SPECIFICATIONS

FOR

CITY OF SAN ANGELO

Texas Bank Sports Complex
at Rio Concho Community Park
Concession Building #2

SAN ANGELO, TEXAS

37B WEST CONCHO STREET
SAN ANGELO, TX 76903
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POWER SYSTEMS INC.
MEP CONSULTANT
(325) 659-2235

SKG ENGINEERING
STRUCTURAL CONSULTANT
(325) 655-1288

SEPTEMBER 14, 2016

PROJECT NO. 250-02-0516

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REGISTERED ARCHITECT
CRAIG KINNEY
09-14-16
STATE OF TEXAS

09-14-16

STATE OF TEXAS
JERRY P. WHITE
110408
LICENSED
PROFESSIONAL ENGINEER

9/14/16

Sky Engineering
F-7608

NOTE:
MEP SPECIFICATIONS WILL FOLLOW ARCHITECTURAL SPECIFICATIONS.

END OF TABLE OF CONTENTS

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DOCUMENT 00 7200

GENERAL CONDITIONS

1.1 SUMMARY

A. Related Documents:
   1. Document 00 7300 - Supplementary Conditions.
   2. Division 01 - General Requirements.

1.2 DOCUMENT

A. American Institute of Architects (AIA) Document A201-2007, General Conditions of the Contract for Construction, forms a part of this Contract and by reference is incorporated herein as fully as if repeated at length.

END OF DOCUMENT

DOCUMENT 00 7300

SUPPLEMENTARY CONDITIONS

1.1 SUMMARY

A. Related Documents:
1. Document 00 7200 - General Conditions.
2. Division 01 - General Requirements.

1.2 GENERAL

A. The following supplements modify, delete from, or add to the General Conditions referenced above.

B. Where provisions of the General Conditions are modified, unaltered provisions remain in effect.

1.3 SUPPLEMENTS

A. Article 1 - General Provisions:

1. Add Subparagraph 1.1.9:

1.1.8 The term "product" includes materials, systems, and equipment.

2. Add Subparagraph 1.1.10:

1.1.9 The term "furnish" means to supply and deliver to Project site, ready for unloading, unpacking, assembly, erection, placement or similar requirements.

3. Add Subparagraph 1.1.11:

1.1.10 The term "install" means to unload, unpack, assemble, erect, place, finish, protect, adjust, and clean, or similar requirements.

4. Add Subparagraph 1.1.12:

1.1.11 The term "provide" means to furnish and install.

B. Article 9 - Payments and Completion:
1. Add Subparagraph 9.6.8:

9.6.8 Until final payment, the Owner will retain 10 (ten) percent of the amount due the Contractor on account of progress payments.

A. Article 10 - Protection of Persons and Property:

1. Add Paragraph 10.3.7:

10.3.7 The Contractor shall not knowingly use any materials containing asbestos or other known hazardous materials in the Work.

B. Article 11 - Insurance and Bonds:

1. In Subparagraph 11.1.1, following the word "located", add "and against whom the Owner has no reasonable objection."

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2. Add the following to the end of Subparagraph 11.1.3: "The form of the Certificate of Insurance shall be acceptable to the Owner."

3. Add Subparagraph 11.1.5:

11.1.5 Liability insurance shall include all major divisions of coverage and be on a comprehensive basis including:

.1 Premises.
.2 Independent Contractors' Protective.
.3 Products and Completed Operations.
.4 Personal Injury Liability with Employment Exclusion deleted.
.5 Contractual, including specified provision for Contractor's obligation under Paragraph 3.18.
.6 Owned, non owned and hired motor vehicles.
.7 Broad Form Property Damage including Completed Operations."

4. Add Subparagraph 11.1.6:

11.1.6 The insurance required by Subparagraph 11.1.1 shall be written for not less than the following limits or those required by law, whichever is greater and shall include the following coverages as a minimum:

.1 Worker's Compensation:
(a) State: Statutory.
(b) Applicable Federal: Statutory.
(c) Employer's Liability: $1,000,000 per accident; $1,000,000 per disease, Policy Limit; $1,000,000 per disease, each employee.

.2 Comprehensive or Commercial General Liability including Premises-Operations; Independent Contractors' Protective; Products and Completed Operations; Broad Form Property Damage:
(a) Bodily Injury: $1,000,000 each occurrence; $2,000,000 aggregate.
(b) Property Damage: $1,000,000 each occurrence; $2,000,000 aggregate.
(c) Products and Completed Operations shall be maintained for 2 years after final payment. [Provide evidence of coverage on annual basis.]
(d) Property Damage Liability: Include X, C and U coverage.
(e) Broad Form Property Damage shall include Completed Operations.

.3 Contractual Liability:
(a) Bodily Injury: $1,000,000 each occurrence; $2,000,000 aggregate.
(b) Property Damage: $1,000,000 each occurrence; $2,000,000 aggregate.

.4 Personal Injury, with Employment Exclusion deleted: $2,000,000 aggregate.

.5 Business Automobile Liability including owned, non-owned and hired vehicles:
(a) Bodily Injury: $250,000 each person; $500,000 each occurrence.
(b) Property Damage: $100,000 each occurrence.

.6 If General Liability coverages are provided by a Commercial Liability policy, the:
(a) General Aggregate shall be not less than $2,000,000 and it shall apply, in total, to this policy only.
(b) Fire Damage Limit shall be not less than $100,000 on any one Fire.
(c) Medical Expense Limit shall be not less than $5,000 on any one person.

.7 Umbrella Excess Liability:
(a) $5,000,000 over primary insurance.
(b) $10,000 retention for self-insured hazards each occurrence.

5. Delete Subparagraph 11.4.1; substitute the following:

11.4.1 Furnish to Owner performance bond and labor and material payment bond, each equal to the amount of the Contract Sum, with approved surety, covering faithful performance of Contract and payment of obligations incurred in performance of Contract and also for use and benefit of parties who may become entitled to liens under the Contract according to provisions of laws of the State in which the project is located. The form of the bonds shall be acceptable to Owner.

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.1 The Contractor shall deliver the required bonds to the Owner not later than three days following the date of execution of the Owner-Contractor Agreement, or if the Work is to be commenced prior thereto in response to a letter of intent, the Contractor shall, prior to commencement of the Work, submit evidence satisfactory to the Owner that such bonds will be furnished.

.2 The Contractor shall require the attorney-in-fact who executes the required bonds on behalf of the surety to affix thereto a certified and current copy of the power of attorney.

C. Article 13 - Miscellaneous Provisions:

D. Article 15 - Claims and Disputes:

1. Add Paragraph 15.1.5.3:

15.1.5.3 Extensions of time because of inclement weather will be granted only for the following conditions at the site:

.1 Precipitation, defined as 0.1 inch or more of rain, snow, or ice, exceeds the mean for that month as published by the National Oceanic and Atmospheric Administration for the closest reporting station to the Project.

.2 Freezing weather, defined as a high daytime temperature of [32] [__] degrees F or below, exceeds the mean for that month as published by the National Oceanic and Atmospheric Administration for the closest reporting station to the Project.

.3 Sustained winds exceeding 25 MPH.

.4 Mud.

.5 Standing snow of 1 inch or more.

.6 Claims shall be in whole or half day increments. If both precipitation and freezing weather exceed the norm for any given day, only one day will be counted.

END OF DOCUMENT

SECTION 01 1100

SUMMARY OF WORK

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Project description.
2. Work by Others.
3. Work sequence.
4. Owner occupancy.
5. Future work.
6. Construction Manager's use of site and premises.
7. Owner furnished Products.

1.2 PROJECT DESCRIPTION

A. Work of this Project is described as the construction of a new, approximately 1,150 square foot concession building, and associated sitework, located at the Rio Concho Sports Complex for the City of San Angelo.

B. Work includes site construction, general construction, plumbing, HVAC, and electrical.

C. The Project will be constructed per City of San Angelo (method will be stated in the front end of these specifications, written by the City of San Angelo), whether it be under a General Contractor or a Construction Manager at Risk. For the purposes of these specifications Construction Manager at Risk language will be used, however the delivery method will be dictated by the City of San Angelo.

1.3 CONSTRUCTION MANAGER'S USE OF SITE AND PREMISES

A. Construction Manager shall have complete and exclusive use of immediate site and premises for execution of the Work (within fencing boundary, set with Owner's direction).

1.4 OWNER FURNISHED PRODUCTS

A. Products that will be furnished and paid for by Owner are as follows:
1. Furniture and freestanding equipment (that can be easily moved).

B. Owner's Responsibilities:
1. Arrange for and deliver necessary Shop Drawings, Product Data and Samples to Construction Manager.
2. Arrange and pay for product delivery to site, in accordance with Progress Schedule.

C. Construction Manager's Responsibilities:
1. Designate delivery date for each product in Progress Schedule.
2. Review Shop Drawings, Product Data and Samples. Submit to Architect with notification of any discrepancies or problems anticipated in use of product.
3. Receive and unload products at site.
4. Promptly inspect products jointly with Owner; record shortages, damage, and defective items.
5. Handle products at site, including uncrating and storage.
6. Protect products from exposure to elements and from damage.
7. Assemble, install, connect, adjust, and finish products, as stipulated in respective specification section.
8. Repair or replace any items damaged by Construction Manager.

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

END OF SECTION

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SECTION 01 2100

ALLOWANCES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Cash allowances.
   2. Contingency allowance.

B. Related Sections
   1. Section 01 2900 - Payment Procedures.
   2. Section 01 3216 - Construction Progress Schedules.
   3. Individual specification sections.

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 Section 01 3216 delivery dates for products under each allowance.

E. Designate in Schedule of Values specified in Section 01 2900 quantities of materials specified 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, Construction Manager'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.
      e. Overhead and profit.

B. Selection of Products:
   1. Architect's Duties:
      a. Consult with Construction Manager in consideration of products and suppliers.
      b. Make selection; designate products to be used.
      c. Prepare Change Orders.
   2. Construction Manager's Duties:
      a. Assist Architect in determining:
         1) Supplier or installer, as applicable.
         2) 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. Construction Manager'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 ALLOWANCE
A. Include in Contract Sum a stipulated sum of Thirty-five thousand dollars ($35,000.) for use upon Owner's instruction.

B. Construction Manager's costs for products, delivery, installation, labor, insurance, payroll, taxes, bonding, equipment rental, overhead and profit will be included in Change Orders authorizing expenditure of funds from this Contingency Allowance.

C. Funds will be drawn from Contingency Allowance only by Change Order.

D. At closeout of Contract, funds remaining in Contingency Allowance will be credited to Owner by Change Order.

1.4 SIGNAGE ALLOWANCE
A. Include in Contract Sum a stipulated sum of five hundred dollars ($500.) for use upon Owner's instruction.

B. At closeout of Contract, funds remaining in Contingency Allowance will be credited to Owner by Change Order.

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

END OF SECTION

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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. Construction Manager Agreement: Alternates accepted by Owner for incorporation into the 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.

1.4 DESCRIPTION OF ALTERNATES

A. Alternate No. 1 -
1. Add Alternate: Provide and install sun fabric per specifications for Concession buildings: # 1, 2 & 3. Color selections are based on USA Shade Shadesure color options.
Building #1 color: Royal Blue
Building #2 color: Rain Forest
Building #3 color: Red

B. Alternate No. 2 -
1. Add Alternate: Provide and install shade structure (Octagon style, 10ft height of columns at spring point, 42ft diameter), including:
a. footings and/or piers
b. structural steel
c. fabric
d. all associated electrical and lighting
2. Shade manufacturer will be responsible for steel and fabric of shade structure and for structural design of all necessary footings and/or beams required for shade structure. (Stamped by registered engineer.)
3. General contractor will be responsible for all flatwork installed after shade structure is installed. Flatwork will be per structural detail 4/S2.01-A.
4. Steel column color: Brown PNS8-C0004
5. Shadesure fabric (canopy) color: Arizona

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

END OF SECTION

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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 copy of form bound into 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.

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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

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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: _____

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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 Construction Manager Applications for Payment.

B. Form and Content:
1. Format: AIA Document G703 - Continuation Sheet of Application and Certification for Payment. Construction Manager standard electronic media format.
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. Construction Manager 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 $40,000.00, 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 electronically in Adobe PDF format.

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. Construction Manager standard electronic media format.
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 the each Application for Payment, submit waivers of lien from Construction Manager 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 three copies of each Application for Payment.
2. Payment period: Submit by the 30th day of each month.

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

END OF SECTION

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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. Submit required project submittals electronically in Abode PDF format.

B. Coordinate scheduling, submittals, and work of various Sections of specifications to assure efficient and orderly sequence of installation of interdependent construction elements.

C. 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.

D. 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.

E. In finished areas, conceal pipes, ducts, and wiring within construction. Coordinate locations of fixtures and outlets with finish elements.

F. Coordinate completion and clean up of work of separate Sections in preparation for Substantial Completion.

G. 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 DRAWINGS

A. Coordination Drawings:
   1. Prior to commencement of Work, prepare coordination drawings to define relationship of mechanical, plumbing, fire protection, and electrical components with beams, columns, ceilings and walls.
   2. Include plans, elevations, sections, and details required to define relationships between components.
   3. Prepare drawings at 1/4 inch = 1'-0" scale for general layout and 3/8 inch = 1'-0" for plans and sections in congested areas including equipment spaces.
   4. Submit 3 copies.

B. Hold coordination meetings with trades providing mechanical, plumbing, fire protection, and electrical work.

C. Resolve conflicts between trades, prepare composite coordination drawings and obtain signatures on original composite coordination Drawings.

D. 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.

E. 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 and progress meetings.

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 architect's office.

B. Attendance:
   1. Construction Manager, Owner.
   2. Architect and principal consultants.
   3. Major subcontractors and suppliers as Construction Manager deems appropriate.
   4. Representative of Testing Laboratory.

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: Architect's office

C. Attendance:
   1. Construction Manager
   2. Owner.
   3. Architect and consultants as appropriate to agenda.
   4. Subcontractors and suppliers as appropriate to agenda.
   5. Others as appropriate to agenda.

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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 CITY OF SAN ANGELO PARKS DEPARTMENT CONTACT LIST

A. Contacts are listed in order of priority should the contractor need help or have questions at the Complex during construction.

1.	Jason Campbell	(325) 277-4972
2.	Marcus Hinojosa	(325) 277-3319
3.	Tony Harris	(325) 315-0012
4.	Michael Dennis	(325) 450-3285
5.	Mike Hitchcock	(325) 234-0530
6.	Roger Havlak	(325) 234-0259

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

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: Work sequence.
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 and other logically grouped activities.

D. Provide subschedules for each phase of Work identified in Section 01 1100.

E. Provide subschedules to define critical portions of the entire Progress Schedule.

F. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.

G. Provide separate schedule of submittal dates for Shop Drawings, Product Data, and Samples, including:
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.

H. Coordinate content with Schedule of Values specified in Section 01 2900.

I. 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.

J. 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 every other Application for Payment.

C. Submit electronically in Adobe PDF format.

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.

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

END OF SECTION

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1Q 2013

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 function 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.

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PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

END OF SECTION

SECTION 01 4000

QUALITY REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. References.
   2. Quality assurance and control of installation.
   3. Mockups.
   4. Manufacturer's field services and reports.
   5. Design data and calculations.
   6. Test reports and certifications.
   7. Manufacturer's installation instructions.

1.2 REFERENCES

A. For products or workmanship specified by reference to association, trade, or industry standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.

C. Conform to edition of reference standard in effect as of Owner/Construction Manager Agreement.

D. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.3 QUALITY ASSURANCE AND CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, Products, services, site conditions, and workmanship, to produce Work of specified quality.

B. Comply fully 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 a minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Perform work by persons qualified to produce workmanship of specified quality.

F. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement.

1.4 MOCKUPS

A. Definition:
   1. Mockups are field samples constructed, applied, or assembled at the project site for review by the Owner and Architect that illustrate materials, equipment, or workmanship.
   2. Approved mockups establish the standard of quality by which the Work will be judged.

B. Construct, apply, or assemble specified items, with related attachment and anchorage devices, flashings, seals, and finishes.

C. Perform work in accordance with applicable specifications sections.

D. Erect at project site at location acceptable to Architect. Protect from damage.

E. Removal:
   1. Mockups may remain as part of the Work only when so designated in individual specification sections.
   2. Do not remove mockups until removal is approved by Architect or upon Final Completion.
   3. Where mockup is not permitted to remain as part of the Work, clear area after removal of mockup has been approved by Architect.

1.5 MANUFACTURERS' FIELD SERVICES AND REPORTS

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, or startup of equipment, as applicable, and to initiate instructions when necessary.

B. Individuals to report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

C. Submit report to Architect within 10 days of observation.

1.6 DESIGN DATA AND CALCULATIONS

A. When specified in individual specification Sections, require material or Product suppliers or manufacturers to provide design data and calculations.

B. Accuracy of design data and calculations is the responsibility of the Construction Manager.

C. When so specified, prepare design data and calculations under the direction of a professional engineer licensed in the state in which the Project is located. Affix engineer’s seal to submittals.

D. Submit electronically in Adobe PDF format.

1.7 TEST REPORTS AND CERTIFICATIONS

A. When specified in individual specification Sections, require material or Product suppliers or manufacturers to provide test reports and manufacturers’ certifications.

B. Indicate that material or Product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

C. Submittals may be recent or previous test results on material or Product, but must be acceptable to Architect.

D. Submit electronically in Adobe PDF format.

1.8 MANUFACTURER'S INSTALLATION INSTRUCTIONS

A. When Contract Documents require that Products be installed in accordance with manufacturer's instructions:
   1. Submit manufacturer's most recent printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, as applicable.
      a. Submit in quantities specified for Product Data.
      b. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.
      c. Identify conflicts between manufacturers' instructions and requirements of Contract Documents.

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2. Perform installation of Products to comply with requirements of manufacturer's instructions.
3. If installation cannot be performed in accordance with manufacturer's instructions, notify Architect and await instructions.
4. Submit three copies and submit electronically in Adobe PDF format.

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

END OF SECTION

SECTION 01 4523

TESTING AND INSPECTION SERVICES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Laboratory selection and payment.
2. Laboratory duties.
3. Construction Manager responsibilities.

B. Related Sections: Individual specifications sections contain specific tests and inspections to be performed.

1.2 REFERENCES

A. ASTM International (ASTM):
1. C1077 - Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.
2. D3666 - Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials.
3. D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
4. E329 - Standard Specification for Agencies Engaged in Construction Inspection and/or Testing.
5. E543 - Standard Specification for Agencies Performing Nondestructive Testing.

1.3 QUALITY ASSURANCE

A. Owner will employ and pay for services of an independent testing laboratory to perform specified testing and inspection. Construction Manager will arrange for testing as required.

B. Construction Manager shall cooperate with the Testing Laboratory to facilitate performance of its work.

1.4 LABORATORY DUTIES

A. Cooperate with Architect and Construction Manager 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 or noncompliance of materials with requirements of Contract Documents.

C. Promptly notify Architect and Construction Manager of observed irregularities or deficiencies of Work or products.

D. Promptly submit written report of each test and inspection; submit one printed copy and submit electronically in Adobe PDF format to Architect and Construction Manager

E. Each report to include:
1. Date issued.
2. Project title and number.
3. Testing Laboratory name, address, and telephone number.
4. Name of Inspector and signature of individual in charge.

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 noncompliance with Contract Documents.
12. Interpretation of test results when requested by Architect or Construction Manager

F. Perform additional tests when required by Architect or Construction Manager.

G. Laboratory is not authorized to:
1. Release, revoke, alter, or enlarge on requirements of Contract Documents.
2. Approve or accept any portion of work.
3. Perform any duties of Construction Manager.

1.5 CONSTRUCTION MANAGER'S RESPONSIBILITIES

A. Cooperate with Laboratory personnel, provide access to Work, and to manufacturer's operations.

B. When materials require testing prior to being incorporated into Work, secure and deliver to Laboratory adequate quantities of representative samples of materials proposed to be used.

C. Furnish copies of product 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 product to be tested.
3. To facilitate inspections and tests.
4. For safe 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.

F. When tests or inspections cannot be performed after such notice, reimburse Owner for Laboratory personnel and travel expenses incurred due to Construction Manager negligence.

G. Make arrangements with Laboratory and pay for additional samples and tests required for Construction Manager convenience.

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

END OF SECTION

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SECTION 01 5000

TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Temporary utilities.
2. Field offices and sheds.
3. Temporary controls.
4. Protection of installed Work.
5. Security.
6. Progress cleaning.
7. Water, erosion, sediment, dust, and mold and mildew control.
8. Access roads and parking areas.
9. Removal.

