate water between a heater and storage tank have controls that limit operation from startup to <= 5 minutes after end of heating cycle.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Exception: Requirement does not apply.
C404.6.3 [PL7] ³	Pumps that circulate water between a heater and storage tank have controls that limit operation from startup to <= 5 minutes after end of heating cycle.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Exception: Requirement does not apply.
C404.7 [PL8] ³	Water distribution system that pumps water from a heated-water supply pipe back to the heated-water source through a cold-water supply pipe is a demand recirculation water system. Pumps within this system have controls that start the pump upon receiving a signal from the action of a user of a fixture or appliance and limits the temperature of the water entering the cold-water piping to 104°F.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Exception: Requirement does not apply.
C404.7 [PL8] ³	Water distribution system that pumps water from a heated-water supply pipe back to the heated-water source through a cold-water supply pipe is a demand recirculation water system. Pumps within this system have controls that start the pump upon receiving a signal from the action of a user of a fixture or appliance and limits the temperature of the water entering the cold-water piping to 104°F.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Exception: Requirement does not apply.

Additional Comments/Assumptions:

1 High Impact (Tier 1)	2 Medium Impact (Tier 2)	3 Low Impact (Tier 3)
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Section # & Req.ID	Mechanical Rough-In Inspection	Complies?	Comments/Assumptions
C402.2.6 [ME41] ³	Thermally ineffective panel surfaces of sensible heating panels have insulation \geq R-3.5.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Exception: Requirement does not apply.
C403.2.13 [ME71] ²	Unenclosed spaces that are heated use only radiant heat.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Exception: Requirement does not apply.
C403.2.3 [ME55] ²	HVAC equipment efficiency verified.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	See the Mechanical Systems list for values.
C403.2.4.7 [ME113] ²	Fault detection and diagnostics installed with air-cooled unitary DX units having economizers.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C403.2.6.1 [ME59] ¹	Demand control ventilation provided for spaces >500 ft ² and >25 people/1000 ft ² occupant density and served by systems with air side economizer, auto modulating outside air damper control, or design airflow $>3,000$ cfm.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Exception: Spaces where the supply airflow rate minus makeup air and minus outgoing transfer air is less than 1200 cfm.
C403.2.6.2 [ME115] ³	Enclosed parking garage ventilation has automatic contaminant detection and capacity to stage or modulate fans to 50% or less of design capacity.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Exception: Requirement does not apply.
C403.2.7 [ME57] ¹	Exhaust air energy recovery on systems meeting Table C403.2.7(1) and C403.2.7(2).	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Exception: Requirement does not apply.
C403.2.8 [ME116] ³	Kitchen exhaust systems comply with replacement air and conditioned supply air limitations, and satisfy hood rating requirements and maximum exhaust rate criteria.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Exception: Requirement does not apply.
C403.2.9 [ME60] ²	HVAC ducts and plenums insulated. Where ducts or plenums are installed in or under a slab, verification may need to occur during Foundation Inspection.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C403.2.9 [ME10] ²	Ducts and plenums sealed based on static pressure and location.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C403.2.9.1.3 [ME11] ³	Ductwork operating >3 in. water column requires air leakage testing.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Exception: Requirement does not apply.
C403.3 [ME62] ¹	Air economizers provided where required, meet the requirements for design capacity, control signal, ventilation controls, high-limit shut-off, integrated economizer control, and provide a means to relieve excess outside air during operation.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.

1 High Impact (Tier 1) 2 Medium Impact (Tier 2) 3 Low Impact (Tier 3)

Section # & Req.ID	Mechanical Rough-In Inspection	Complies?	Comments/Assumptions
C403.4.4.6 [ME110] ³	Multiple zone VAV systems with DDC of individual zone boxes have static pressure setpoint reset controls.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Exception: Requirement does not apply. <i>See the Mechanical Systems list for values.</i>
C408.2.2.1 [ME53] ³	Air outlets and zone terminal devices have means for air balancing.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C403.5, C403.5.1, C403.5.2 [ME123] ³	Refrigerated display cases, walk-in coolers or walk-in freezers served by remote compressors and remote condensers not located in a condensing unit, have fan-powered condensers that comply with Sections C403.5.1 and refrigeration compressor systems that comply with C403.5.2..	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Exception: Requirement does not apply.