1.2 REFERENCES

A. Green Seal, Inc. (GS) 37 - Environmental Standard for Industrial and Institutional Cleaners.

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

3.1 TEMPORARY ELECTRICITY

A. Connect to existing electrical system for electricity required during construction.
1. Cost of electricity used will be paid for by Owner. Exercise measures to conserve electricity.
2. Regulate system to prevent interference with Owner's normal usage.
3. Maintain continuous power operation of Owner's facilities during changeover of electrical services.
4. Notify Owner when unusually heavy loads will be connected, including welding and other equipment with special power requirements.
5. Provide and pay for required service of capacity or characteristics other than that currently available.

B. Provide power outlets for construction operations, with branch wiring and distribution boxes located as required. Provide flexible power cords as required.

C. Maintain distribution system and provide routine repairs.

3.2 TEMPORARY LIGHTING

A. Provide temporary lighting for construction and security purposes.

B. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps as required.

C. Maintain lamps and provide routine repairs.

D. Provide portable lights when required to provide minimum lighting levels necessary for specific work.

3.3 TEMPORARY HEAT

A. Provide temporary heating devices required to maintain specified ambient temperatures for construction.

B. Existing heating facilities may not be used during construction.

3.4 TEMPORARY VENTILATION

A. Ventilate enclosed areas to facilitate curing of materials, disperse humidity, and prevent accumulations of dust, fumes, vapors, or gases.

B. Provide temporary fan units as required to maintain clean air for construction.

C. Existing ventilation equipment may not be used during construction.

3.5 TEMPORARY TELEPHONE AND COMPUTER SERVICES

A. Construction Manager shall be accessible during normal business hours via mobile telephone with voice mail or an answering service.

3.6 TEMPORARY WATER

A. Provide temporary water required for construction.

B. Existing water may not be used during construction.

C. Extend branch piping and provide temporary hoses so that water is available at locations needed for work.

D. Protect from freezing.

E. Maintain distribution system and provide routine repairs.

3.7 TEMPORARY SANITARY FACILITIES

A. Provide chemical toilets for use during construction.

B. Existing toilets may not be used during construction.

3.8 FIELD OFFICES AND SHEDS

A. Provide temporary field offices and storage sheds required for construction.

B. Existing building may be not used for field office and storage of materials.

C. Do not unreasonably encumber site or premises with excess materials or equipment.

D. Temporary Structures:
   1. Portable or mobile buildings, structurally sound, weathertight, with floors raised above ground.
   2. Thermal transmission resistance: Compatible with occupancy and storage requirements.
   3. Provide connections for utility services when required.
   4. Provide steps and landings at entrances.

E. Field Office:
   1. Size required for Construction Manager use and to provide space for project meetings.
   2. Adequate electrical power, lighting, heating, and cooling to maintain human comfort.
   3. Provide facilities for storage of Project Record Documents.
   4. Provide thermometer mounted at convenient outside location, not in direct sunlight.

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3.9 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas and to protect existing facilities from construction operations.

B. Provide barricades required by governing authorities for public right-of-ways.

C. Fencing:
   1. Provide temporary fencing for construction operations.
   2. Construction: Commercial grade chain link.
   3. Height: 6 feet.
   4. Locate to protect construction operations, materials, and equipment.
   5. Provide vehicular gates.

D. Tree and Plant Protection:
   1. Protect existing trees and plants at site that are designated to remain.
   2. Remove roots and branches that interfere with construction.
   3. Provide temporary barriers around individual or groups of trees and plants.
   4. Do not permit vehicular traffic, parking, storage of materials, dumping of harmful chemicals or liquids, or standing or continuously running water within root zones.
   5. Supervise earthwork operations to prevent damage to root zones.
   6. Replace trees and plants that are damaged or destroyed due to construction operations.

3.10 EXTERIOR CLOSURES

A. Provide temporary weathertight closures for exterior openings to provide acceptable interior working conditions, to allow for temporary heating and maintenance of ambient temperatures required in individual specification sections, to protect the Work, and to prevent entry of unauthorized persons.

B. Provide access doors with locking hardware.

3.11 PROTECTION OF INSTALLED WORK

A. Protect installed work from construction operations; provide special protection when required in individual specification sections.

B. Minimize traffic, storage, and construction activities on roof surfaces. If traffic, storage, or activity is necessary, obtain recommendations for protection from roofing manufacturer.

C. Prohibit traffic from landscaped areas.

3.12 SECURITY

A. Provide a project security program, to:
   1. Protect the Work, stored products, and construction equipment from theft and vandalism.
   2. Prevent entry by unauthorized persons.
   3. Protect Owner's operations from theft, vandalism, and damage.

3.13 PROGRESS CLEANING

A. Maintain areas free from waste materials, debris, and rubbish. Maintain site in clean and orderly condition.

B. Provide containers for collection of waste materials, debris, and rubbish; remove and dispose of off site as required by construction activities.

C. Periodically clean interior areas to provide suitable conditions for finish work.

3.14

3.15 TEMPORARY CONTROLS

A. Water Control:
   1. Grade site to drain. Prevent puddling water.
   2. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
   3. Provide water barriers to protect site from soil erosion.

B. Erosion and Sediment Control:
   1. Plan and execute methods to control surface drainage from cuts, fills, borrow areas, and waste disposal areas. Prevent erosion and sedimentation.
   2. Minimize amount of bare soil exposed at any one time.
   3. Provide temporary measures such as silt fences, dikes, berms, settlement basins, and drainage systems to prevent water flow and sedimentation.
   4. Periodically inspect earthwork to detect erosion and sedimentation; promptly employ corrective measures.

C. Dust Control:
   1. Provide dust control materials and methods to minimize dust from construction operations.
   2. Prevent dust from dispersing into atmosphere.

D. Mold and Mildew Control:
   1. Provide continuous measures to prevent formation of mold and mildew in construction.
   2. Do not install materials sensitive to mold and mildew growth until protection can be provided.
   3. Promptly remove and replace materials exhibiting mold and mildew growth.

3.16 ACCESS ROADS AND PARKING AREAS

A. Existing roads designated by Owner may be used for construction purposes. Do not allow heavy vehicles or construction equipment in parking areas.

B. Provide for access by emergency vehicles.

C. Keep fire hydrants and water control valves free from obstruction and accessible for use.

D. Provide parking facilities for construction personnel. When parking needs exceed on site capacity, provide additional off site facilities.

E. Maintain existing construction, and restore to original or specified condition at completion of Work.

3.17 REMOVAL

A. Remove temporary utilities, equipment, facilities, and services when construction needs can be met by use of permanent construction or upon completion of Project.

B. Remove foundations and underground installations; grade site as indicated.

C. Clean and repair damage caused by installation or use of temporary work.

D. Restore existing and permanent facilities used during construction to original or to specified condition.

END OF SECTION

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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

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SECTION 01 6000

PRODUCT REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Products.
   2. Transportation and handling.
   3. Storage and protection.
   4. Reuse of existing materials.
   5. Product options.

B. Related Sections:
   1. Section 01 2500 - Substitution Procedures.

1.2 PRODUCTS

A. Provide interchangeable components by the same manufacturer for identical items.

B. Do not use products containing asbestos or other known hazardous materials.

C. Do not reuse materials and equipment removed from existing construction in completed Work, except as specifically permitted by the Contract Documents.

1.3 TRANSPORTATION AND HANDLING

A. Coordinate delivery of Products to prevent conflict with Work and adverse conditions at site.

B. Transport and handle Products in accordance with manufacturer's instructions.

C. Promptly inspect shipments to ensure that Products comply with requirements of Contract Documents, are undamaged, and quantities are correct.

D. Provide equipment and personnel to handle products by methods to prevent damage.

1.4 STORAGE AND PROTECTION

A. Store and protect Products in accordance with manufacturer's instructions with manufacturer's seals and labels intact and legible.

B. Store Products on site unless prior written approval to store off site has been obtained from Owner.

C. Store Products subject to damage by elements in weathertight enclosures. Maintain temperature and humidity within ranges required by manufacturer's instructions.

D. Exterior Storage:
   1. Store fabricated Products above ground; prevent soiling and staining.
   2. Cover products subject to deterioration with impervious sheet coverings; provide ventilation to prevent condensation.
   3. Store loose granular materials in well drained area on solid surfaces; prevent mixing with foreign matter.

E. Arrange storage areas to permit access for inspection. Periodically inspect stored products to verify that products are undamaged and in acceptable condition.

1.5 REUSE OF EXISTING MATERIALS

A. Carefully remove, handle, protect, and store Products.

B. Clean and refinish Products to original or specified condition.

C. Restore operable components to working condition.

D. Arrange and pay for transportation, storage, and handling of Products requiring off site storage, restoration, or renovation.

1.6 PRODUCT OPTIONS

A. Products specified by reference standard only:
   1. Select any Product meeting the specified standard.
   2. Submit Product Data to substantiate compliance of proposed Product with specified requirements.

B. Products specified by naming two or more acceptable Products: Select any named Product.

C. Products specified by stating that the Contract Documents are based on a Product by a single manufacturer followed by the statement "Equivalent products by the following manufacturers are acceptable":
   1. Select the specified Product or a Product by a named manufacturer having equivalent or superior characteristics to the specified Product and meeting the requirements of the Contract Documents.
   2. If the specified Product is not selected, submit Product Data to substantiate compliance of proposed Product with specified requirements.
   3. The specified Product establishes the required standard of quality.

D. Products specified by naming one or more Products followed by "or approved substitute" or similar statement:
   1. Submit a substitution request under provisions of Section 01 2500 for Products not listed.
   2. The specified Product establishes the required standard of quality.

E. Products specified by naming one or more Products or manufacturers followed by the statement "Substitutions: Under provisions of Division 01":
   1. Submit a substitution request under provisions of Section 01 2500 for Products not listed.
   2. The specified Product establishes the required standard of quality.

F. Products specified by naming one Product followed by the statement "Substitutions: Not permitted": Substitutions will not be allowed.

G. Products specified by required performance or attributes, without naming a manufacturer or Product:
   1. Select any Product meeting specified requirements.
   2. Submit Product Data to substantiate compliance of proposed Product with specified requirements.

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

END OF SECTION

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SECTION 01 7329

CUTTING AND PATCHING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Requirements and limitations for cutting and patching of work.

B. Related sections:
   1. Section 01 2500 - Substitution Procedures.

1.2 SUBMITTALS

A. Submit written request in advance of executing cutting or alteration that affects:
   1. Work of Owner or separate contractor.
   2. Structural integrity of project.
   3. Integrity or effectiveness of weather exposed or moisture resistant elements or systems.
   4. Efficiency, operational life, maintenance, or safety of operational elements.
   5. Visual qualities of sight exposed elements.

B. Include in Request:
   1. Identification of project.
   2. Description of work affected.
   3. Necessity for cutting or patching.
   4. Effect of cutting or patching on work of Owner or separate contractor, or on structural, weatherproof, or visual integrity of project.
   5. Description of proposed work:
      a. Scope of cutting and patching.
      b. Subcontractor and trades to execute work.
      c. Products proposed to be used.
      d. Extent of refinishing.
   6. Alternate to cutting and patching.
   7. Cost proposal, if applicable.
   8. Written permission of any separate contractor whose work will be affected.

C. If conditions of work or schedule necessitate a change of material from that originally installed, submit substitution request in accordance with Section 01 2500.

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

3.1 PREPARATION

A. Examine existing conditions of work, including elements subject to movement or damage during cutting and patching.

B. After uncovering work, examine conditions affecting installation of new products or performance of work.

C. Provide protection for other portions of project.

D. Provide protection from elements.

3.2 CUTTING AND PATCHING

A. Execute cutting to include excavating, fitting, and patching of Work required to:
   1. Make several parts fit properly.
   2. Uncover work to provide for installation of ill timed work.
   3. Remove and replace defective work.
   4. Remove and replace work not conforming to requirements of Contract Documents.
   5. Provide routine penetrations of nonstructural surfaces for installation of piping and electrical conduit.

B. Execute fitting and adjustment of products to provide finished installation to comply with specified tolerances, and finishes.

C. Execute cutting and demolition by methods that will prevent damage to other work, and will provide proper surfaces to receive installation of repairs and new work.

D. Execute excavating and backfilling by methods that will prevent damage to other Work, and will prevent settlement.

E. Employ original installer or fabricator to perform cutting and patching for:
   1. Weather exposed or moisture resistant elements.
   2. Sight exposed finished surfaces.

F. Restore work that has been cut or removed; install new products to provide completed Work in accordance with requirements of Contract Documents.

G. Refinish entire surfaces as necessary to provide an even finish:
   1. Continuous surfaces: To nearest intersections.
   2. Assembly: Refinish entirely.

END OF SECTION

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SECTION 01 7700

CLOSEOUT PROCEDURES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Closeout procedures.
   2. Final cleaning.
   3. Adjusting.
   4. Project record documents.
   5. Operation and maintenance data.
   6. Warranties.
   7. Spare parts and maintenance materials.
   8. Starting of systems.
   9. Demonstration and instructions.

1.2 CLOSEOUT PROCEDURES

A. Final Inspection:
   1. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with the Contract Documents and ready for Architect's inspection.
   2. If Architect performs reinspection due to failure of Work to comply with claims of status of completion made by Construction Manager, Owner will compensate Architect for such additional services and will deduct the amount of such compensation from final payment to Construction Manager.

B. Submit final Application for Payment showing original Contract Sum, adjustments, previous payments and sum remaining due.

C. Closeout Submittals:
   1. Evidence of compliance with requirements of governing authorities.
   2. Certificate of Occupancy.
   3. Project Record Documents.
   4. Operation and Maintenance Data.
   5. Warranties.
   6. Keys and keying schedule.
   7. Spare parts and maintenance materials.
   8. Evidence of payment of Subcontractors and suppliers.
   9. Final lien waiver.
   10. Certificate of insurance for products and completed operations.
   11. Consent of Surety to final payment.

D. Owner will occupy all portions of the building as specified in Section 01 1100.

1.3 FINAL CLEANING

A. Execute final cleaning prior to final inspection.

B. Clean surfaces exposed to view:
   1. Clean glass.
   2. Remove temporary labels, stains and foreign substances.
   3. Polish transparent and glossy surfaces.
   4. Vacuum carpeted surfaces; damp mop hard surface flooring.

C. Clean equipment and fixtures to a sanitary condition.

D. Clean or replace filters of operating equipment.

E. Clean debris from roofs and drainage systems.

F. Clean site; sweep paved areas, rake clean landscaped surfaces.

G. Remove waste and surplus materials, rubbish, and construction facilities from the site.

1.4 ADJUSTING

A. Adjust operating Products and equipment to ensure smooth and unhindered operation.

1.5 PROJECT RECORD DOCUMENTS

A. Maintain following record documents on site; 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. Material Safety Data Sheets.

B. Store Record Documents separate from documents used for construction.

C. Record information concurrent with construction progress.

D. Make entries neatly and accurately.

E. Label each set or volume with title "PROJECT RECORD DOCUMENTS", project title, and description of contents.
   1. Organize contents according to Project Manual table of contents.
   2. Provide table of contents for each volume.

F. Drawings: Mark each item to record actual construction including:
   1. Measured depths of foundations in relation to finish 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 Drawings.

G. Specifications: Mark 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.

H. Shop Drawings: Mark each item to record actual construction including:
   1. Field changes of dimension and detail.
   2. Details not on original Shop Drawings.

I. Submit two copies.

1.6 OPERATION AND MAINTENANCE DATA

A. Identify as "OPERATION AND MAINTENANCE INSTRUCTIONS" and title of project.

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B. Contents:
   1. Directory: List names, addresses, and telephone numbers of Architect, Construction Manager, Subcontractors, and major equipment suppliers.
   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. Project documents and certificates including:
      a. Shop drawings and product data.
      b. HVAC balance reports.
      c. Certificates.
      d. Copies of warranties and bonds.

C. Submittal:
   1. Submit three copies at least 15 days prior to final inspection.
   2. Architect will notify Construction Manager of any required revisions after final inspection.
   3. Revise content of documents as required prior to final submittal.
   4. Submit three copies of revised documents within 10 days after final inspection.

1.7 WARRANTIES

A. Execute and assemble documents from Subcontractors, suppliers, and manufacturers.

B. Include Table of Contents.

C. Submit electronically in Adobe PDF format along with final Application for Payment.

D. For items of Work delayed beyond date of Substantial Completion, provide updated submittal within 10 days after acceptance, listing date of acceptance as start of warranty period.

1.8 SPARE PARTS AND MAINTENANCE MATERIALS

A. Provide products, spare parts, maintenance and extra materials in quantities specified in individual specification Sections.

B. Deliver to Project site in location as directed; obtain receipt prior to final payment.

1.9 STARTING OF SYSTEMS

A. Notify Owner and Architect at least seven days prior to startup of each system or piece of equipment.

B. Prior to beginning startup verify that:
   1. Lubrication has been performed.
   2. Drive rotation, belt tension, control sequences, tests, meter readings, and electrical characteristics are within manufacturer's requirements.
   3. Utility connections and support components are complete and tested.

C. Execute start-up under supervision of applicable manufacturer's representative or Construction Manager personnel in accordance with manufacturers' instructions.

D. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to startup, and to supervise placing equipment or system in operation.

E. Submit written report that equipment or system has been properly installed and is functioning correctly.

1.10 DEMONSTRATION AND INSTRUCTIONS

A. Demonstrate operation and maintenance of Products to Owner's personnel two weeks prior to date of Substantial Completion.

B. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

C. Utilize Operation and Maintenance Manuals as basis for instruction. Review contents of manual with Owners' personnel in detail to explain all aspects of operation and maintenance.

D. Demonstrate startup, operation, control, adjustment, troubleshooting, servicing, maintenance, and shutdown of each item of equipment at agreed upon times, at equipment location.

E. Prepare and insert additional data in Operation and Maintenance Manuals when need for additional data becomes apparent during instruction.

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

END OF SECTION

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SECTION 02 2010

SITE PREPARATION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Clearing and protection of vegetation.
2. Removal of existing debris.
3. Disconnection and capping of utilities
4. Demolition of walks, paving, curbs, gutters, and site improvements.
5. Removal of materials from site.

B. Related Sections:

1. Section 01 1100 - Summary: Limitations on Contractor's use of site and premises.
2. Section 01 5000 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.

1.2 REFERENCES

A. 29 CFR 1926 - U.S. Occupational Safety and Health Standards; current edition.

B. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2000.

1.3 SUBMITTALS

A. Submittals for Review:

1. Demolition procedures and operational sequence.

B. Site Plan: Showing:

1. Vegetation removal limits.
2. Areas for temporary construction and field offices.
3. Areas for temporary and permanent placement of removed materials.

C. Quality Control Submittals: Submit prior to beginning demolition:

1. Certificates of severance of utility services.
2. Permit for transportation and disposal of debris.

1.4 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 of closing of streets, sidewalks, or other public places.

C. Minimize production of dust due to construction operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

PART 2 PRODUCTS

2.1 MATERIALS

A. Fill Material: As specified in Civil Engineering Spec.

PART 3 EXECUTION

3.1 EXISTING UTILITIES

A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.

B. Protect existing utilities to remain from damage.

C. Do not disrupt public utilities without permit from authority having jurisdiction.

D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.

E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner.

F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.

G. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.

H. Remove all curbs, paving, asphalt, flatwork, where shown on plans. Remove and dispose of properly.

3.2 VEGETATION

A. Scope: Remove trees, shrubs, brush, and stumps in areas to be covered by building structure, paving, playing fields, lawns, and planting beds. Refer to Site Plan for trees to be removed or relocated.

B. Install substantial, highly visible fences at least 3 feet high to prevent inadvertent damage to vegetation to remain:

1. At vegetation removal limits.

2. Around trees to remain within vegetation removal limits; locate no closer to tree than at the drip line.

C. In areas where vegetation must be removed but no construction will occur other than pervious paving, remove vegetation with minimum disturbance of the subsoil.

D. Vegetation Removed: Do not burn, bury, landfill, or leave on site, except as indicated.

1. Chip, grind, crush, or shred vegetation for mulching, composting, or other purposes; preference should be given to on-site uses.
2. Trees: Remove stumps and roots to depth of 18 inches.
3. Existing Stumps: Treat as specified for other vegetation removed; remove stumps and roots to depth of 18 inches.
4. Sod: Re-use on site if possible.
5. Fill holes left by removal of stumps and roots, using suitable fill material, with top surface neat in appearance and smooth enough not to constitute a hazard to pedestrians.

E. Dead Wood: Remove all dead trees (standing or down), limbs, and dry brush on entire site; treat as specified for vegetation removed.

F. Restoration: If vegetation outside removal limits or within specified protective fences is damaged or destroyed due to subsequent construction operations, replace at no cost to Owner.

3.3 DEBRIS

A. Remove debris, junk, and trash from site.

3.4 MATERIAL DISPOSAL

A. Remove from site all materials not to be reused on site; do not burn or bury. Dispose off-site legally.

B. Leave site in clean condition, ready for subsequent work.

C. Clean up spillage and wind-blown debris from public and private properties.

END OF SECTION

SECTION 03 33 00
CONCRETE PLACEMENT

I. GENERAL:

Furnish equipment, labor, materials. Convey and place consolidated concrete. Refer to Civil Specifications Section 03100 for Concrete Formwork.

II. PRECAUTIONS:

1. Place no concrete until form, screeds, reinforcement, and conditions are approved; pipes, conduits, sleeves, thimbles, hangers, anchors, flashing, and other required work have been properly installed; forms properly cleaned.

2. Place no concrete when temperature is below 40 degrees or below 50 degrees and falling.

3. Remove hardened concrete, foreign materials from surfaces of conveying equipment, thoroughly wet forms, and remove debris before deposition of concrete.

4. Remove water from space to be occupied by concrete, pump to remove continuous flow.

III. PLACING CONCRETE:

1. Handle concrete and deposit in forms as rapidly as possible by methods which prevent segregation or loss of ingredients and avoid inclusion of foreign matter.

2. Place concrete, as nearly as practicable, in its final position.

3. Consolidate concrete immediately after placing by spading or mechanical vibration to insure contact with forms and embedded items. Tamp slab surfaces with suitable tools to force coarse aggregate away from surface.

4. Rate and method of placing shall be such that concrete between construction joints is placed in one continuous operation. Location and type of construction joints to be as approved or as shown on Drawings.

IV. CONTRACTOR'S RESPONSIBILITIES:

Contractor shall provide materials and placement of required items in order to eliminate barriers to the physically handicapped. The General Contractor shall direct any question about the handicap requirements to the Architect. Contractor shall verify any A.D.A. and Texas Accessibility Standard requirements and locations with the Architect prior to installation.

SECTION 03 33 20

CONCRETE REINFORCEMENT

I. PART 1 GENERAL

A. SECTION INCLUDES

1. Reinforcing steel bars and accessories for cast-in-place concrete.

B. RELATED SECTIONS

1. Section 03100 - Concrete Formwork.

2. Section 03300 - Cast-in-Place Concrete.

C. REFERENCES

1. TxDOT 2004 Standard Specifications, Item 440 - Reinforcing Steel.

2. ASTM A615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement.

3. ACI 318-83 - Building Code Requirements for Reinforced Concrete.

D. QUALITY ASSURANCE

1. Owner will engage a testing and inspection service for quality control testing during construction.

E. COORDINATION

1. Coordinate with placement of formwork, formed openings and other Work.

II. PART 2 PRODUCTS

A. REINFORCEMENT

1. Reinforcing Steel Plain Bar and Rod Mats: ASTM A704, ASTM A615, Grade 40 or 60; steel bars or rods, unfinished.

2. Stirrup Steel: ASTM A82, unfinished.

B. ACCESSORY MATERIALS

1. Tie Wire: Minimum 16 gage, annealed type.

2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions including load bearing pad on bottom to prevent vapor barrier puncture.

C. FABRICATION

1. Fabricate concrete reinforcing in accordance with TxDOT Standard Specification Item 440 - Reinforcing Steel.

III. PART 3 EXECUTION

A. PLACEMENT

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

2. Do not displace or damage vapor barrier.

3. Accommodate placement of formed openings.

4. Maintain concrete cover around reinforcement as follows:

Condition	Concrete Cover
Concrete not exposed to earth and weather	1.5 inches
Concrete exposed to earth and weather	2.0 inches
Concrete cast against and permanently exposed to earth	3.0 inches

B. FIELD QUALITY CONTROL

1. Inspect reinforcement to ensure that work is in accordance with design, and that supports, ties, and items are secure.

2. Notify Engineer and Owner 48 hours to inspect work prior to placing concrete.

END OF SECTION

SECTION 03 33 30

CAST-IN-PLACE CONCRETE

I. GENERAL:

Furnish concrete materials and equipment required to deliver concrete as specified below and shown on Drawings.

II. MATERIALS:

1. Portland Cement: ASTM Specifications C150-49 of Air-Entraining Portland Cement C175-48T. Use Type IIIA where high early strength concrete is designated and Type I or IA for all other concrete work.

2. Coarse Aggregate: Hard, durable, uncoated crushed stone or gravel conforming to ASTM Specifications C33-40. Maximum size aggregate allowed is 1-1/2", 1/5 of narrowest dimension between forms of the concrete member, or 3/4 of minimum clean space between reinforcing bars.

3. Sand: Clean, hard, durable, uncoated grains free from silt, loam, or clay. Grade in size from fine to coarse with 95% to 100% passing (by weight) No. 4 sieve; 45% to 70% passing No. 16 sieve; 15% to 30% passing No. 50 sieve; and 3% to 8% passing No. 100 sieve.

4. Mixing water shall be clean and free from oil, acid, and injurious amounts of vegetable matters, alkalis, and other salts.

5. Admixture: "PSI" as manufactured by Gifford-Hill Co., or equal. Mix according to manufacturer's recommendations. Include all structural concrete.

III. STRENGTH, PROPORTIONS, AND MIXES OF CONCRETE:

1. See Structural Drawings for type and strength of concrete. All concrete shall have a minimum 3,000 psi compressive strength at 28 days unless noted otherwise.

2. Proportions of cement, aggregate, and water to attain required plasticity and minimum compressive strength shall be determined by laboratory design for materials to be used.

3. Contractor shall obtain and pay for laboratory designed mixes.

4. Workability of concrete shall be such that concrete can be handled, placed, and worked into angles and corners of forms, around reinforcing steel and inserts without segregation and without water and fine material rising to surface.

5. Use method of measuring water and aggregate so as to secure specified proportions in each batch, and in a manner that proportion of water to cement can be closely controlled and easily checked at any time.

6. Concrete shall be mixed until there is a uniform distribution of materials throughout the mass and discharged completely before recharging. Mixer shall be rotated at speed recommended by manufacturer and continued for at least one minute after all materials are in mixer.

7. Transit-mixed concrete shall conform to ASTM Specification C-94, latest edition, revised to date.

IV. CONCRETE CONTROL TESTS:

1. Make test cylinders from concrete mixed and at the direction of Architect/Engineer. A minimum of three (3) test cylinders shall be made for each pour.

2. Test Specimen: Shall be taken and tested by an approved testing laboratory, in accordance with ASTM Specifications for Compression Test of Concrete. Crush one (1) test cylinder at seven days and two (2) at twenty-eight days. Concrete tested which falls below the strength specified shall be removed at the expense of Contractor.

3. Make slump test for each set of cylinders. Only concrete within the following slump limits will be placed:

	Slump in Inches	
	Max.	Min.
Slabs, Walls, Beams	5	4
Footings and piers	5	4

Slump: Determined with a standard slump cone in accordance with ASTM Recommendations by an approved testing company.

4. Laboratory reports shall include:

A. Date of pour

B. Location of pour, so that identified on Plans

C. By whom cylinders taken, including name of individual

D. Slump

E. Temperature

F. Results of compression test

5. Distribution of Test Results: One copy to Structural Engineer and one copy to Architect. Test results which do not include above information are not acceptable, unless accompanied by letter explaining reason for non-compliance.

END OF SECTION

SECTION 04100 - MORTAR

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Mortar and grout for masonry.

1.02 RELATED SECTIONS

A. Section 01410 - Testing Laboratory Services: Testing laboratory services.

B. Section 04300 - Unit Masonry System: Installation of mortar and grout.

C. Section 08112 - Standard Steel Frames: Grouting steel door frames.

1.03 REFERENCES

A. ACI 530 - Building Code Requirements for Masonry Structures.

B. ACI 530.1 - Specifications For Masonry Structures.

C. ASTM C144 - Aggregate for Masonry Mortar.

D. ASTM C150 - Portland Cement.

E. ASTM C207 - Hydrated Lime for Masonry Purposes.

F. ASTM C270 - Mortar for Unit Masonry.

G. ASTM C404 - Aggregates for Masonry Grout.

H. ASTM C476 - Grout for Masonry.

I. ASTM C780 - Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.

J. ASTM C1019 - Method of Sampling and Testing Grout.

1.04 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Include design mix, indicate whether the Proportion or Property specification of ASTM C270 is to be used, required environmental conditions, and admixture limitations.

C. Samples:
   1. Submit samples showing manufacturers range of colors for Architect’s selection.
   2. After selection of color by Architect, submit three (3) samples of selected dye mixed with mortar to show final color of mortar.

D. Reports: Submit reports on mortar indicating conformance of mortar to property requirements of ASTM C270 and test and evaluation reports to ASTM C780.

E. Reports: Submit reports on grout indicating conformance of component grout materials to requirements of ASTM C476 and test and evaluation reports to ASTM C1019.

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 530 and ACI 530.1.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect, and handle products to site under provisions of Section 01600.

B. Maintain packaged materials clean, dry, and protected against dampness, freezing, and foreign matter.

1.07 ENVIRONMENTAL REQUIREMENTS

A. Maintain materials and surrounding air temperature to minimum 50 degrees F prior to, during, and 48 hours after completion of masonry work.

B. Maintain materials and surrounding air temperature to maximum 90 degrees F (32 degrees C) prior to, during, and 48 hours after completion of masonry work.

PART 2 PRODUCTS: Refer to drawings for additional flashing products and details at masonry.

2.01 MATERIALS

A. Portland Cement, exposed or clear finished masonry: ASTM C150, Type I, color as approved by architect from manuf. standard range of colors. Provide Alamo brand mortar and provide **"Dry Block"** moisture control additive (as per Acme Brick).

B. Mortar Aggregate, exposed, or clear finished masonry: ASTM C144, color as approved by architect.

C. Hydrated Lime: ASTM C207, Type S.

E. Water: Clean and potable.

2.02 MORTAR MIXING

A. Thoroughly mix mortar ingredients in accordance with ASTM C270 in quantities needed for immediate use.

B. Add mortar color in accordance with manufacturer's instructions, if required. Provide uniformity of mix and coloration.

C. Maintain sand uniformly damp immediately before the mixing process.

D. Do not use anti-freeze compounds to lower the freezing point of mortar.

E. If water is lost by evaporation, re-temper only within two hours of mixing.

F. Use mortar within two hours after mixing at temperatures of 90 degrees F, or two-and-one-half hours at temperatures under 50 degrees F.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install mortar and grout in accordance with manufacturer's instructions. Provide tooled joints in Running Bond pattern.

B. Work grout into masonry cores and cavities to eliminate voids. Provide foamed insulation at cores as per drawings.

C. Do not install grout in lifts greater than 24 inches without consolidating grout by rodding.

D. Do not displace reinforcement while placing grout.

E. Remove excess mortar from grout spaces.

END OF SECTION

SECTION 04810 UNIT MASONRY ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Concrete Block.

C. Reinforcement and Anchorage.

D. Flashings.

E. Lintels.

F. Accessories.

1.02 RELATED SECTIONS

A. Section 03300 – Cast-in-Place Concrete: Reinforcing steel for grouted masonry.

B. Section 04065 - Mortar and Masonry Grout.

C. Section 07900 - Joint Sealers: Backing rod and sealant at control and expansion joints.

D. Section 09900 – Paints and Coatings: Stains and sealers on CMU block.

1.03 REFERENCES

A. ACI 530/ASCE 5/TMS 402 - Building Code Requirements for Masonry Structures; American Concrete Institute International; 1999.

B. ACI 530.1/ASCE 6/TMS 602 - Specification For Masonry Structures; American Concrete Institute International; 1999.

C. ASTM A 82 - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement; 1997a.

D. ASTM A 153/A 153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2000.

E. ASTM C 67 - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile; 2000.

F. ASTM C 129 - Standard Specification for Nonloadbearing Concrete Masonry Units; 2000a.

G. ASTM C 216 - Standard Specification for Facing Brick (Solid Masonry Units Made From Clay or Shale); 2000.

H. ASTM C 780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry; 2000.

I. ASTM D 226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing; 1997a.

1.04 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data for masonry units, fabricated wire reinforcement, and mortar.

C. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

A. Comply with provisions of ACI 530/ASCE 5/TMS 402 and ACI 530.1/ASCE 6/TMS 602, except where exceeded by requirements of the contract documents.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

1.07 ENVIRONMENTAL REQUIREMENTS

A. Maintain materials and surrounding air temperature to minimum 40 degrees F prior to, during, and 48 hours after completion of masonry work.

B. Maintain materials and surrounding air temperature to maximum 90 degrees F prior to, during, and 48 hours after completion of masonry work.

1.08 EXTRA MATERIALS

A. See Section 01600 - Product Requirements, for additional provisions.

B. Provide 50 of each size, color, and type of face brick units for Owner's use in maintenance of project.

PART 2 PRODUCTS

2.01 CONCRETE MASONRY UNITS

A. Concrete Block: Comply with referenced standards and as follows:
   1. Size: Standard units with nominal face dimensions of 16 x 8 inches and nominal depths as indicated on the drawings for specific locations.
   2. Integral colored split face block with split face on exterior side. Provide **Dry Block** type units as per Acme Brick, typical.
   3. Color: Featherlite, Western Gold
   4. Lightweight aggregate
   3. Special Shapes: Provide non-standard blocks configured for corners.
   4. Loadbearing Units

2.02 GLAZED BRICK ACCENT UNITS

A. Manufacturer:
   1. Elgin Butler
      Field Two: #4340 Rainforest Green

   2. Substitutions: Under provisions of Section 01600.

2.03 MORTAR AND GROUT MATERIALS

A. Mortar and grout: As specified in Section 04065.

2.04 REINFORCEMENT AND ANCHORAGE

A. Manufacturers of Joint Reinforcement and Anchors:
   1. Dur-O-Wal: www.dur-o-wal.com.
   2. Heckmann Building Products, Inc.: www.heckmannbuildingprods.com.
   3. Hohmann & Barnard, Inc.: www.h-b.com.
   4. Masonry Reinforcing Corporation of America: www.wirebond.com.
   5. Substitutions: See Section 01600 - Product Requirements.

B. Reinforcing Steel: size as indicated on drawings; uncoated finish.

C. Single Wythe Joint Reinforcement: Truss type; ASTM A 82 steel wire, hot dip galvanized after fabrication to ASTM A 153/A 153M, Class B; 0.1483 inch side rods with 0.1483 inch cross rods; width as required to provide not more than 1 inch and not less than 1/2 inch of mortar coverage on each exposure.

2.05 FLASHINGS

A. As shown on drawings.

B. Lap Sealant: Butyl type as specified in Section 07900.

2.06 ACCESSORIES

A. Preformed Control Joints: Rubber material. Provide with corner and tee accessories, fused joints.
   1. Manufacturers:
      a. Dur-O-Wal: www.dur-o-wal.com.
      b. Heckmann Building Products, Inc: www.heckmannbuildingprods.com.
      c. Hohmann & Barnard, Inc: www.h-b.com.
      d. Substitutions: See Section 01600 - Product Requirements.

B. Joint Filler: Closed cell polyvinyl chloride; oversized 50 percent to joint width; self expanding; maximum lengths available.
   1. Manufacturers:
      a. Dur-O-Wal: www.dur-o-wal.com.
      b. Hohmann & Barnard, Inc: www.h-b.com.
      c. Substitutions: See Section 01600 - Product Requirements.

F. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive masonry.

B. Verify that related items provided under other sections are properly sized and located.

C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.02 PREPARATION

A. Direct and coordinate placement of metal anchors supplied for installation under other sections.

B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.03 COURSING

A. Establish lines, levels, and coursing indicated. Protect from displacement.

B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

C. Concrete Masonry Units:
   1. Bond: Running.
   2. Coursing: One unit and one mortar joint to equal 8 inches.
   3. Mortar Joints: Concave.

D. Note that 4 x 8 x 16” units will be placed behind glazed brick accent bricks, typical.

3.04 PLACING AND BONDING

A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.

B. Lay hollow masonry units with face shell bedding on head and bed joints.

C. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.

D. Remove excess mortar as work progresses.

E. Interlock intersections and external corners, except for units laid in stack bond.

F. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.

G. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

H. Isolate top joint of masonry partitions from horizontal structural framing members and slabs or decks with compressible joint filler.

3.06 REINFORCEMENT AND ANCHORAGE - GENERAL

A. Unless otherwise indicated on drawings or specified under specific wall type, install horizontal joint reinforcement 16 inches on center.

B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.

C. Place continuous joint reinforcement in first and second joint below top of walls.

D. Lap joint reinforcement ends minimum 6 inches.

E. Fasten anchors to structural framing and embed in masonry joints as masonry is laid. Unless otherwise indicated on drawings or closer spacing is indicated under specific wall type, space anchors at maximum of 36 inches horizontally and 24 inches vertically.

3.07 REINFORCEMENT AND ANCHORAGE - SINGLE WYTHE MASONRY

A. Install horizontal joint reinforcement 16 inches on center.

B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.

C. Place continuous joint reinforcement in first and second joint below top of walls.

D. Lap joint reinforcement ends minimum 6 inches.

3.08 MASONRY FLASHINGS: Refer to drawings.

A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.
   1. Extend flashings full width at such interruptions and at least 4 inches into adjacent masonry or turn up at least 4 inches to form watertight pan at non-masonry construction.
   2. Remove or cover protrusions or sharp edges that could puncture flashings.

B. Extend metal flashings to within 1/4 inch of exterior face of masonry.

C. Lap end joints of flashings at least 4 inches and seal watertight with mastic or elastic sealant.

3.09 LINTELS: Refer to drawings

3.10 GROUTED COMPONENTS

A. Lap splices minimum 24 bar diameters.

B. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.

C. Place and consolidate grout fill without displacing reinforcing.

3.11 CONTROL AND EXPANSION JOINTS

A. Do not continue horizontal joint reinforcement through control joints.

B. Form control joint with a sheet building paper bond breaker fitted to one side of the hollow contour end of the block unit. Fill the resultant core with grout fill. Rake joint at exposed unit faces for placement of backer rod and sealant.

C. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.

D. Size control joint in accordance with Section 07900 for sealant performance.

3.12 BUILT-IN WORK

A. As work progresses, install built-in metal door frames and other items to be built into the work and furnished under other sections.

B. Install built-in items plumb, level, and true to line.

C. Bed anchors of metal door frames in adjacent mortar joints. Fill frame voids solid with grout.

3.13 TOLERANCES

A. Maximum Variation from Alignment of Columns: 1/4 inch.

B. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.

C. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.

D. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.

E. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.

F. Maximum Variation of Joint Thickness: 1/8 inch in 3 ft.

G. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.

3.14 CLEANING

A. Remove excess mortar and mortar smears as work progresses.

B. Replace defective mortar. Match adjacent work.

C. Clean soiled surfaces with cleaning solution.

D. Use non-metallic tools in cleaning operations.

3.15 PAINTING

A. Seal concrete block in accordance with Section 09900..

3.16 PROTECTION OF FINISHED WORK

A. Without damaging completed work, provide protective boards at exposed external corners which are subject to damage by construction activities.

END OF SECTION

SECTION 05210

STEEL JOISTS

1 PART 1 GENERAL

1.1 SECTION INCLUDES

A. Open web steel joists and, with bridging, attached seats and anchors.

B. Loose bearing plates and anchor bolts for site placement.

C. Framed floor and roof openings greater than 18 inches.

1.2 RELATED SECTIONS

A. Section 05120 - Structural Steel

B. Section 05311 - Steel Roof Deck

C. Section 05500 - Metal Fabrications

1.3 REFERENCES

A. ASTM A36/A36M - Structural Steel.

B. ASTM A108 - Steel Bars, Carbon, Cold-Finished, Standard Quality.

C. ASTM A123 - Zinc (Hot Dipped Galvanized) Coatings on Iron and Steel Products.

D. ASTM A153 - Zinc Coating (Hot Dip) on Iron and Steel Hardware.

E. ASTM A307 - Carbon Steel Threaded Standard Fasteners.

F. ASTM A325 - High Strength Bolts for Structural Steel Joints.

G. AWS D1.1 - Structural Welding Code.

H. FM - Roof Assembly Classifications.

I. SJI (Steel Joist Institute) - Specifications, Load tables, and Weight Tables for Steel Joists and Joist Girders.

J. SSPC (Steel Structures Painting Council) - Steel Structures Painting Manual.

K. UL - Fire Resistance Directory.

1.4 SUBMITTALS FOR REVIEW

A. Section 01300 - Submittals: Procedures for submittals.

B. Shop Drawings:
   1. Indicate standard designations, configuration, sizes, spacing, locations of joists, joist leg extensions.
   2. Joist coding, bridging, and connections, attachments.
   3. Cambers.

1.5 SUBMITTALS FOR INFORMATION

A. Section 01300 - Submittals: Procedures for submittals.

B. Welders' Certificates: Submit manufacturer's certificates, certifying welders employed on the Work, verifying AWS qualification within the previous 12 months.

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with SJI, Load Tables, and Weight Tables, including headers and other supplementary framing.

B. Maintain one copy of each document on site.

C. Fabricator: Company specializing in performing the work of this section with minimum two years documented experience.

D. Erector: Company specializing in performing the work of this section with minimum two years documented experience.

E. Design connections not detailed on the Drawings under direct supervision of a Professional Engineer experienced in design of this work and licensed in the State of Texas.