Additional Comments/Assumptions:

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)
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Section # & Req.ID	Rough-In Electrical Inspection	Complies?	Comments/Assumptions
C405.2.1 [EL15] ¹	Lighting controls installed to uniformly reduce the lighting load by at least 50%.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C405.2.1 [EL18] ¹	Occupancy sensors installed in required spaces.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C405.2.1, C405.2.2.3 [EL23] ²	Independent lighting controls installed per approved lighting plans and all manual controls readily accessible and visible to occupants.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C405.2.2.1 [EL22] ²	Automatic controls to shut off all building lighting installed in all buildings.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Exception: Areas such as security or emergency areas that need continuous lighting.
C405.2.3 [EL16] ²	Daylight zones provided with individual controls that control the lights independent of general area lighting.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Exception: Requirement does not apply.
C405.2.3.1, C405.2.3.2 [EL20] ¹	Primary sidelighted areas are equipped with required lighting controls.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Exception: Requirement does not apply.
C405.2.3.1, C405.2.3.3 [EL21] ¹	Enclosed spaces with daylight area under skylights and rooftop monitors are equipped with required lighting controls.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Exception: Requirement does not apply.
C405.2.4 [EL4] ¹	Separate lighting control devices for specific uses installed per approved lighting plans.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C405.2.4 [EL8] ¹	Additional interior lighting power allowed for special functions per the approved lighting plans and is automatically controlled and separable from general lighting.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C405.2.5 [EL25] ^{null}	Automatic lighting controls for exterior lighting installed. Controls will be daylight controlled, set based on business operation time-of-day, or reduce connected lighting > 30%.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C405.3 [EL6] ¹	Exit signs do not exceed 5 watts per face.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.

Additional Comments/Assumptions:

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)
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1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)
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Section # & Req.ID	Final Inspection	Complies?	Comments/Assumptions
C303.3, C408.2.5.2 [FI17] ³	Furnished O&M instructions for systems and equipment to the building owner or designated representative.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C303.3, C408.2.5.3 [FI8] ³	Furnished O&M manuals for HVAC systems within 90 days of system acceptance.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C403.2.2 [FI27] ³	HVAC systems and equipment capacity does not exceed calculated loads.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C403.2.4.1 [FI47] ³	Heating and cooling to each zone is controlled by a thermostat control. Minimum one humidity control device per installed humidification/dehumidification system.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C403.2.4.1.2 [FI38] ³	Thermostatic controls have a 5 °F deadband.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C403.2.4.1.3 [FI20] ³	Temperature controls have setpoint overlap restrictions.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C403.2.4.2 [FI39] ³	Each zone equipped with setback controls using automatic time clock or programmable control system.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C403.2.4.2.1, C403.2.4.2.2 [FI40] ³	Automatic Controls: Setback to 55°F (heat) and 85°F (cool); 7-day clock, 2-hour occupant override, 10-hour backup	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C403.2.4.2.3 [FI41] ³	Systems include optimum start controls.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C404.3 [FI11] ³	Heat traps installed on supply and discharge piping of non-circulating systems.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C404.4 [FI25] ²	All piping insulated in accordance with section details and Table C403.2.10.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C405.4.1 [FI18] ¹	Interior installed lamp and fixture lighting power is consistent with what is shown on the approved lighting plans, demonstrating proposed watts are less than or equal to allowed watts.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	<i>See the Interior Lighting fixture schedule for values.</i>

1 High Impact (Tier 1) 2 Medium Impact (Tier 2) 3 Low Impact (Tier 3)

Section # & Req.ID	Final Inspection	Complies?	Comments/Assumptions
C405.5.1 [FI19] ¹	Exterior lighting power is consistent with what is shown on the approved lighting plans, demonstrating proposed watts are less than or equal to allowed watts.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	See the Exterior Lighting fixture schedule for values.
C408.2.1 [FI28] ¹	Commissioning plan developed by registered design professional or approved agency.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C408.2.3.1 [FI31] ¹	HVAC equipment has been tested to ensure proper operation.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C408.2.3.2 [FI10] ¹	HVAC control systems have been tested to ensure proper operation, calibration and adjustment of controls.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C408.2.3.3 [FI32] ¹	Economizers have been tested to ensure proper operation.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C408.2.4 [FI29] ¹	Preliminary commissioning report completed and certified by registered design professional or approved agency.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C408.2.5.1 [FI7] ³	Furnished HVAC as-built drawings submitted within 90 days of system acceptance.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C408.2.5.1 [FI16] ³	Furnished as-built drawings for electric power systems within 90 days of system acceptance.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C408.2.5.3 [FI43] ¹	An air and/or hydronic system balancing report is provided for HVAC systems.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C408.2.5.4 [FI30] ¹	Final commissioning report due to building owner within 90 days of receipt of certificate of occupancy.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C408.3 [FI33] ¹	Lighting systems have been tested to ensure proper calibration, adjustment, programming, and operation.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.

Additional Comments/Assumptions:

1 High Impact (Tier 1)	2 Medium Impact (Tier 2)	3 Low Impact (Tier 3)
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