1.7 DELIVERY, STORAGE, AND PROTECTION

A. Section 01600 - Material and Equipment: Transport, handle, store, and protect products and to SJI requirements.

2 PART 2 PRODUCTS

2.1 MATERIALS

A. Open Web Joists Members: SJI Type K, LH Longspan, DLH Deep Longspan, or Joist Girders as called for on the plans.

B. Anchor Bolts, Nuts and Washers: ASTM A325.

C. Shear Stud Connectors: ASTM A108 Grade.

D. Structural Steel For Supplementary Framing and Joist Leg Extensions: ASTM A36.

E. Welding Materials: AWS D1.1; type required for materials being welded.

F. Shop and Touch-Up Primer: SSPC 15, Type 1, red oxide.

G. Touch-Up Primer for Galvanized Surfaces: SSPC 20 Type I B Inorganic.

2.2 FABRICATION

A. Provide bottom and top chord extensions as indicated.

B. Fabricate to achieve end bearing of:
   1. 2-1/2 inches on steel
   2. 4 inches on masonry.

C. Drill holes in chords necessary for attachment of wood nailers or weld threaded lugs to chords for attachment of wood nailers as required.

D. Frame special sized openings in joist web framing as detailed.

E. Space stud shear connectors at inches.

2.3 FINISH

A. Prepare joist component surfaces in accordance with SSPC SP 2.

B. Shop prime joists. Do not prime surfaces that will be fireproofed, field welded, or in contact with concrete.

3 PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01039 - Coordination and Meetings: Verification of existing conditions prior to beginning work.

3.2 ERECTION

A. Erect and bear joists on supports.

B. Allow for erection loads. Provide sufficient temporary bracing to maintain framing safe, plumb, and in true alignment.

C. Coordinate placement of anchors in concrete or masonry construction for securing bearing plates or angles.

D. After joist alignment and installation of framing, field weld joist seat to bearing plates or angles.

E. Position and field weld joist chord extensions and wall attachments as required.

F. Frame floor and roof openings greater than 18 inches with supplementary framing.

G. Do not permit erection of decking until joists are braced bridged, and secured or until completion of erection and installation of permanent bridging and bracing.

H. Do not field cut or alter structural members without approval of joist manufacturer.

I. After erection, prime welds, abrasions, and surfaces not shop primed except surfaces to be in contact with concrete or fireproofed.

3.3 ERECTION TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch.

B. Maximum Offset From True Alignment: 1/4 inch.

3.4 FIELD QUALITY CONTROL

A. Section 01400 - Quality Assurance: Field inspection, and testing of welds.

END OF SECTION

SECTION 05 5000

METAL FABRICATIONS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Shop fabricated metal components.

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

1.2 REFERENCES

A. American Architectural Manufacturers Association (AAMA):
   1. 611 - Voluntary Specification for Anodized Architectural Aluminum.
   2. 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Architectural Extrusions and Panels.
   3. 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Architectural Extrusions and Panels.
   4. 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Architectural Extrusions and Panels.

B. American Welding Society (AWS):
   1. D1.1 - Structural Welding Code - Steel.
   2. D1.2 - Structural Welding Code - Aluminum.
   3. D1.6 - Structural Welding Code - Stainless Steel.

C. ASTM International (ASTM):
   1. A36/A36M - Standard Specification for Carbon Structural Steel.
   2. A47/A47M - Standard Specification for Ferritic Malleable Iron Castings.
   3. A48/A48M - Standard Specification for Gray Iron Castings.
   4. A108 - Standard Specification for Steel Bars, Carbon, Cold-Finished, Standard Quality.
   5. A123/A123M - Standard Specification for Zinc (Hot-Galvanized) Coatings on Iron and Steel Products.
   6. A283 - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates, Shapes and Bars.
   7. A307 - Standard Specification for Carbon Steel Externally Threaded Standard Fasteners.
   8. A354 - Standard Specification for Quenched and Tempered Alloy Steel Bolts, Studs, and Other Externally Threaded Fasteners.
   9. A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
   10. A501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
   11. A510 - Standard Specification for General Requirements for Wire Rods and Coarse Round Wire, Galvanized Steel.
   12. A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
   13. A780 - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
   14. A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
   15. A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength, Low-Alloy and High-Strength Low-Alloy with Improved Formability.
   16. B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
   17. B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

18. B241 - Standard Specification for Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube.
19. E985 - Standard Specification for Permanent Metal Railing Systems and Rails for Buildings.

D. National Association of Architectural Metal Manufacturers (NAAMM):
1. AMP 503 - Finishes for Stainless Steel.
2. MBG 531 - Metal Bar Grating Manual.

E. Society for Protective Coatings (SSPC) - Painting Manual.

1.3 SYSTEM DESCRIPTION

A. Minimum design loads:
1. Pedestrian loading:
a. Uniform load of 100 PSF.
b. Concentrated load of 300 pounds.
c. Maximum deflection under loading: [L/180.] [L/240.]
2. Vehicular loading:
a. Uniform load of [00 PSF.
b. Concentrated load of 2000 pounds.
c. Maximum deflection under loading: L/240.
3. Guard rails and handrails:
a. 50 pounds per linear foot applied in any direction at top, transferred via attachments and supports to building structure.
b. Concentrated 200 pound load applied in any direction at any point along top, transferred via attachments and supports to building structure.
c. Maximum deflection under loading: L/120.
4. Concentrated and uniform loads do not need to be applied simultaneously.
5. Perform design under direct supervision of Professional Structural Engineer licensed in State in which Project is located, with minimum 2 years experience in work of this Section.

B. Fabricate guard rails and handrails in accordance with ASTM E985.

1.4 SUBMITTALS

A. Submittals for Review:
1. Shop Drawings: Show dimensions, metal thicknesses, finishes, joints, attachments, and relationship of work to adjacent construction.

B. Quality Control Submittals:
1. Certificate of Compliance from Professional Structural Engineer performing system design.

1.5 QUALITY ASSURANCE

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

B. Mockup:
1. Provide mockup of railing at mezzanine.
2. Size: one bay
3. Locate where directed.
4. Approved mockup may remain as part of the Work.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:
1. Design Basis: Contract Documents are based on products by Ventaire Awning or AMA Manufacturing, San Angelo, Texas.

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B. Substitutions: Under provisions of Division 01.

2.2 MATERIALS - STEEL

A. Shapes: ASTM A36/A36M.

B. Plate: ASTM A283.

C. Checkered Plate: ASTM A1011/A1011M, diamond pattern.

D. Sheet: ASTM A1008/A1008M.

E. Pipe: ASTM A501.

F. Tube: ASTM A500.

G. Bars: ASTM A108.

2.3 MATERIALS - CAST IRON

A. Cast Iron: ASTM A48/A48M, Class 30, or ASTM A47/A47M.

2.4 MATERIALS - ALUMINUM

A. Extrusions: ASTM B221, 6063-T5 alloy and temper.

B. Sheet: ASTM B209, alloy and temper best suited to application.

C. Pipe: ASTM B241, extruded, anodizing quality, 6063 aluminum pipe, Schedule 40.

2.5 MATERIALS - STAINLESS STEEL

A. Stainless Steel: ASTM A666, Type [304] [or] [316], rollable temper.

B. Bolts, Nuts and Washers: ASTM A354.

2.6 MATERIALS - BAR GRATINGS

A. Formed Steel Sheet for Welding: ASTM A1011/A1011M, rectangular shape.

B. Steel Rod for Cross Bars: ASTM A510.

C. Aluminum for Riveting or Pressure Locking: ASTM B221, rectangular shape.

2.7 ACCESSORIES

A. Exposed Screws: Same material as metal being fastened; Phillips flat head, countersunk, unless noted otherwise.

B. Bolts: ASTM A307, hexagonal head type.

C. Primer Paint: SSPC Paint 15, Type 1, red oxide.

D. Anchoring Cement: Non-shrink cementitious type.

2.8 FABRICATION

A. Fit and shop assemble items in largest practical sections, for delivery to site.

B. Fabricate items with joints tightly fitted and secured.

C. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

D. Exposed Mechanical Fastenings: Flush countersunk screws or bolts, unobtrusively located, consistent with design of component except where specifically noted otherwise.

E. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

F. Conceal fastenings where possible.

G. Welding to conform to AWS D1.1.
   1. Use welds for permanent connections where possible. Grind exposed welds smooth.
   2. Tack welds prohibited on exposed surfaces.

H. Whenever different metals come in contact with each other, separate the metals with an approved layer of bituminous coating.

I. Zinc plated fasteners or galvanized metal will not be allowed to secure aluminum or copper. Use copper or aluminum anchors.

J. All exterior ferrous metals shall be hot-dip galvanized after fabrication.

2.9 FINISHES

A. Exterior Ferrous Metal: Galvanized; ASTM A123/A123M, to 1.3 ounces per square foot or per structural engineer.

B. Interior Ferrous Metal:
   1. Shop painted except steel to be encased in concrete and surfaces to be welded.
   2. Surface preparation: SSPC SP2 - Hand Tool Cleaning or SP3 - Power Tool Cleaning.
   3. Application: One coat; follow coating manufacturer's instructions.
   4. Minimum dry film thickness: 2.0 mils.

C. Aluminum: Per Architect.

D. Stainless Steel: NAAMM AMP 503; No. 4 satin.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install items in accordance with approved Shop Drawings.

B. Install components plumb, level, and rigid.

C. Welding: AWS D1.1. Grind and fill exposed welds; finish smooth and flush.

D. Install sleeved components with anchoring cement.

E. Prevent contact of dissimilar metals by use of zinc rich paint, bituminous coating, or non-absorptive gaskets.

3.2 ADJUSTING

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A. Clean and touch up damaged primer paint with same product as applied in shop.

B. Clean and touch up galvanized coatings at welded and abraded surfaces in accordance with ASTM A780, Annex A1.

END OF SECTION

SECTION 06100 - ROUGH CARPENTRY

PART 1 GENERAL

1.01 QUALITY ASSURANCE

A. Lumber Grading Rules and Wood Species in accordance with PS 20.

B. Grade Marks:
   1. Identify lumber and plywood by official grade mark.
   2. Lumber:
      a. Grade mark to contain symbol of grading agency certified by Board of Review, American Lumber Standards Committee, mill number of name, grade of lumber, species or species grouping or combination designation, rules under which graded where applicable and condition of seasoning at time of manufacture.
      b. S - GRN: Unseasoned.
      c. S - Dry: 19% maximum moisture content.
      d. MC-15 or KD: 15% maximum moisture content.
      e. Dense.
   3. Softwood Plywood: Conform to PS-1.
   4. Pressure Treated Materials: Conform to AWPA Standards.
   5. Fire Retardant Treated Materials: Bear U.L. label FR-S.

1.02 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Store materials minimum 6" above ground on framework or blocking and cover with protective waterproof covering providing for adequate air circulation.

B. Do not store seasoned or treated materials in damp location.

C. Protect edges of sheet materials from damage to corners.

PART 2 PRODUCTS

2.01 MATERIALS

A. Lumber:
   1. Dimensions indicated are nominal; actual dimensions to conform to PS 20.
   2. Surfacing: Surfaced four sides (S4S) unless noted otherwise.
   3. End Jointed Lumber: Structural purposes interchangeable with sawn lumber; glued joints of load bearing lumber in accordance with PS 36.

4. Framing Lumber:
    a. Light Framing:
        (1) Bracing, blocking and general purposes: No. 2 any specie.

B. Plywood: Exterior Grade where edge or surface is permanently exposed weather.

C. Pressure Treated Products: In accordance with AWPA Standard C2 for above ground application.

D. Hardware:
1. Bolts: ASTM A307.
2. Nuts: ASTM A307.
3. Anchors: Hilti Hit system.
4. Wood Screws: FS FF-S-111.
5. Nails: FS FF-N-105.

PART 3 EXECUTION

3.01 INSTALLATION

A. Framing:
1. Accurately saw-cut lumber to seat square on bearings. Fit closely into proper location, true to line and grade, plumb and level.
2. Frame, anchor, tie and brace members to develop strength and rigidity required for purpose for which they are to be used. Do not stress members in excess of design strength.
3. Secure members permanently in position with proper fastenings to render parts rigid.
4. Provide scaffolding and temporary enclosures, partitions, stairs and protective covers as required.

B. Blocking and Furring:
1. Provide wood blocking, nailers, ground, furring, etc. as required for securing work of other trades.
2. Shape, install and secure work properly to receive, engage or support other work.

C. Pressure treated products: Provide where wood comes in contact with concrete, masonry or roofing. After erection, field treat cuts and holes with swabbing of concentrated solution of same preservative as originally applied in accordance with AWPA Standard M4.

D. Hardware:
   1. Furnish and install nails, screws, bolts, anchors, washers, clips, shields and other rough hardware necessary to complete work.
   2. Bore holes for bolts true to line and of same diameter as bolts. Drive bolts into place with a tight fit; provide plates or washers where bolt heads or nuts are in contact with wood.

END OF SECTION

SECTION 07 2600

VAPOR RETARDERS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Sheet materials for controlling vapor diffusion at exterior walls and roofs.

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

1.2 REFERENCES

A. ASTM International (ASTM):
1. D882 - Standard Test Method for Tensile Properties of Thin Plastic Sheeting.
2. D1709 - Standard Test Method for Impact Resistance of Plastic Film by the Free-Falling Dart Method.
3. E96/E96M - Standard Test Method for Water Vapor Transmission of Materials.
4. E154 - Standard Test Method for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.
5. E1643 - Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
6. E1745 - Standard Test Method for Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.

1.3 SUBMITTALS

A. Submittals for Review:
1. Product Data: Include product description and performance characteristics.
2. Samples: 12 x 12 inch vapor retarder samples.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:
1. Griffolyn, Division of Reef Industries. (www.reefindustries.com)
2. Raven Industries. (www.rufco.com)
3. W.R. Meadows, Inc. (www.wrmeadows.com)
4. Dupont

B. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

A. Vapor Retarder: ASTM E1745, Class A, minimum 6 mil thick polyethylene film.

1. Tyvek or equal.

2.3 ACCESSORIES

A. Adhesive:

1. Compatible with vapor retarder and substrate, permanently non hardening.

B. Joint Tape:
1. Minimum 2 inches wide, pressure sensitive, waterproof, compatible with vapor retarder.

PART 3 EXECUTION

3.1 INSTALLATION - WALLS AND ROOFS

A. Install in accordance with manufacturer’s instructions.

B. Provide complete and continuous vapor retarder at exterior walls except where interrupted by glazing or other openings.

C. Locate vapor retarder on exterior side of sheathing.

D. Apply adhesive to substrate in accordance with manufacturer's instructions for application and coverage.

E. Install vapor retarder without tears, voids, and holes.

F. Lap ends and edges minimum 2 inches over adjacent sheets. Seal laps with tape.

G. Extend vapor retarder to full perimeter of adjacent door frames and window frames and to utility and other penetrations interrupting plane of membrane.

H. Tape seal lapped joints, tears, holes, perimeter, and penetrations through vapor retarder.

3.2 REPAIR

A. Inspect vapor retarder for damage just prior to covering.

B. Clean damaged areas and cover with additional vapor retarder material cut minimum 6 inches larger than damaged area on all sides. Seal to main vapor retarder with continuous tape.

END OF SECTION

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SECTION 07 5400

SINGLE PLY MEMBRANE (PVC) ROOFING

PART 1 – GENERAL

1.1 GENERAL REQUIREMENTS

A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

A. The Work of this Section includes all labor, materials, equipment and services necessary to complete the polyvinyl-chloride (PVC) roofing as shown on the drawings and specified herein, including but not limited to, the following:

1. Mechanically fastened PVC membrane roofing system.
2. Associated flashing.
3. Roof insulation.
4. Walkways.

1.3 RELATED SECTIONS

A. Rough Carpentry - Section 06 1000.

B. Sheet Metal Flashing - Section 07 6200.

1.4 DEFINITIONS

A. Roofing Terminology: See ASTM D 1079 and glossary in NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work in this Section.

1.5 SUBMITTALS

A. Shop Drawings: Submit complete shop drawings showing details, dimensions, plan

layout showing the location where the field roofing area meets the perimeter roof area colors, fabrication and fastening elements for each condition encountered, schedule of fastens and plates for all perimeter and corner conditions of the roof areas, layout of flat and tapered insulation, showing all seams, layout of each sheet noting seam locations, perimeter and penetration flashing, plan layout showing all protection walkways and other details where roofing abuts other materials and/or conditions, prior to roofing conference.

B. Certifications:

1. Submit notarized letter indicating that roofing Subcontractor is an approved applicator of the manufacturer.

2. Submit a letter signed by the manufacturer and Contractor acknowledging that the submitted roofing system complies with ASCE-7 and FM 1-90, for wind speed code requirements based on height and geographic location of project.

C. Product Data: Submit manufacturer's complete product information for each item to be furnished under this Section.

D. Samples for Verification: Submit samples for the following:

1. Sheet roofing, of color specified, including T-shaped side and end lap seam; 12" square piece.

2. Roof insulation, 12" x 12".

3. Walkway pads or rolls, 12" square piece.

1.6 QUALITY ASSURANCE

A. Installer: A firm with not less than 5 years of successful experience in installation of roofing systems similar to those required for this projects and which is acceptable to or licensed by the manufacturer of the primary roofing materials.

B. UL Listing: Provide labeled materials which have been tested and listed by UL for application indicated and which have a Class "A" rating.

C. Comply with ASCE-7 and FM uplift of 1-90.

D. Membrane to have no formulation changes in the last 15 years as certified by the manufacturer.

E. Membrane manufacturer must complete a minimum of 3 field inspections with reports.

The first field inspection shall occur at 20% completion of the roof installation. This initial inspection shall include, but not limited to, attachments methods of insulation & membrane, welding of seams, flashing at roof penetrations, walls and parapets, expansion joints, roof drains and at area where the adhered system meets the mechanical attached system. The second shall occur at 70% completion of the roof and the third shall be for the final. Membrane manufacturer may require addition inspections to meet their requirement for the warrantee.

1.7 PREROOFING CONFERENCE

A. Prior to ordering of materials, a pre-roofing conference will be held to discuss the specified roofing system, and its proper application. Conference shall include General Contractor, installer, Roofing installer Foreman, roofing manufacturer, installers of related work, Architect and representatives of Owner. Record discussions and agreements and furnish copy to each participant. Provide at least 72 hours advance notice to participants prior to convening conference.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.

1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

D. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

1.9 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

1.10 WARRANTY

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.

B. Applicator/Roofing Contractor Warranty: The 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. The Applicator's warranty obligation shall run directly to the Owner, and a copy shall be sent to the manufacturer.

PART 2 - PRODUCTS

2.1 PVC MEMBRANE ROOFING

A. PVC Sheet: ASTM D 4434, Type IV, fabric reinforced.

1. Manufacturers: Subject to compliance with requirements, provide roofing system and related products as manufactured by one of the following, or approved equal:

a. Duro-Last Roofing, Inc. (basis for project design).

b. BondCote Corporation.

c. Sarnafil

d. IB Roof Systems.

2. Thickness: 0.040-inch, nominal.

3. Exposed Face Color: White.

2.2 AUXILIARY MEMBRANE ROOFING MATERIALS

A. General: Auxiliary membrane roofing materials recommended by roofing system manufacturer for intended use, and compatible with membrane roofing.

1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.

B. Sheet Flashing: Manufacturer's standard sheet flashing of same material, type, reinforcement, thickness, and color as PVC sheet membrane.

C. Bonding Adhesive: Manufacturer's standard.

D. Slip Sheet: Manufacturer's standard, of thickness required for application.

E. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum bars, approximately 1” by 1/8” thick; with anchors.

F. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening membrane to substrate, and acceptable to membrane roofing system manufacturer.

G. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.

2.3 ROOF INSULATION

A. General: In locations where called for, provide preformed roof insulation boards (equal to R-20) with 1/2" integral nail deck, manufactured or approved by PVC membrane roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated. Note that some locations call for 1" polyiso board.

B. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, Grade 2, felt or glass-fiber mat facer on both major surfaces.

C. Where indicated, provide extruded polystyrene board insulation complying with ASTM C 578, Type VII with min. compressive strength of 60 psi; “Styrofoam” by Dow

Chemical Co., or approved equal.

D. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated. Fabricate to slopes indicated.

2.4 ASPHALT MATERIALS

A. Roofing Asphalt: ASTM D 312, Type III or Type IV.

B. Asphalt Primer: ASTM D 41.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:

1. Verify that roof openings and penetrations are in place and curbs are set and braced and that roof drain bodies are securely clamped in place.

2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.

3. Verify that minimum concrete drying period recommended by roofing system manufacturer has passed.

4. Verify that concrete substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.

5. Verify that concrete curing compounds that will impair adhesion of roofing components to roof deck have been removed.

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

3.2 PREPARATION

A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.

B. Prevent materials from entering and clogging roof drains and conductors and from

spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

C. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

3.3 INSULATION INSTALLATION

A. Coordinate installing membrane roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.

B. Comply with membrane roofing system and insulation manufacturer's written instructions for installing roof insulation.

C. Install insulation under area of roofing to achieve required thickness. Install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.

D. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.

E. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch with insulation.

1. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.

F. Adhered Insulation: Install each layer of insulation and adhere to substrate as follows:

1. Prime surface of concrete deck with asphalt primer at rate of 3/4 gal./100 sq. ft. and allow primer to dry.

2. Set each layer of insulation in a solid mopping of hot roofing asphalt, applied within plus or minus 25 deg F of equiviscous temperature.

3. Set each layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.

4. Set each layer of insulation in a uniform coverage of full-spread insulation adhesive,

firmly pressing and maintaining insulation in place.

3.4 MECHANICALLY FASTEN ROOFING INSTALLATION

A. As per manufacturers recommendation.

3.5 BASE FLASHING INSTALLATION

A. Install sheet flashings and preformed flashing accessories and adhere to substrates according to membrane roofing system manufacturer's written instructions.

B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate and allow to partially dry. Do not apply to seam area of flashing.

C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.

D. Clean seam areas, overlap, and firmly roll sheet flashings into the adhesive. Hot-air weld side and end laps to ensure a watertight seam installation.

E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

3.6 WALKWAY INSTALLATION

A. Flexible Walkways: Install walkway products in locations indicated. Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

3.7 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Repair or remove and replace components of membrane roofing system where inspections indicate that they do not comply with specified requirements.

C. Additional inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.8 PROTECTING AND CLEANING

A. Protect membrane roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

B. Correct deficiencies in or remove membrane roofing system that does not comply with requirements; repair substrates; and repair or reinstall membrane roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

End of Section

SECTION 07611 - CUSTOM SHEET METAL ROOFING

1 PART 1 GENERAL

1.1 SECTION INCLUDES

A. Prefinished sheet roofing, associated flashings, and underlayment.

B. Counterflashings.

C. Integral gutters.

D. Integral fascias.

1.2 RELATED SECTIONS

A. Section 07212 - Board Insulation: Rigid insulation under sheet metal roofing system.

B. Section 07620 - Sheet Metal Flashing and Trim.

C. Section 07631 - Gutters and Downspouts.

D. Section 07900 - Joint Sealers.

1.3 REFERENCES

A. ASTM B32 - Standard Specification for Solder Metal.

B. ASTM B370 - Standard Specification for Copper Sheet and Strip for Building Construction.

C. ASTM D226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.

D. ASTM D2178 - Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing.

E. ASTM D4586 - Standard Specification for Asphalt Roof Cement, Asbestos Free.

F. CDA (Copper Development Association) - Copper in Architecture - Handbook.

G. FS L-P-512 - Plastic Sheet (Sheeting); Polyethylene.

H. FS TT-C-494 - Coating Compound, Bituminous, Solvent Type, Acid Resistant.

I. SMACNA (Sheet Metal and Air Conditioning Contractors National Association) - Architectural Sheet Metal Manual.

1.4 SUBMITTALS FOR REVIEW

A. Section 01300 - Submittals: Procedures for submittals.

B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details. NOTE THE PATTERN OF THE STANDING SEAMS AS SHOWN ON THE DRAWINGS.

C. Product Data: Provide data on metal types, finishes, characteristics, and limitations.

D. Submit two samples 24 x 24 inch in size illustrating metal roofing mounted on plywood backing illustrating typical seam, external corner, internal corner, junction to vertical dissimilar surface, material, and finish.

1.5 QUALITY ASSURANCE

A. Perform work in accordance with national industry standards

B. Maintain one copy on site.

C. Fabricator and Installer Qualifications: Company specializing in sheet metal roof installations with minimum ten (10) years experience.

1.6 MOCK-UP

A. Section 01400 - Quality Control: Requirements for mock-up.

B. Provide mock-up in accordance with Section 01400, located where directed.

1.7 PRE-INSTALLATION MEETING

A. Section 01039 - Coordination and Meetings: Pre-installation meeting.

B. Convene one week before staring work of this section.

1.8 DELIVERY, STORAGE, AND PROTECTION

A. Section 01600 - Material and Equipment: Transport, handle, store, and protect.

B. Stack material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

C. Prevent contact with materials which may cause discoloration or staining.

1.9 COORDINATION

A. Section 01039 - Coordination and Meetings.

1.10 WARRANTY

A. Section 01740 - Warranties.

B. Correct defective work within a two (2) year period after Date of Substantial Completion. Defective work includes degradation of metal finish, failure of watertightness or seals.

2 PART 2 PRODUCTS

2.1 SHEET MATERIALS

A. Prefinished color (final selections approved by architect from samples) as follows:

Field One: Equal to Berridge Royal Blue
Field Two: Equal to Berridge Aged Bronze
Field Three: Equal to Berridge Teal Green
Field Four: Equal to Berridge Colonial Red.
Underside of the roofing will be exposed. Color will be off-white.

B. Roof:

1. Equal to Medallion-Lok concealed fastener architectural standing seam roof panel, 24 guage, prefinished colors, 16” panel width, 1-3/4” rib height, clip spacing to meet UL 90 Classifications, UL Class 60 (minimum panel on 5’-0” max spacing on purlins.

2.2 ACCESSORIES

A. Fasteners: Same material and finish as roofing metal, with soft neoprene washers.

B. Underlayment: The underside of the roofing will be exposed. Contractor will ensure the finish (off white) of the underside is not damaged.

C. Slip Sheet: N/A

D. Sealant: Type specified in Section 07900.

E. Plastic Cement: ASTM D4586, Type I.

F. Ice and Water Shield: Ice and Water Shield, as manufacturered by W.R. Grace.

G. Reglets: Recessed] type, rigid extruded PVC; face and ends covered with plastic tape.

H. Solder: ASTM B32; 50/50 type.

2.3 FABRICATION

A. Form sections true to shape, accurate in size, square, and free from distortion or defects.

B. Fabricate cleats of same material as sheet, minimum 1-1/2 inches wide, interlockable with sheet.

C. Fabricate starter strips of same material as sheet, interlockable with sheet.

D. Form pieces in longest practical lengths.

E. Hem exposed edges on underside 1/2 inch; miter and seam corners.

F. Form material with batten seams, except where otherwise indicated. At moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.

G. Fabricate corners from one piece with minimum 18 inch long legs; solder for rigidity, seal with sealant.

H. Fabricate vertical faces with bottom edge formed outward 1/4 inch (6 mm) and hemmed to form drip.

I. Fabricate flashings to allow toe to extend 2 inches over roofing. Return and brake edges.

3 PART 3 EXECUTION

3.1 EXAMINATION

A. Inspect steel frame substrate is clean and smooth, free of depressions, waves, or projections, properly sloped.

3.2 PREPARATION

A. Install starter and edge strips, and cleats before starting installation.

B. Install reglets true to lines and levels.

3.3 INSTALLATION - EAVE PROTECTION

A. Apply eave protection sheet in accordance with manufacturer's instructions.

3.4 INSTALLATION - ROOFING

A. Cleat and seam all joints.

B. Use plastic cement for joints between metal and bitumen and for joints between metal and felts.

C. Provide formed metal pans for protrusions through roof. Fill pans watertight with plastic cement.

D. Solder joints. After soldering, wash metal clean with neutralizing solution, rinse with water.

3.5 INSTALLATION - FLASHINGS

A. Insert flashings into reglets to form tight fit. Secure in place with lead wedges at maximum 6 inches on center. Pack remaining spaces with lead wool. Seal flashings into reglets with sealant.

B. Secure flashings in place using concealed fasteners.

C. Cleat and seam all joints.

D. Apply plastic cement compound between metal flashings and felt flashings.

E. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.

F. Solder metal joints for full metal surface contact. After soldering, wash metal clean with neutralizing solution and rinse with water.

3.6 PROTECTION OF FINISHED WORK

A. Section 01700 - Contract Closeout: Protecting installed work.

B. Do not permit traffic over unprotected roof surface.

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:
   1. Provide mockup of each firestopping system.
   2. Locate where directed.
   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.

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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 07900 - JOINT SEALERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Sealants and joint backing.

B. Precompressed foam sealers.

1.02 REFERENCES

A. ASTM C 834 - Standard Specification for Latex Sealing Compounds.

B. ASTM C 920 - Standard Specification for Elastomeric Joint Sealants.

C. ASTM C 1193 - Guide for Use of Joint Sealants.

D. ASTM D 1667 - Specification for Flexible Cellular Materials - Vinyl Chloride Polymers and Copolymers (Closed-Cell Foam).

1.03 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data indicating sealant chemical characteristics.

C. Manufacturer's Installation Instructions: Indicate special procedures.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum (3) three years experience.

B. Applicator Qualifications: Company specializing in performing the work of this section with minimum (3) three years experience.

1.05 ENVIRONMENTAL REQUIREMENTS

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

1.06 WARRANTY

A. Correct defective work within a five (5) 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.

PART 2 PRODUCTS

2.01 SEALANTS

A. General Purpose Exterior Sealant: Polyurethane; ASTM C 920, Grade NS, Class 25, Uses M, G, and A; multi- component.
   1. Color: Standard colors matching finished surfaces.
   2. Applications: Use for:
      a. Control, expansion, and soft joints in concrete and 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 Metal Lap Joint Sealant: Butyl or polyisobutylene, nondrying, nonskinning, noncuring.
   1. Applications: Use for:
      a. Concealed sealant bead in sheet metal work.

C. General Purpose Interior Sealant: Acrylic emulsion latex; ASTM C 834, 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.

D. Type M - Bathtub/Tile Sealant: White silicone; ASTM C 920, Uses 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.

E. Type S - Concrete Paving Joint Sealant: Polyurethane, self-leveling; ASTM C 920, Class 25, Uses T, 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. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.

C. Install bond breaker where joint backing is not used.

D. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.

E. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

F. Tool joints concave.

G. Precompressed 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 08110

STEEL DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Non-fire-rated steel doors.

B. Non-fire rated steel frames for exterior use.

C. Thermally insulated steel doors.

1.02 RELATED SECTIONS

A. Section 08120 – Interior Aluminum Door Frames: Door frames for interior use.

B. Section 08710 - Door Hardware.

C. Section 09900 - Paints and Coatings: Field painting.

1.03 REFERENCES

A. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; International Code Council; 1998.

B. ANSI A250.3 - Test Procedure and Acceptance Criteria for Factory-Applied Finish Painted Steel Surfaces for Steel Doors and Frames; 1999.

C. ANSI A250.8 - SDI-100 Recommended Specifications for Standard Steel Doors and Frames; 1998.

D. ANSI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 1998.

E. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2000.

F. DHI A115 Series - Specifications for Steel Doors and Frame Preparation for Hardware; Door and Hardware Institute; current edition (ANSI/DHI A115 Series).

G. NAAMM HMMA 840 - Installation and Storage of Hollow Metal Doors and Frames; The National Association of Architectural Metal Manufacturers; 1999.

H. NFPA 80 - Standard for Fire Doors and Fire Windows; National Fire Protection Association; 1999.

I. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; National Fire Protection Association; 1999.

J. UBC Std 7-2, Part II - Test Standard for Smoke- and Draft-control Assemblies; International Conference of Building Officials; 1997.

K. UL (BMD) - Building Materials Directory; Underwriters Laboratories Inc.; current edition.

1.04 SUBMITTALS

A. See Section 01300 - Administrative Requirements for submittal procedures.

B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes.

C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and identifying location of different finishes, if any.

D. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.

E. Manufacturer's Certificate: Certification that products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum five years documented experience.

B. Maintain at the project site a copy of all reference standards dealing with installation.

1.06 DELIVERY, STORAGE, AND PROTECTION

A. Store in accordance with NAAMM HMMA 840.

B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Steel Doors and Frames:
   1. Ceco Door Products: www.cecodoor.com.
   2. Republic Builders Products: www.republicdoor.com.
   3. Steelcraft: www.steelcraft.com.
   4. Substitutions: See Section 01600 - Product Requirements.

2.02 DOORS AND FRAMES

A. Requirements for All Doors and Frames:
   1. Accessibility: Comply with ANSI/ICC A117.1.
   2. Door Top Closures: Flush with top of faces and edges.
   3. Door Edge Profile: Beveled on both edges.
   4. Door Texture: Smooth faces.
   5. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings.
   6. Hardware Preparation: In accordance with DHI A115 Series, with reinforcement welded in place, in addition to other requirements specified in door grade standard.
   7. Galvanizing For exterior doors: All components hot-dipped zinc-iron alloy-coated (galvannealed), manufacturer's standard coating thickness.
   8. Finish: Factory primed, for field finishing.

B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with all the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.03 STEEL DOORS

A. Exterior Doors:
   1. Grade: ANSI A250.8 Level 4, physical performance Level A, Model 1, full flush.
   2. Core: Polystyrene foam.
   3. Top Closures for Outswinging Doors: Flush with top of faces and edges.
   4. Galvanizing: All components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A 653/A 653M, with manufacturer's standard coating thickness.
   5. Texture: Smooth faces.
   6. Weatherstripping: Separate, see Section 08710.

2.04 STEEL FRAMES FOR EXTERIOR USE

A. Refer to Section 08120 for interior frame requirements.

B. General:
   1. Frame Gage: 16 gage.
   2. Finish: Factory primed, for field finishing.
   3. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.
   4. Frames Wider than 48 Inches: Reinforce with steel channel fitted tightly into frame head, flush with top.

C. Exterior Door Frames: Face welded, seamless with joints filled.
   1. Galvanizing: All components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A 653/A 653M, with manufacturer's standard coating thickness.
   2. Weatherstripping: Separate, see Section 08710.

2.05 ACCESSORY MATERIALS

A. Removable Stops: Formed sheet steel, shape as indicated on drawings, mitered or butted corners; prepared for countersink style tamper proof screws.

B. Grout for Frames: Portland cement grout of maximum 4-inch slump for hand troweling; thinner pumpable grout is prohibited.

C. Silencers: Resilient rubber, fitted into drilled hole; 3 on strike side of single door, 3 on center mullion of pairs, and 2 on head of pairs without center mullions.

D. Temporary Frame Spreaders: Provide for all factory- or shop-assembled frames.

2.06 FINISH MATERIALS

A. Primer: Rust-inhibiting, complying with ANSI A250.10, door manufacturer's standard.

B. Bituminous Coating: Asphalt emulsion or other high-build, water-resistant, resilient coating for interior of frames in contact with masonry or grout.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

3.02 PREPARATION

A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

B. Coat inside of other frames with bituminous coating to a thickness of 1/16 inch.

3.03 INSTALLATION

A. Install in accordance with the requirements of the specified door grade standard and NAAMM HMMA 840.

B. In addition, install fire rated units in accordance with NFPA 80.

C. Coordinate frame anchor placement with wall construction.

D. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.

E. Coordinate installation of hardware.

F. Coordinate installation of electrical connections to electrical hardware items.

3.04 ERECTION TOLERANCES

A. Clearances Between Door and Frame: As specified in ANSI A250.8.

B. Maximum Diagonal Distortion: 1/16 in measured with straight edge, corner to corner.

3.05 ADJUSTING

A. Adjust for smooth and balanced door movement.

3.06 SCHEDULE

A. Refer to Door and Frame Schedule on the drawings.

END OF SECTION

SECTION 08 3313

COILING COUNTER SHUTTERS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Manually operated overhead coiling counter shutters.
2. Operating hardware, controls, and supports.

B. Related Sections:
1. Division 01: Administrative, procedural, and temporary work requirements.
2. Section 06 1100 - Wood Framing and Sheathing

1.2 REFERENCES

A. ASTM International (ASTM):
1. A167 - Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
2. A653/A653M - Standard Specification for Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
3. B209 - Standard Specification for Aluminum - Alloy Sheet and Plate.
4. B221 - Standard Specification for Aluminum - Alloy Extruded Bars, Rods, Wires, Shapes and Tubes.

1.3 SYSTEM DESCRIPTION
A. Operation: Awning crank

1.4 SUBMITTALS

A. Submittals for Review:
1. Shop Drawings: Indicate opening dimensions and required tolerances, jamb connection details, anchorage spacing, hardware locations, installation details, and special conditions.
2. Product Data: Provide information on components, application, hardware, and accessories.

B. Closeout Submittals:
1. Operation and Maintenance Data.
2. Warranty documents

1.5 WARRANTIES

A. Provide manufacturer’s three year warranty against defects in materials and workmanship.

PART 2 PRODUCTS

2.1 MANUFACTURERS
A. Contract Documents are based on DURASHUTTER STANDARD by Raynor Door (www.raynor.com)
B. Substitutions: Under provisions of Division 01.

2.2 COMPONENTS

A. Curtain:

1. Material: Interlocking slats, roll formed from 22 gage commercial quality hot dipped galvanized (G-90) steel complying with ASTMA-653
2. Mounting: Face Mounting: fasten to face of wall on each side of door opening
3. Endlocks: Lateral movement of the slats to be contained by means of zinc plated stamped steel endlocks fastened to slat.
4. Bottom Bar and Seal: Roll-formed painted tubular steel type, with 1/4" thick protective strip to cushion impact of bottom bar on counter top. Finish to match shutter curtain.

B. Door Operator
1. Provide door designed for hand crank operation
2. Drive Orientation: Orient the drive from the left-hand side when facing the reference side of the door.

C. Enclosures
1. Hood: Furnish rolling counter shutter with a square hood enclosure fabricated from 24 gauge steel, finish painted to match curtain.
2. Headplate Cover: Rolling counter shutter shall be furnished with an enclosure for the headplates, consisting of 24 gauge steel finish-painted to match the curtain.

D. Locking: Cylinder Lock for use with manual and hand crank operated doors.

2.3 FINISHES

PART 3 EXECUTION

3.1 INSTALLATION

A. Install shutter assembly in accordance with manufacturer's instructions, shop drawings.

B. Anchor to adjacent construction without distortion or stress.

C. Fit and align shutter assembly including hardware, level and plumb, to provide smooth operation.

3.2 ADJUSTING

A. Adjust shutter to operate smoothly throughout full operating range.
B. Lubricate bearings and sliding parts, and adjust doors for proper operation, balance, clearance and similar requirements.

3.3 DEMONSTRATION

A. Demonstrate proper operation to Owner.

END OF SECTION

SECTION 08710 - DOOR HARDWARE

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Provide hardware for all doors. Coordinate with Owner for locksets and latchsets before submitting bid. Each door will have hardware as shown below.

B. Submittals: Hardware Schedule.

C. Deliver keys to Owner.

D. For fire-rated openings provide hardware tested and listed by UL or FMG (NFPA 80). On exit devices provide UL or FMG label indicating "Fire Exit Hardware."

PART 2 - PRODUCTS

2.1 HARDWARE

A. Manufacturers:

1. Falcon, Emtek or approved equal. Monarch exit devices.

B. Hinges:

1. Satin Chrome hinges with stainless-steel pins for exterior.
2. Nonremovable hinge pins for exterior and public interior exposure.
3. Ball-bearing hinges for doors with closers and entry doors.
4. Two hinges for 1-3/8-inch- (35-mm-) thick wood doors.
5. Three hinges for 1-3/4-inch- (45-mm-) thick doors 90 inches (2300 mm) or less in height; four hinges for doors more than 90 inches (2300 mm) in height.

C. Locksets and Latchsets:

1. BHMA A156.2, Series 4000, Grade 2 for bored locks and latches.
2. BHMA A156.3, Grade 1 for exit devices.
3. BHMA A156.5, Grade 2 for auxiliary locks.
4. BHMA A156.13, Series 1000, Grade 2 for mortise locks and latches.
5. Lever handles on locksets and latchsets,.
6. Provide trim on exit devices matching locksets.

D. Key locks to Owner's new master-key system.

1. Five or Six cylinder as approved by owner
2. Provide construction keying.

E. Closers (for all restroom doors at concessions):

1. Mount closers on interior side (room side) of door opening. Provide regular-arm, parallel-arm, or top-jamb-mounted closers as necessary by Norton or equal.

F. Provide wall stops or floor stops for doors without closers.

G. Provide hardware finishes as follows:

1. Hinges: Matching finish of lockset/latchset.
2. Locksets, Latchsets, and Exit Devices: Satin chrome plated; at toilet rooms, provide split finish with bright chrome-plated finish on inside.
3. Closers: Primed for field painting.
4. Other Hardware: Matching finish of lockset/latchset.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Mount hardware in locations recommended by the Door and Hardware Institute, unless otherwise indicated.

3.2 HARDWARE SCHEDULE (submitted by General Contractor for Owner's approval)

END OF SECTION 08710

SECTION 09900

PAINTS AND COATINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints, stains, varnishes, and other coatings.

1.02 RELATED SECTIONS

A. Section 05500 - Metal Fabrications: Shop-primed items.

B. Section 09260 – Gypsum Board Assemblies.

1.03 REFERENCES

A. ASTM D 16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2000.

B. ASTM D 4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials; 1992 (Reapproved 1997).

1.04 DEFINITIONS

A. Conform to ASTM D 16 for interpretation of terms used in this section.

1.05 SUBMITTALS

A. Contact Contractor for submittal procedures.

B. Product Data: Provide data on all finishing products.

C. Manufacturer's Instructions: Indicate special surface preparation procedures.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum five years documented experience.

B. Applicator Qualifications: Company specializing in performing the work of this section with minimum five years experience.

1.07 REGULATORY REQUIREMENTS

A. Conform to applicable code for flame and smoke rating requirements for products and finishes.

1.08 DELIVERY, STORAGE, AND PROTECTION

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.09 ENVIRONMENTAL REQUIREMENTS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.

C. Minimum Application Temperatures for Latex Paints: 45 degrees F for interiors; 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.

D. Minimum Application Temperature for Varnish Finishes: 65 degrees F for interior or exterior, unless required otherwise by manufacturer's instructions.

E. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

1.10 EXTRA MATERIALS

A. Supply 1 gallon of each color; store where directed.

B. Label each container with color in addition to the manufacturer's label.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Paints and Stains and Primers
   1. Sherwin-Williams Co: www.sherwin-williams.com.
   2. Substitutions: See Section 01600 – Product Requirements.

2.02 PAINTS AND COATINGS - GENERAL

A. Paints and Coatings: Ready mixed, except field-catalyzed coatings. Prepare pigments:
   1. To a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating.
   2. For good flow and brushing properties.
   3. Capable of drying or curing free of streaks or sags.
   4. COLOR SCHEDULE:
      Paint for Exterior Steel: SW 7020 Black Fox
      Paint for Exterior Doors: SW Sycamore Tan
      Paint for Door Frames: SW 2855 Sycamore Tan
      Paint for interior walls: SW 2855 Sycamore Tan

2.03 PAINT SYSTEMS - EXTERIOR

C. Ferrous Metals, Unprimed, Alkyd, 3 Coat:
   1. One coat of alkyd primer.
   2. Semi-gloss: Two coats of alkyd enamel.

D. Ferrous Metals, Primed, Alkyd, 2 Coat:
   1. Touch-up with rust-inhibitive primer recommended by top coat manufacturer.
   2. Semi-gloss: Two coats of alkyd enamel.

E. Galvanized Metals, Alkyd, 3 Coat:
   1. One coat galvanize primer.
   2. Semi-gloss: Two coats of alkyd enamel.

G. Pavement, Pavement Marking Paint:
   1. Match existing color: Safety Yellow..

2.04 PAINT SYSTEMS – INTERIOR

A. Wood, Opaque, Alkyd, 3 Coat:
   1. One coat alkyd primer sealer.
   2. Semi-gloss: Two coats of alkyd enamel.

B. Wood, Transparent, Varnish, Stain:
   1. One coat of stain.
   2. One coat sealer.
   3. Satin: One coat of varnish.

C. Concrete/Masonry, Opaque

   1. Masonry where called out to be painted: one coat Prep Rite block filler; one coat Loxon surfacer; two coats A-100 exterior latex semi-gloss

2. Note that all exterior masonry surfaces will be unpainted integral color block

D. Ferrous Metals, Unprimed, Alkyd, 3 Coat:
   1. One coat of alkyd primer.
   2. Semi-gloss: Two coats of alkyd enamel.

E. Ferrous Metals, Unprimed, Latex, 3 Coat:
   1. One coat of latex primer.
   2. Semi-gloss: Two coats of latex enamel.

F. Galvanized Metals, leave galvanized

G. Aluminum, Unprimed, Alkyd, 3 Coat:
   1. One coat etching primer.
   2. Semi-gloss: Two coats of alkyd enamel.

H. Gypsum Board (dry areas), latex, 3 Coat:
   1. One coat of latex primer sealer.
   2. Eggshell: Two coats of latex enamel.

2.05 ACCESSORY MATERIALS

A. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve the finishes specified; commercial quality.

B. Patching Material: Latex filler.

C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are ready to receive Work as instructed by the product manufacturer.

B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

C. Test shop-applied primer for compatibility with subsequent cover materials.

D. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
   1. Plaster and Gypsum Wallboard: 12 percent.
   2. Masonry, Concrete, and Concrete Unit Masonry: 12 percent.
   3. Interior Wood: 15 percent, measured in accordance with ASTM D 4442.
   4. Exterior Wood: 15 percent, measured in accordance with ASTM D 4442.

3.02 PREPARATION

A. Surface Appurtenances: Remove electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or finishing.

B. Surfaces: Correct defects and clean surfaces which affect work of this section. Remove or repair existing coatings that exhibit surface defects.

C. Marks: Seal with shellac those which may bleed through surface finishes.

D. Impervious Surfaces: Remove mildew by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

E. Concrete and Unit Masonry Surfaces to be Painted: 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.

F. Gypsum Board Surfaces to be Painted: Fill minor defects with filler compound. Spot prime defects after repair.

G. Plaster Surfaces to be Painted: Fill hairline cracks, small holes, and imperfections with latex

patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.

H. Asphalt, Creosote, or Bituminous Surfaces to be Painted: Remove foreign particles to permit adhesion of finishing materials. Apply latex based sealer or primer.

I. Insulated Coverings to be Painted: Remove dirt, grease, and oil from canvas and cotton.

J. Aluminum Surfaces to be Painted: Remove surface contamination by steam or high pressure water. Remove oxidation with acid etch and solvent washing. Apply etching primer immediately following cleaning.

K. Galvanized Surfaces to be Painted: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.

L. Uncoated Steel and Iron Surfaces to be Painted: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by hand wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Prime paint entire surface; spot prime after repairs.

M. Shop-Primed Steel Surfaces to be Finish Painted: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.

N. Interior Wood Items to Receive Opaque Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats. Back prime concealed surfaces before installation.

O. Interior Wood Items to Receive Transparent Finish: Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after sealer has dried; sand lightly between coats. Prime concealed surfaces with gloss varnish reduced 25 percent with thinner.

P. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

3.03 APPLICATION

A. Apply products in accordance with manufacturer's instructions.

B. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.

C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

D. Apply each coat to uniform appearance. Apply each coat of paint slightly darker than preceding coat unless otherwise approved.

E. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

F. Where clear finishes are required, tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.

3.04 FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT

A. Paint shop-primed equipment, where indicated.

B. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

C. Finish equipment, piping, conduit, and exposed duct work in utility areas in colors according to the color coding scheme indicated.

D. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.05 FIELD QUALITY CONTROL

A. Architect will provide field inspection.

B. Inspect and test questionable coated areas.

3.06 CLEANING

A. Collect waste material which may constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.07 SCHEDULE - SURFACES TO BE FINISHED

A. All surfaces within the scope of this project are to be painted, with the following exceptions:
   1. Items fully factory-finished unless specifically noted.
   2. Fire rating labels, equipment serial number and capacity labels.
   3. Stainless steel items.

B. Mechanical and Electrical: Use paint systems defined for the substrates to be finished.
   1. Paint all insulated and exposed pipes occurring in finished areas to match background surfaces, unless otherwise indicated.
   2. Paint shop-primed items occurring in finished areas.
   3. Paint interior surfaces of air ducts and convector and baseboard heating cabinets that are visible through grilles and louvers with one coat of flat black paint to visible surfaces.
   4. Paint dampers exposed behind louvers, grilles, and convector and baseboard cabinets to match face panels.

C. Paint both sides and edges of plywood backboards for electrical and telephone equipment before installing equipment.

END OF SECTION

SECTION 10170

SOLID PLASTIC TOILET COMPARTMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Solid plastic toilet compartments.

B. Urinal screens.

1.02 RELATED SECTIONS

A. Section 06100 - Rough Carpentry: Concealed wood framing and blocking for compartment support.

B. Section 10800 - Toilet Accessories.

1.03 REFERENCES

A. ASTM A 666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2000.

1.04 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate partition plan, elevation views, dimensions, details of wall supports, door swings.

C. Product Data: Provide data on panel construction, hardware, and accessories.

D. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

1.05 COORDINATION

A. Coordinate the work with placement of support framing and anchors in wall.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Plastic Toilet Compartments:
   1. Ampco Products, Inc: www.ampco.com.
   2. Capitol Partitions, Inc: www.capitolpartitions.com.
   3. Santana Products Co., Inc: www.hinyhider.com.
   4. Substitutions: Section 01600 - Product Requirements.

2.02 COMPONENTS

A. Toilet Compartments: Solid molded plastic panels, doors, and pilasters, floor-mounted headrail-braced.
   1. Color: As scheduled as selected by Architect..

B. Shower Compartments: Solid molded plastic panels, doors, and pilasters, ceiling-mounted headrail-braced.
   1. Color: As scheduled as selected by Architect..

C. Door and Panel Dimensions:
   1. Thickness: 1 inch.
   2. Door Width: 24 inch.
   3. Door Width for Handicapped Use: 36 inch, out-swinging.
   4. Height: 58 inch.
   5. Thickness of Pilasters: 1-1/4 inch.

D. Urinal Screens: Wall mounted with two panel brackets.

2.03 ACCESSORIES

A. Pilaster Shoes: Formed ASTM A 666, Type 304 stainless steel with No. 4 finish, 3 in high, concealing floor fastenings.
   1. Provide adjustment for floor variations with screw jack through steel saddles integral with pilaster.

B. Head Rails: Hollow stainless steel tube, 1 x 1-5/8 inch size, with anti-grip strips and cast socket wall brackets.

C. Wall and Pilaster Brackets: Polished stainless steel.

D. Attachments, Screws, and Bolts: Stainless steel, tamper proof type.
   1. For attaching panels and pilasters to brackets: Through-bolts and nuts; tamper proof.

E. Hardware: Polished stainless steel:
   1. Pivot hinges, gravity type, adjustable for door close positioning; two per door.
   2. Nylon bearings.
   3. Door Latch: Slide type with exterior emergency access feature.
   4. Door strike and keeper with rubber bumper; mounted on pilaster in alignment with door latch.
   5. Coat hook with rubber bumper; one per compartment, mounted on door.
   6. Provide door pull for outswinging doors.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify correct spacing of and between plumbing fixtures.

C. Verify correct location of built-in framing, anchorage, and bracing.

3.02 INSTALLATION

A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's instructions.

B. Maintain 3/8 to 1/2 inch space between wall and panels and between wall and end pilasters.

C. Attach panel brackets securely to walls using anchor devices.

D. Attach panels and pilasters to brackets. Locate head rail joints at pilaster center lines.

3.03 ERECTION TOLERANCES

A. Maximum Variation From True Position: 1/4 inch.

B. Maximum Variation From Plumb: 1/8 inch.

3.04 ADJUSTING

A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch.

B. Adjust hinges to position doors in partial opening position when unlatched. Return out-swinging doors to closed position.

C. Adjust adjacent components for consistency of line or plane.

END OF SECTION

SECTION 10440

INTERIOR SIGNAGE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Engraved plastic signs.

B. Signs made of individual plastic letters.

1.02 RELATED SECTIONS

A. Section 15190 - Mechanical Identification.

B. Section 16195 - Electrical Identification.

1.03 REFERENCES

A. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; International Code Council; 1998.

1.04 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate sign styles, lettering font, foreground and background colors, locations, overall dimensions of each sign.

C. Samples: Submit two sample signs illustrating type, style, letter font, and colors specified; method of attachment.

D. Manufacturer's Installation Instructions: Include installation template and attachment devices.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

1.06 DELIVERY, STORAGE, AND PROTECTION

A. Package signs, labeled in name groups.

B. Store adhesive attachment tape at ambient room temperatures.

1.07 ENVIRONMENTAL REQUIREMENTS

A. Do not install signs when ambient temperature is lower than recommended by manufacturer.

B. Maintain this minimum temperature during and after installation of signs.

PART 2 PRODUCTS

2.01 MANUFACTURERS: locally by Fast Signs or Ryan Gregonis

A. Plastic Signs:
   1. Best Manufacturing Co: www.bestsigns.com.
   2. Mohawk Sign Systems, Inc: www.mohawksign.com.
   3. Seton Identification Products: www.seton.com/aec.
   4. Substitutions: See Section 01600 - Product Requirements.

2.02 SIGNS WITH RAISED LETTERS

A. Signs:
   1. Comply with applicable provisions of ANSI/ICC A117.1, including Braille.
   2. Face Color: As selected by Architect.
   3. Core Color: Satin White.
   4. Total Thickness: 1/4 inch.
   5. Size: ~8" x 8"
   6. Edges: Square.
   7. Character Font: Helvetica.

2.03 INDIVIDUAL GRAPHICS

A. Comply with applicable provisions of ANSI/ICC A117.1 for signs not required to be tactile.

B. Material: Clear acrylic plastic:
   1. Thickness: 1/8 inch.
   2. Height: 3 inches.
   3. Edges: Square.

C. Character Style:
   1. Character Color: Black.
   2. Character Font: Helvetica.
   3. Character Case: Upper case only.

D. Graphic Style: Handicapped type.

2.04 ACCESSORIES

A. Tape Adhesive: Double sided tape, permanent adhesive.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install signs after doors are finished, in locations indicated.

C. Center signs on door surface, level.

END OF SECTION

SECTION 10522 – FIRE EXTINGUISHERS, CABINETS, AND ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fire extinguishers.

B. Fire extinguisher cabinets.

1.02 RELATED SECTIONS

A. Section 06114 - Wood Blocking and Curbing: Wood blocking and shims.

B. Section 09900 - Painting: Field paint finish.

1.03 REFERENCES

A. NFPA 10 - Standard for Portable Fire Extinguishers.

B. UL - Fire Protection Equipment Directory.

1.04 PERFORMANCE REQUIREMENTS

A. Conform to NFPA 10 code.

B. Provide extinguishers classified and labeled by Underwriters Laboratories Inc. for the purpose specified and indicated.

1.05 SUBMITTALS FOR REVIEW

A. Section 01300 - Submittals: Procedures for submittals.

B. Shop Drawings: Indicate cabinet physical dimensions, rough-in measurements for recessed cabinets and location.

C. Product Data: Provide extinguisher operational features, color and finish, and anchorage details.

1.06 SUBMITTALS FOR INFORMATION

A. Section 01300 - Submittals: Procedures for submittals.

B. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.

C. Manufacturer's Certificate: Certify that Products meet or exceed specified requirements.

1.07 SUBMITTALS AT PROJECT CLOSEOUT

A. Section 01730 - Operation and Maintenance Data: Procedures for submittals.

B. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

1.08 ENVIRONMENTAL REQUIREMENTS

A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers:
   1. Larsen's Manufacturing Company.
   2. Ansul Incorporated.
   3. Guardian Fire Equipment Company.
   4. J.L. Industries, Panorama Series.
   5. Substitutions: Under provisions of Section 01600.

2.02 FIRE EXTINGUISHERS

A. Dry Chemical Type: Cast steel tank, with pressure gage; Class A:B:C, Size 10.

B. Extinguisher Finish: Steel , polished chrome.

2.03 FIRE EXTINGUISHER CABINETS

A. Larsen FS 2409-R3, recessed box, square trim, 9-1/2" x 24" x 5-1/2" box size, vertical duo door with clear anodized finish.

B. Cabinet Mounting Hardware: Appropriate to cabinet.

C. Pre-drill for anchors.

D. Hinge doors for 180 degree opening with continuous piano hinge. Provide nylon catch.

E. Weld, fill, and grind components smooth.

H. Cabinet Interior: Baked white enamel finish.

I. Substitutions: Under provisions of Section 01600.

PART 3 EXECUTION

3.01 EXAMINATION

A. Section 01039 - Coordination and Meetings: Verification of existing conditions before starting work.

B. Verify rough openings for cabinet are correctly sized and located.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install cabinets plumb and level in wall openings, with top edge of cabinet mounted 60 inches from finished floor.

C. Secure rigidly in place.

D. Place extinguishers in cabinets.

END OF SECTION

SECTION 10530 **-** SHADE STRUCTURE

A SUMMARY

The shade structure contractor shall be responsible for the design, engineering, fabrication, supply and installation of the work specified herein. The finished shade structure will resemble the shade structure shown in the drawings (number and location of columns, fabric, etc.). Note that there will be no center pole/column. The intent of this specification is to have single source supplier who is responsible for the above functions.

B DESIGN CRITERIA

B.1 The shade structure shall be designed to comply with the International Building Code 2003.

B.2 All shade structures are engineered and designed to meet a 90 mph wind load Exposure C and a snow load of 10 pounds per square foot.

B.3 The steel frame structure shall not rely on the fabric for structural stability.

B.4 All tests are in accordance with the American Society for Testing Materials (ASTM).

B.5 All welds are in accordance with the American Welding Society guidelines.

B.6 All steel shall be designed, manufactured, and installed in accordance with the American Institute of Steel Construction (AISC), “Specifications for the Design, Fabrication, and Erection of Structural Steel”.

B.7 All steel shall be fabricated by a fabricator recognized by the **IAS** (**International Accreditation Service ,Inc.**) for **Structural Steel Fabrication** under UBC 97 & 2000 Section 1701.7 and IBC 2000 Section 1704.2.2.

C QUALITY ASSURANCE

Fabrication and erection is limited to firms with proven experience in design and construction of fabric shade structures and such firms shall meet the following minimum requirements:

C.1 A single contractor should design, engineer, manufacture and erect the fabric shade structures.

C.2 The contractor shall demonstrate to have a minimum of 10 years experience in the engineering, fabrication, and erection of permanent fabric structures under the same name.

C.3 The contractor shall demonstrate that it has a staff of experienced fabric structure installation personnel who will undertake the installation of each project.

C.4 The contractor shall submit a Corporate Quality Control Manual describing their complete quality assurance program.

C.5 The contractor must be an approved Structural Steel Fabricator by the **IAS** (International Accreditation Service) for **Structural Steel Fabrication** under UBC 97 & 2000 Section 1701.7 and IBC 2000 Section 1704.2.2.

D MANUFACTURERS

D.1 USA Shade & Fabric Structures 972-354-6545 Jennie Mocek

D.2 Or approved equal. Substitution requests must be submitted by a Prime Bidder a minimum of ten (10) days prior to bid date. Any approvals of substitutions shall be issued by addendum only prior to the bid date.

D.3 Alternate suppliers must meet the qualifications and provide proof of certification listed under Section C – Quality Assurance.

E ERECTION HARDWARE

F.1 Bolt and fastening hardware shall be determined based on calculated engineering loads.

F.2 All bolts shall comply with SAE- J429 (Grade 8) or ASTM A354 Grade BD). All nuts shall comply with ASTM F-594, alloy Group 1 or 2.

F CONCRETE

G.1 Concrete work shall be executed in accordance with the latest edition of American Concrete Building Code ACI 318.

G.2 Concrete specifications shall comply in accordance with the section 03300, and detailed as per plans, shall be as follows:

G.2.1 28 Days Strength F'c = 3000 psi
G.2.2 Aggregate: HR
G.2.3 Slump: 3 – 5
G.2.4 Portland Cement shall conform to C-150
G.2.5 Aggregate shall conform to ASTM C-33

G.3 All reinforcement shall conform to ASTM A-615 grade 60.

G.4 Reinforcing steel shall be detailed, fabricated, and placed in accordance with the latest ACI Detailing Manual and Manual of Standard Practice.

G.5 Whenever daily ambient temperatures are below 80 degrees Fahrenheit, the contractor may have mix accelerators and hot water added at the batch plant (See Table 1)

G.6 The contractor shall not pour any concrete when daily ambient temperature is below 55 degrees Fahrenheit.

TABLE 1

Temperature Range	**% Accelerator**	**Type Accelerator**
75-80 degrees	1%	High Early (non calcium)
70-75 degrees	2%	High Early (non calcium)
Below 70 degrees	3%	High Early (non calcium)

G FOOTINGS

H.1 All Anchor Bolts set in new concrete shall be ASTM A-325.

H.2 All Anchor Bolts shall be Hot Dipped Galvanized.

H.3 Footings shall be placed in accordance with and conform to engineered specifications and drawings.

H FABRIC SPECIFICATIONS

I.1 UV shade fabric is made of UV stabilized Shadesure® cloth manufactured by Multi Knit Ltd.

I.2 The high-density polyethylene material shall be manufactured with tensioned fabric structures in mind.

I.3 The fabric knit is to be made using monofilament and tape filler which has weight of 195g per square meter. Material to be Rachel-knitted to ensure material will not unravel if cut.

I.4 Burst strength of 260 kpa.

I.5 Cloth meets fire resistance tests as follows:
National tests: ASTM E 84-91a with a Class A

I.6 Fabric Properties

Stretch	Stentored
Tear Tests (lbs)	Warp 220.5 Weft 462.9707 lb.
Burst Tests (PSIA)	37.7
Fabric Weight (oz/m2)	6.9
Fabric Width	10 ft.
Roll length	164ft
Roll Size	63” x 16.5”
Weight	68 lb.
Life Expectancy	10 years in sun
Fading	Minimum fading after 6 years (3 years for red)
Temperature	-22° F
Maximum Temperature	+ 176° F

I THREAD

J.1 Gore™ TENARA® sewing thread is made up of 100% expanded PTFE fiber, known as Teflon®. The sewing thread carries an 8-year warranty against deterioration from exposure to the elements.

J.2 Shall be high strength and low shrinkage.

J.3 Shall have a wide temperature and humidity range.

J.4 Flew and abrasion resistant and UV radiation immunity.

J.5 Shall be unaffected by cleaning agents, acid rain, mildew, rot, chlorine, saltwater, and pollution.

J.6 Lockstitch thread – 1200 Denier or approved equal.

J.7 Chainstitch thread – 2400 Denier or approved equal.

J SEWING

K.1 On-site sewing of a fabric will not be accepted.

K.2 All corners shall be reinforced with extra non-tear cloth and strap to distribute the load.

K.3 The perimeters that contain the cables shall be double lock stitched.

K STEEL TUBING

L.1 All final steel tubing must be in accordance with approved shop drawings and calculations.

L.2 All steel is cleaned, degreased or etched to ensure proper adhesion of powder-coat in accordance with manufacturer's specifications.

L.3 All steel used on this project needs to be new and accompanied by the mill certificates.

L.4 All non-hollow structural steel shapes comply with ASTM A-36, unless otherwise noted.

L.5 All hollow structural steel shapes shall be cold formed HSS ASTM A-500 grade C, unless otherwise noted.

L.6 Plate products shall comply with ASTM A-572 grade 50.

L WELDING

M.1 All Shop welds shall be executed in accordance with the latest edition of the American Welding Society Specifications.

M.2 Welding procedures shall comply in accordance with the AWS D1.1 – AWS Structural Welding Code-Steel.

M.3 All welds to be performed by a certified welder. All Welds shall be continuous where length is not given, unless otherwise shown or noted on drawings.

M.4 All welds shall develop the full strength of the weaker member. All welds shall be made using E70xx .035 wire.

M.5 Shop connections shall be welded unless noted otherwise. Field connections shall be indicated on the drawings. Field-welded connections are not acceptable.

M.6 All fillet welds shall be a minimum of ¼" unless otherwise noted.

M.7 All steel shall be welded shut at terminations to prevent internal leakage.

M.8 Internal weld sleeving is not acceptable.

M.9 On-site welding of any component is not acceptable .

M POWDER COATING

N.1 All steel should be sandblasted prior to powder coating using a G50 steel grit.

N.2 All steel parts shall be coated for rust protection and finished with a minimum 3.5 mil thick UV-inhibited weather resistant powder coating.

N.3 Characteristics

Powder used in the powder-coat process shall have the following characteristics:

N.3.1	Specific gravity:	1.68 ± 0.05
N.3.2	Theoretical coverage:	114 ± 4 ft 2/lb/mil
N.3.3	Mass loss during cure:	<1%
N.3.4	Maximum storage temp:	75 degrees F

N.4 Powder-coating shall meet the following tests:

ASTM D523-89	Gloss at 60 degrees	85-95
HOI TM 10.219	PCI Powder smoothness	7
ASTM D2454-91	Over-bake resistance time	200%
ASTM D3363-92A	Pencil hardness	H-2H
ASTM D2794-93	Dir/Rev Impact, Gardner	140/140 in/lbs
ASTM D3359-95, B	Adhesion, cross hatch	5B Pass
ASTM D522-93a	Flexibility Mandrel	¼ in. dia., no fracture
ASTM B 117-95	Salt Spray	1,000 hours
UL DtOV2	Organic Coating Steel enclosures, elect eq	Recognized

N.5 Application Criteria

N.5.1	Electrostatic spray, cold (Substrate: 0.032 in. CRS)	
N.5.2	Cure schedule:	10 minutes at 400 0 F
N.5.3	Pretreatment:	Bonderite 1000
N.5.4	Film Thickness:	3.5 Mils

N WARRANTY

After final payment, the contractor shall furnish the owner with a written **ten (10) year limited warranty,** which warrants that the fabric panels (cloth, stitching and fading), its perimeter attachment system and the structural support systems supplied and installed by the subcontractor has been installed in accordance with the project and manufacturer's specifications and will be free from defects in materials and workmanship which will impair its normal use or service. The structure carries a **10 year structural warranty.** The warranty shall extend from the date of substantial completion of the fabric panel shade structure, specifically

the first date on which the entire fabric panel system is subject to design pre-stress conditions.

Because of surety requirements, any performance and payment bond that may be required, will cover only the first year of the warranty. The manufacturers warranty will be a separate document between manufacturer and the Owner, and will be executed at the time of completion of the work.

END OF SECTION

SECTION 10800 - TOILET AND BATH ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Toilet room accessories.

B. Grab bars.

C. Attachment hardware.

1.02 PRODUCTS INSTALLED BUT NOT FURNISHED UNDER THIS SECTION

A. Section 09260 - Gypsum Board Systems: Placement of concealed anchor devices.

B. Section 09260 - Gypsum Board Systems: Placement of backing plate reinforcement.

1.03 RELATED SECTIONS

A. Section 08800 - Glazing: Wall mirrors.

B. Section 10170 – Solid Plastic Toliet Compartments.

1.04 REFERENCES

A. ANSI A117.1 Safety Standards for the Handicapped.

B. ASTM A123 Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

C. ASTM A167 Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

D. ASTM A269 Seamless and Welded Austenitic Stainless Steel Tubing for General Service.

E. ASTM A366 Steel, Carbon, Cold-Rolled Sheet, Commercial Quality.

F. ASTM B456 Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.

G. NEMA LD-3 High Pressure Decorative Laminates.

1.05 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data: Provide data on accessories describing size, finish, details of function, attachment methods.

C. Samples: Submit two (2) samples of each component, illustrating color and finish.

D. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

1.06 REGULATORY REQUIREMENTS

A. Conform to ANSI A117.1 code for access for the handicapped.

1.07 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on product data.

1.08 COORDINATION

A. Coordinate work under provisions of Section 01039.

B. Coordinate the work with the placement of internal wall reinforcement and reinforcement of toilet partitions to receive anchor attachments.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Bobrick. Refer to Drawings for designated items.

B. Other acceptable manufacturers offering equivalent products.
1. Bradley Washroom Accessories.
2. Gam Co Architectural Accessories

C. Substitutions: Under provisions of Section 01600.

2.02 MATERIALS

A. Stainless Steel Sheet: ASTM A167, Type 304.

B. Tubing: ASTM A269, stainless steel.

C. Adhesive: Two component epoxy type, waterproof.

D. Fasteners, Screws, and Bolts: Hot dip galvanized, tamper-proof.

E. Expansion Shields: Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

F. Primer: Not required - all stainless satin finishes.

2.03 FABRICATION

A. Weld and grind joints of fabricated components, smooth.

B. Form exposed surfaces from single sheet of stock, free of joints. Form surfaces flat without distortion. Maintain surfaces without scratches or dents.

C. Fabricate grab bars of tubing, free of visible joints, return to wall with end attachment flanges. Form bar with 1-1/2 inches clear of wall surface.

D. Shop assemble components and package complete with anchors and fittings.

E. Provide steel anchor plates, adapters, and anchor components for installation.

2.04 KEYING

A. Supply 2 keys for each accessory to Owner.

B. Master key all accessories.

2.05 FINISHES

A. Galvanizing: ASTM A123 to 1.25 oz/sq yd. Galvanize ferrous metal and fastening devices.

B. Shop Primed Ferrous Metals: Pretreat and clean, spray apply one (1) coat primer and bake.

C. Enamel: Pretreat to clean condition, apply one (1) coat primer and minimum two (2) coats epoxy baked enamel.

D. Chrome/Nickel Plating: ASTM B456, Type SC 2 polished finish.

E. Stainless Steel: No. 4 satin luster.

F. Back paint components where contact is made with building finishes to prevent electrolysis.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify site conditions under provisions of Section 01039.

B. Verify that site conditions are ready to receive work and dimensions are as indicated on shop drawings.

C. Verify exact location of accessories for installation.

3.02 PREPARATION

A. Deliver inserts and rough-in frames to site for timely installation.

B. Provide templates and rough-in measurements as required.

3.03 INSTALLATION

A. Install accessories in accordance with manufacturers' instructions and ANSI A117.1

B. Install plumb and level, securely and rigidly anchored to substrate.

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

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SECTION 32 1313

CONCRETE PAVING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Concrete curbs, gutters, walks, and paving.

B. Related Sections:
1. Division 01: Administrative, procedural, and temporary work requirements.
2. Section 03 1000 - Concrete Forms and Accessories.
3. Section 03 2000 - Concrete Reinforcement.
4. Section 03 3000 - Cast-In-Place Concrete.
5. Section 03 3500 - Concrete Finishing.
6. Section 07 9200 - Joint Sealers.

1.2 REFERENCES

A. ASTM International (ASTM) D1752 - Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.

PART 2 PRODUCTS

2.1 MATERIALS

A. Formwork:
1. Specified in Section 03 1000.
2. Metal Forms: Free of deformities, furnished in maximum practical lengths.
3. Wood Forms: Good grade lumber, sound and free of warp, minimum 2 inch nominal thickness except where extremely short radii of curves require thinner forms.

B. Reinforcement:
1. Specified in Section 03 2000.
2. Dowels: Plain round bar dowels, conforming to reinforcing steel requirements.

C. Concrete Materials: Specified in Section 03 3000.

2.2 ACCESSORIES

A. Joint Filler: Non asphaltic type, ASTM D1752with removable strip providing recess for joint sealer.

B. Joint Sealers: Specified in Section 07 9200.

PART 3 EXECUTION

3.1 CONSTRUCTION OF FORMS

A. Construct formwork in accordance with Section 03 1000.

B. Set forms accurately to required grades and alignment.

C. Brace forms to withstand loads applied during concrete placement.

D. Install flexible or curved forms of wood or metal for curves with radius of 300 feet or less.

E. Leave forms in place for minimum 12 hours after completion of finishing operation.

F. Provide expansion joints where paving abuts other construction, and at maximum 30 feet on center.
   1. Shape joint filler to concrete cross section and fasten in place.
   2. Provide holes for dowel bars maximum 1/8 inch larger than bar diameter.
   3. Use removable strips to provide recess for sealant.

3.2 PLACING REINFORCING

A. Install reinforcement in accordance with Section 03 2000.

B. Place reinforcing in middle third of flatwork.

C. Stop alternate bars of reinforcing steel at control joints.

D. Provide dowels at maximum 12 inches on center at expansion joints. Wrap one end of dowel in building paper or felt. Stop reinforcement on both sides of joint.

3.3 PLACING CONCRETE

A. Place concrete in accordance with Section 03 3000.

B. Place concrete continuously between predetermined expansion and control joints. Do not interrupt successive placement such that cold joints occur.

C. Shape curbs and gutters to cross section indicated on Drawings.

D. Strike off flatwork with screed, then float to uniform surface.

E. Provide broom finish in accordance with Section 03 3500.

F. Tool expansion joint edges and other exposed edges to smooth, dense surface with 1/8 inch radius.

G. Provide sawn tooled control joints at maximum 6 feet on center.

H. Installation Tolerances: Surfaces true to plane, in longitudinal direction to required grade, within plus or minus 1/4 inch in 10 feet, noncumulative.

I. Seal expansion joints as specified in Section 07 9200.

END OF SECTION

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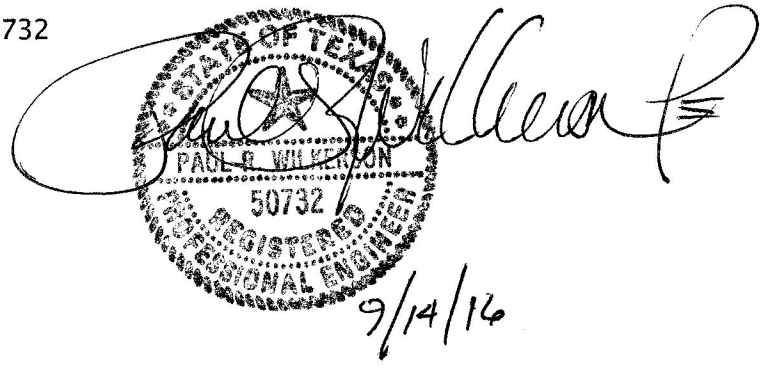
PLUMBING, MECHANICAL & ELECTRICAL
SPECIFICATIONS

SECTION	TITLE
15000	GENERAL PROVISIONS FOR MECHANICAL
15010	SHOP DRAWINGS, PRODUCT DATA AND SAMPLES
15100	SITE UTILITIES
15140	HANGERS AND SUPPORTS
15190	MECHANICAL IDENTIFICATION
15260	PIPING INSULATION
15300	FIRE PROTECTION SYSTEM
15300	FIRE PROTECTION PIPING
15410	PLUMBING PIPING
15430	PLUMBING SPECIALTIES
15440	PLUMBING FIXTURES
15800	HVAC GENERAL PROVISIONS
16000	GENERAL PROVISIONS FOR ELECTRICAL
16010	SHOP DRAWINGS, PRODUCT DATA AND SAMPLES
16110	CONDUIT
16120	BUILDING WIRE AND CABLE
16130	BOXES
16140	WIRING DEVICES
16160	CIRCUIT AND MOTOR DISCONNECTS
16170	GROUNDING AND BONDING
16190	SUPPORTING DEVICES
16195	ELECTRICAL IDENTIFICATION
16420	UTILITY SERVICE ENTRANCE
16460	DRY TYPE TRANSFORMERS
16470	PANELBOARDS
16510	LUMINAIRES
16720	FIRE ALARM SYSTEM
16780	COMMUNICATIONS AND COMPUTER SYSTEMS
16785	COSA SYSTEMS WIRING STANDARDS
2009 INTERNATIONAL ENERGY CONSERVATION CODE CERTIFICATES	

Paul Wilkerson, PE Texas # 50732
Power Systems
Firm #F-6257



SECTION 15000 GENERAL PROVISIONS FOR MECHANICAL

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 16000, 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, 2009 Edition.

B. All mechanical work shall be in accordance with the requirements of the International Mechanical Code, 2009 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 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 16 of these specifications. The Contractor for each section shall erect all his motors in place ready for connections. The Contractor, under Division 16, 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 16. 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 16. 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 15 and 16 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 15010 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

1 PART 1 - GENERAL

1.1 DESCRIPTION

A. Related Work Specified Elsewhere:

1. Construction Schedules: Section 01310.

2. Project Record Documents: Section 01711.

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 CONTRACTORIS 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 15100 SITE UTILITIES

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 (NOT USED)

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 Sate 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: Water service is existing to the Restroom Building.

B. Sanitary Sewer: Install new sewer line to the existing lift station. Verify invert elevations before installing pipe.

C. 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 16420.

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.

END OF SECTION

SECTION 15140 HANGERS AND SUPPORTS

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 15260 - Piping Insulation.

B. Section 15410 - 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 gage thick galvanized steel.

B. Metal Counterflashing: 22 gage 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 gage minimum; 16 gage at fire resistant elements.

2.5 EQUIPMENT CURBS

A. Fabrication: Welded 18 gage 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 gage thick galvanized steel.

B. Sleeves for Pipes Through Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Steel pipe or 18 gage 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 Feet	HANGER ROD DIAMETER 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 15190 MECHANICAL IDENTIFICATION

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.)

Systems	Band Color	Label
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 15260 PIPING INSULATION

1 PART 1 GENERAL

1.1 SECTION INCLUDES

A. Piping insulation.

B. Jackets and accessories.

1.2 RELATED SECTIONS

A. Section 15190 - Mechanical Identification.

B. Section 15410 - 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.

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: 1/2 inch.

3. Condensate Drain Lines:
a. Thickness: 3/8 inch.

4. Refrigerant Suction:
a. Thickness: 3/4 inch.

END OF SECTION

SECTION 15300 FIRE PROTECTION

1 PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including GENERAL and SUPPLEMENTARY CONDITIONS and DIVISION 1 SPECIFICATION SECTIONS apply to this Section.

B. Section 15000, GENERAL PROVISIONS FOR MECHANICAL.

C. Section 15100, SITE UTILITIES.

D. Section 15190, MECHANICAL IDENTIFICATION for labeling and identification of fire protection piping system and components.

1.2 SUMMARY

A. This Section specifies automatic sprinkler systems for buildings and structures. Materials and equipment specified in this Section include:

Pipe, fittings, valves, and specialties. Sprinklers and accessories.

B. Products furnished include, but are not limited to, sprinkler head cabinet or cabinets with spare heads and wrenches. Locate as directed by the Owner's maintenance personnel or Engineer.

1.3 DEFINITIONS

A. Pipe sizes used in this Specification are Nominal Pipe Size (NPS).

B. Other definitions for fire protection systems are listed in NFPA Standards 13, 14, 24, and 25.

C. Working Plans as used in this Section means those documents (including drawings and calculations) prepared pursuant to the requirements contained in NFPA 13, NFPA 14, NFPA 24, and NFPA 25 for obtaining approval of the authority having jurisdiction.

1.4 SYSTEM DESCRIPTION

A. Fire protection system is an integrated system of underground and overhead piping designed in accordance with NFPA standards. The installation includes a network of piping, hydraulically designed, to supply water to fire sprinklers throughout the structure.

B. On wet pipe sprinkler systems, small (less than 40 gallon capacity) anti-freeze systems may be utilized to protect unheated areas.

C. Unless specified or required otherwise by NFPA 13, the following system) minimum densities over the design area shall be provided:

System Design Densities

a. Light Hazard: 0.10 gpm/sq. ft.
b. Ordinary Hazard 1: 0.15 gpm/sq. ft.
c. Ordinary Hazard 2: 0.20 gpm/sq. ft

D. A minimum of 5 psi or 10%, which ever is greater, safety pressure shall be available at the connection to the public water supply for the total water required, including hose allowances required for the system.

E. Water Flow Data:

Static Pressure
Residual Pressure
Flow
Date:
Time:
By:

F. Provide tamper switches on each control valve and water flow switches as noted for interface with building fire alarm system.

1.5 SUBMITTALS

A. Product Data for each type sprinkler head, valve, piping specialty, fire protection specialty, fire department connection.

B. Shop Drawings prepared in accordance with NFPA 13 identified as “Working Plans”, including hydraulic calculations where applicable, and which have been approved by the authority having jurisdiction.

C. Maintenance Data for each type sprinkler head, valve, piping specialty, fire protection specialty, fire department connection, for inclusion in operating and maintenance manual specified in Division 1 and Section 15000, GENERAL PROVISIONS FOR MECHANICAL.

D. Welders’ qualification certificates.

E. Test Reports and Certificates including “Contractor’s Material & Test Certificate for Aboveground Piping” and “Contractor’s Material & Test Certificate for Underground Piping” as described in NFPA 13.

1.6 QUALITY ASSURANCE

A. Contractor Qualifications: The fire sprinkler system contractor shall hold and maintain a Certificate of Registration issued by the State Fire Marshal in accordance with the Texas Insurance Code –Chapter Five, Subchapter C, Article 5.43-3. Upon request, submit evidence of such qualifications to the Architect.

B. Installer Qualifications: Installation and alterations of fire protection piping, equipment, specialties, and accessories, and repair and servicing of equipment shall be performed only by a qualified installer. The term qualified means experienced in such work (experienced shall mean having minimum of 5 previous projects similar in size and scope to this project), familiar with all precautions required, and has complied with all the requirements of the authority having jurisdiction. Upon request, submit evidence of such qualifications to the Architect.

C. Qualifications for Welding Processes and Operators: Comply with the requirements of AWS D10.9. Specifications for Qualifications of Welding Procedures and Welders for Piping and Tubing, Level AR-3."

D. Regulatory Requirements: Comply with the requirements of the following codes:

NFPA - Standard for the Installation of Sprinkler Systems. Use the latest version of the NFPA codes for system requirements. Where those requirements conflict with the requirements of this section, the NFPA codes shall prevail.

UL and FM Compliance: Fire protection system materials and components shall be Underwriter's Laboratories listed and labeled, and Factory Mutual approved for the application anticipated.

Texas Insurance Code – Article 5.43-3.

1.7 SEQUENCING AND SCHEDULING

A. Schedule rough-in installations with installations of other building components.

1.8 EXTRA MATERIALS

A. Head Wrenches: Furnish to Owner two (2) head wrenches for each type of sprinkler head installed.

B. Sprinkler Heads and Cabinets: Furnish six extra sprinkler heads of each style included in the project. Furnish each style with its own sprinkler head cabinet and special wrenches as specified in this Section.

2 PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer: Subject to compliance with requirements, provide fire protection system products from one of the following:

Gate Valves and Ball Valves:

Fairbanks
Jenkins
Kennedy Valve, Div of ITT Grinell Valve Co., Inc.
Stockham

Backflow Preventers:

Ames Company
FEBCO
Watts Regulator

Swing Check Valves:

Fairbanks
Jenkins
Kennedy Valve, Div of ITT Grinell Valve Co., Inc.
Stockham

Grooved Mechanical Couplings:

Stockham
Victaulic Company of America
Central Grooved piping Products

Water Flow Indicators:

Potter Electric Signal Company
System Sensor

Fire Department Connection Valve:

Fire Protection Products Inc
Potter Roemer, Inc.
Elkhart Brass Manufacturing Company.

Sprinkler Heads:

Central Sprinkler Corp.
Firematic Sprinkler Devices, Inc.
Gem Sprinkler Company.
Reliable Automatic Sprinkler Co., Inc.
Star Sprinkler Corp.
Viking Corp.

2.2 PIPE AND TUBING MATERIALS

A. General: Refer to Part 3 Article "PIPE APPLICATIONS" for identification of systems where the below specified pipe and fitting material are used.

2.3 FITTINGS

A. Cast-iron Threaded Fittings: ANSI B16.4, Class 125, standard pattern, for threaded joints. Threads shall conform to ANSI B1.20.1.

B. Malleable-Iron Threaded Fittings: ANSI B16.3, Class 125, standard pattern, for threaded joints. Threads shall conform to ANSI B1.20.1.

C. Steel Fittings: ASTM A 234, seamless or welded, for welded joints.

D. Grooved Mechanical Fittings: ASTM A 536, Grade 65-45-12 ductile iron; ASTM A 47 Grade 32510 malleable iron; or ASTM A53, Type F or Types E or S, Grade B fabricated steel fittings with grooves or shoulders designed to accept grooved end couplings.

E. Grooved Mechanical Couplings: consist of ductile or malleable iron housing, a synthetic rubber gasket of a central cavity pressure-responsive design; with nuts, bolts, locking pin, locking toggle, or lugs to secure roll-grooved pipe and fittings.

F. Cast-iron Threaded Flanges: ANSI B16.1, Class 125; raised ground face, bolt holes spot faced.

2.4 JOINING MATERIALS

A. Welding Materials: Comply, with Section II, Part C, ASME Boiler and Pressure Vessel Code for welding materials appropriate for the wall thickness and chemical analysis of the pipe being welded.

B. Gasket Materials: thickness, material, and type suitable for fluid or gas to be handled, and design temperatures and pressures.

2.5 GENERAL DUTY VALVES

A. Gate Valves - 2 Inch and Smaller: body and bonnet of cast bronze, 125 pound cold water working pressure - non-shock, threaded ends, solid

wedge, outside screw and yoke, rising stem, screw-in bonnet, and malleable iron handwheel. Valves shall be capable of being repacked under pressure, with valve wide open.

B. Gate Valves - 2-1/2 Inch and Larger: UL Listed and FM Approved for fire protection service; iron body; bronze mounted, 125 pound cold water working pressure - non-shock. Valves shall have solid taper wedge; outside screw and yoke, rising stem; flanged bonnet, with body and bonnet conforming to ASTM A 126 Class B; replaceable bronze wedge facing rings; flanged ends; and a packing assembly consisting of a cast iron gland flange, brass gland, packing, bonnet, and bronze bonnet bushing. Valves shall be capable of being repacked under pressure, with valve wide open.

C. Ball Valves: MSS SP-110; UL Listed, FM Approved, Two piece body, chrome plated ball. Valve shall have a blowout-proof stem and reinforced TFE seats.

D. Swing Check Valves: MSS SP-71; Class 125, cast iron body and bolted cap conforming to ASTM A 126, Class B; horizontal swing, with a bronze disc or cast iron disc with bronze disc ring, and flanged ends. Valve shall be capable of being refitted while the valve remains in the line.

2.6 SPECIALTY VALVES

A. Alarm Check Valve: 125 psig working pressure, designed for horizontal or vertical installations, and have cast iron, flanged or grooved inlet and outlet, bronze grooved seat with “O” ring seals, single hinge pin and latch design. Provide trim sets for bypass, drain, electric sprinkler alarm switch, pressure gages, precision retarding chamber, drip cup assembly piped with check valve to main drain line, and fill line attachment with strainer.

B. DOUBLE CHECK ASSEMBLY: shall have two independently operated spring loaded cam-check valves, required testing cocks, and inlet and outlet O. S. & Y. shut off valves. Cam check valve shall be internally loaded and provide a positive drip tight closure against the reverse flow of liquid caused by back siphonage or back pressure.

2.7 AUTOMATIC SPRINKLERS

A. Sprinkler Heads: Fusible link or glass bulb type; style as indicated or required by the application. Unless otherwise indicated or required, provide heads with nominal 1/2 inch NPT, for “Ordinary” temperature range.

B. Sprinkler Head Finishes: Provide heads with the following finishes:

Upright, Pendent, and Sidewall Styles: chrome plated in finish spaces, exposed to view; rough bronze finish for heads in unfinished spaces and not exposed to view. Heads shall be wax-coated where exposed to acids, chemicals,. or other corrosive fumes.

Concealed Sprinklers: to be used in all finish ceilings except storage areas and mechanical rooms. Mating cover plates shall be white.

C. Sprinkler Head Cabinet and Wrench: furnish steel cabinet, suitable for wall mounting, with hinged cover space for 6 spare sprinkler heads plus sprinkler head wrench. Provide a separate cabinet and wrench for each style sprinkler head on the project.

2.8 FIRE DEPARTMENT CONNECTIONS

A. Siamese Connections: Flush mounted polished cast brass with two-way connections. Connection sizes shall be 4 inch outlet and two 2-1/2 inch female inlets, having threads compatible with those of the local fire department equipment. Each inlet shall have a clapper valve, and brass cap and brass chain. Unit shall have wall escutcheon of cast brass, finished to match the fire department connection, with words “AUTO SPKR - FIRE DEPT CONNECTION,” in raised letters.

2.9 ALARM DEVICES

A. General: Types and sizes shall mate and match piping and equipment connections.

B. Water Flow Indicators: Vane type waterflow detector, rated to 250 psig; designed for horizontal or vertical installation; have 2-SPDT circuit switches to provide isolated alarm and auxiliary contacts, 7 ampere 125 volts AC and 0.25 ampere 24 Volts DC; complete with factory-set, field-adjustable retard element to prevent false signals, and tamper-proof cover which sends a signal when cover is removed.

C. Supervisory Switches: SPDT, normally closed/open contacts, designed to signal valve in other than full open position.

D. Water Motor Alarm: hydraulically operated mechanical device actuated by flow of water and sounds a continuous alarm while one or more sprinkler heads operate. Locate gong and drain as directed by Engineer.

3 PART 3 EXECUTION

3.1 PIPE APPLICATIONS

A. Install Schedule 40 steel pipe with threaded joints and fittings for 2 inch and smaller. Schedule 10 steel pipe with roll grooved joints for 2-1/2 inch

and larger in wet pipe systems. Schedule 40 galvanized steel pipe in dry pipe and pre-action systems.

B. At the Contractor's option, install Schedule 40 steel pipe with roll-grooved ends and grooved mechanical couplings.

3.2 PIPING INSTALLATIONS

A. Locations and Arrangements: Drawings (plans, schematics, and diagrams) indicate the general location and arrangement of piping systems. So far as practical, install piping as indicated. Unless approved by the Architect or Engineer, all piping in finished areas shall be concealed.

B. Install piping to conserve building space, to not interfere with use of space and other work. Install risers as near the walls as possible.

C. Install sprinkler piping to provide for system drainage in accordance with NFPA 13. Pipe all drains to the outside.

D. Use approved fittings to make all changes in direction, branch takeoffs from mains, and reductions in pipe sizes.

E. Hangers and Supports: Comply with the requirements of NFPA 13. Hanger and support spacing and locations for piping joined with grooved mechanical couplings shall be in accordance with the grooved mechanical coupling manufacturer's written instructions, for rigid systems. Provide protection from damage where subject to earthquake in accordance with NFPA 13.

F. Make connections between underground and aboveground piping using an approved transition piece strapped or fastened to prevent separation.

G. Install test connections sized and located in accordance with NFPA 13 complete with shutoff valve. Test connections may also serve as drain pipes.

H. Install pressure gage on the riser or feed main at or near each test connection. Provide gage with a connection not less than 1/4 inch and having a soft metal seated globe valve, arranged for draining pipe between gage and valve. Install gages to permit removal, and where they will not be subject to freezing.

I. Install double check backflow preventer assembly approved for fire sprinkler service.

3.3 PIPE JOINT CONSTRUCTION

A. Welded Joints: AWS D10.9, Level AR-3.

B. Threaded Joints: conform to ANSI B1.20.1, tapered pipe threads for field cut threads. Join pipe, fittings and valves as follows:

Note the internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint.

Align threads at point of assembly.

Apply appropriate tape or thread compound to the external pipe threads.

Assemble joint to appropriate thread depth. When using a wrench on valves place the wrench on the valve end into which the pipe is being threaded.

Damaged Threads: Do not use pipe with threads which are corroded or damaged. If a weld opens during cutting or threading operations, that portion of pipe shall not be used.

C. Flanged Joints: Align flanges surfaces parallel. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly to appropriate torque specified by the bolt manufacturer.

D. Mechanical Grooved Joints: cut or roll grooves on pipe ends dimensionally compatible with the couplings.

E. End Treatment: After cutting pipe lengths, remove burrs and fins from pipe ends.

3.4 VALVE INSTALLATIONS

A. General: Install fire protection specialty valves, fittings, and specialties in accordance with the manufacturer's written instructions, NFPA 13 and the authority having jurisdiction.

B. Gate Valves: Install supervised-open gate valves so located to control all sources of water supply except fire department connections. Where there is more than one control valve, provide permanently marked identification signs indicating the portion of the system controlled by each valve. Refer to Division-15 Section "Mechanical Identification" for valve tags and signs.

C. Alarm Valve: Install valve in the vertical position, in proper direction of flow including the bypass check valve and retard chamber drain line

connection. Install valve trim in accordance with the valve manufacturer's appropriate trim diagram. Test valve for proper operation.

3.5 SPRINKLER HEAD INSTALLATIONS

A. Use proper tools to prevent damage during installations.

3.6 FIRE DEPARTMENT CONNECTION INSTALLATIONS

A. Install automatic drip valve at the check valve on the fire department connection to the system.

B. Install mechanical sleeve seal pipe penetration in outside walls.

3.7 FIELD QUALITY CONTROL

A. Flush, test, inspect sprinkler piping systems in accordance with NFPA 13. Provide documents per Chapter 8 of NFPA 13 and Article 5.43-3 of the Texas Insurance Code.

B. Replace system piping components which do not pass the test procedures specified, and retest repaired portion of the system.

3.8 SYSTEM ACCEPTANCE AND CLOSEOUT:

A. The contractor's material and test certificates for aboveground and underground piping, all manufacture's literature describing the proper operation and maintenance of any installed equipment or devices, and one NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-based Fire Protection Systems* shall be placed in a binder and provided to the Owner.

B. A set of as-built plans and hydraulic calculations shall be provided to the owner.

C. In addition to the above documents, a copy of the contractor's material and test certificates for aboveground and underground piping , all manufacture's literature describing the proper operation and maintenance of any installed equipment and devices, a set of as-built plans and hydraulic calculations shall be placed in a water-proof envelope and affixed on or near the system riser.

D. All required signs and service tags shall be attached to the system in such a position as to permit convenient inspection and not hamper its actuation or operation.

END OF SECTION

SECTION 15310 FIRE PROTECTION PIPING

1 PART 1 GENERAL

1.1 SECTION INCLUDES

A. Pipe, fittings, valves, and connections for sprinkler systems.

1.2 REFERENCES

A. ASME B16.1 - Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, and 800.

B. ASME B16.3 - Malleable Iron Threaded Fittings, Class 150 and 300.

C. ASME B16.4 - Cast Iron Threaded Fittings, Class 125 and 250.

D. ASME B16.5 - Pipe Flanges and Flanged Fittings.

E. ASME B16.9 - Factory-made Wrought Steel Buttwelding Fittings.

F. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.

G. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.

H. ASTM A135 - Electric-Resistance-Welded Steel Pipe.

I. ASTM A53 - Pipe, Steel, Black and Hot-Dipped, Zinc-coated Welded and Seamless.

J. ASTM A234 - Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures.

K. ASTM A795 - Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use.

L. AWS D10.9 - Specifications for Qualification of Welding Procedures and Welders for Piping and Tubing.

M. NFPA 13 - Installation of Sprinkler Systems.

N. UL 262 - Gate Valves for Fire-Protection Service.

O. UL 312 - Check Valves for Fire-Protection Service.

1.3 REGULATORY REQUIREMENTS

A. City of San Angelo, Texas building codes.

B. Conform to UL. and FM.

C. Sprinkler Systems: Conform work to NFPA 13.

D. Welding Materials and Procedures: Conform to AWS D10.9.

E. Valves: Bear UL and FM label or marking. Provide manufacturer's name and pressure rating marked on valve body.

F. Products Requiring Electrical Connection: Listed and classified as suitable for the purpose specified and indicated.

1.4 DELIVERY, STORAGE, AND PROTECTION

A. Deliver and store valves in shipping containers, with labeling in place.

B. Provide temporary protective coating on cast iron and steel valves.

C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

2 PART 2 PRODUCTS

2.1 ABOVE GROUND PIPING

A. Steel Pipe: ASTM A135 UL listed, threadable, light wall; Schedule 10 black.
1. Cast Iron Fittings: ASME B16.4, threaded fittings.
2. Malleable Iron Fittings: ASME B16.3, threaded fittings.
3. Mechanical Grooved Couplings: Malleable iron housing clamps to engage and lock, "C" shaped elastomeric sealing gasket, steel bolts, nuts, and washers; galvanized for galvanized pipe.
4. Mechanical Formed Fittings: Carbon steel housing with integral pipe stop and O-ring pocked and O-ring, uniformly compressed into permanent mechanical engagement onto pipe.

2.2 PIPE HANGERS AND SUPPORTS

A. Conform to NFPA 13.

B. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Carbon steel, adjustable swivel.

C. Hangers for Pipe Sizes 2 inches and Over: Carbon steel, adjustable, clevis.

D. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.

E. Vertical Support: Steel riser clamp.

F. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

2.3 GATE VALVES

3 PART 3 EXECUTION

3.1 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and foreign material, from inside and outside, before assembly.

C. Prepare piping connections to equipment with flanges or unions.

3.2 INSTALLATION

A. Install piping in accordance with NFPA 13 for sprinkler systems. Unless specifically approved by the Architect/Engineer, all piping in finished areas shall be concealed.

B. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.

C. Install piping to conserve building space, to not interfere with use of space and other work. Install risers as near the walls as possible.

D. Group piping whenever practical at common elevations.

E. Sleeve pipes passing through partitions, walls, and floors.

F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

G. Inserts:
   1. 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.

H. Pipe Hangers and Supports:
   1. Install in accordance with NFPA 13.
   2. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
   3. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
   4. Support vertical piping at every floor. Support riser piping independently of connected horizontal piping.
   5. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.

I. Slope piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe level.

J. Prepare pipe, fittings, supports, and accessories for finish painting. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding. Refer to Section 09900.

K. Do not penetrate building structural members unless indicated.

L. Provide sleeves when penetrating floors and walls. Seal pipe and sleeve penetrations to achieve fire resistance equivalent to fire separation required.

M. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

N. Die cut threaded joints with full cut standard taper pipe threads with red lead and linseed oil or other non-toxic joint compound applied to male threads only.

O. Install valves with stems upright or horizontal, not inverted. Remove protective coatings after installation.

P. Provide gate or butterfly valves for shut-off or isolating service.

Q. Provide drain valves at main shut-off valves, low points of piping and apparatus.

END OF SECTION

SECTION 15410 PLUMBING PIPING

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 15190 - Mechanical Identification.

B. Section 15260 - 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 City of San Angelo standards.

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 City of San Angelo Plumbing Code, and the 2006 International Plumbing Code.

B. Conform to code for installation of backflow prevention devices.

C. Provide certificate of compliance from the City of San Angelo 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

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

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

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: Grinell 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 15260.

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 15100 for work of this Section.

N. Backfill in accordance with Section 15100 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.

C. Provide new gas service or tie to existing gas line as shown on drawings. Gas service distribution piping to have initial minimum pressure of 5 pounds. Provide regulators on each building service line as shown on Drawings, sized in accordance with equipment. Regulator to be Rockwell 143 or equal for demands up to 800 CFH and Rockwell 243 or equal for demands up to 2500 CFH.

END OF SECTION

SECTION 15430 PLUMBING SPECIALTIES

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 15410 - Plumbing Piping.

B. Section 15440 - 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.

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 15440 PLUMBING FIXTURES

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 15140 - Supports and Anchors.

B. Section 15410 - Plumbing Piping.

C. Section 15430 - 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 to 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

	Hot	Cold	Waste	Vent
Water Closet:		1 inch	4 inch	3 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

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. Rooftop Heating/Cooling Units
26. Controls

F. CODES

1. Comply with International Mechanical Code, 2009 Edition.
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. Rooftop Heating/Cooling Units

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 16 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 16 - 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 16000 GENERAL PROVISIONS FOR ELECTRICAL

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, 2009 Edition.

B. All mechanical work shall be in accordance with the requirements of the International Mechanical Code, 2009 Edition.

C. All electrical work shall be in accordance with the requirements of the National Electrical Code, 2008 Edition.

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 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 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 16 of these specifications. The Contractor for each section shall erect all his motors in place ready for connections. The Contractor, under Division 16, 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 16. 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 16. 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 15 and 16 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.

END OF SECTION

SECTION 16010 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

1 PART 1 - GENERAL

1.1 DESCRIPTION

A. Related Work Specified Elsewhere:

1. Construction Schedules: Section 01310.

2. Project Record Documents: Section 01711.

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 CONTRACTORIS 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 16110 CONDUIT

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 16130 - Boxes.

B. Section 16170 - Grounding and Bonding.

C. Section 16190 - Supporting Devices.

D. Section 16195 - 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.

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 REDH$_2$OT 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 16190.

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 16170.

Y. Identify conduit under provisions of Section 16195.

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 16120 BUILDING WIRE AND CABLE

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 16195 - Electrical Identification.

B. Section 16780 - 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

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.

F. Size: 22 gauge, single pair.

G. Aluminum Foil Shield.

H. Raceway: Not required.

2.8 TELEPHONE CABLE

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: Refer to drawings for conduit requirements.

2.9 COMPUTER CABLE

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.

E. Size: 24 gauge, 4 pair twisted.

F. The Owner's Representative will install all computer cabling and terminations, UNLESS OTHERWISE NOTED in Specifications Section 16780 or on the drawings.

G. Unshielded.

H. Raceway: Refer to drawings for conduit requirements.

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

A. Description: 75 ohm coaxial cable, Belden type 9104 or equal, RG-59.

B. Conductor: Copper.

C. Insulation: Gas Injected.

D. Jacket: PVC, black.

E. Size: 18 gauge

F. Shielded.

G. Raceway: Not required.

2.11 SECURITY SYSTEM CABLING

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 16195. 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

SECTION 16130 BOXES

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 16140 - Wiring Devices: Wall plates in finished areas.

B. Section 16160 - Cabinets and Enclosures.

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 Section 16160.

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 16140.

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 16140 WIRING DEVICES

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 16130 - 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 16160 CIRCUIT AND MOTOR DISCONNECTS

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 directly on Roof Top Unit cabinets. Do not install solely on stubbed conduit.

END OF SECTION

SECTION 16170 GROUNDING AND BONDING

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 16190 SUPPORTING DEVICES

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 16195 ELECTRICAL IDENTIFICATION

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
F. controls, devices and covers of electrical enclosures.

END OF SECTION

SECTION 16420 UTILITY SERVICE ENTRANCE

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. Underground service entrance.

1.2 RELATED SECTIONS

A. Section 16110 - Conduit.

B. Section 16170 - Grounding and Bonding.

1.3 REFERENCES

A. ANSI/NFPA 70 - National Electrical Code.

1.4 SYSTEM DESCRIPTION

A. Utility Company: AEP West Texas Utilities 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. Meter is existing at transformer.

2.2 UTILITY METER BASE

A. Meter base is existing.

2.3 CT CABINET

A. CT Cabinet is existing.

2.4 MAIN OUTDOOR DISCONNECT SWITCH

A. Not required since building is fully sprinklered.

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 from utility metering equipment and provide trenching for all service conduits.

B. Install main indoor panelboard for each service entering a building.

END OF SECTION

SECTION 16460 DRY TYPE TRANSFORMERS

1 PART 1 GENERAL

1.1 SECTION INCLUDES

A. Two-winding transformers.

B. Buck-and-boost transformers.

1.2 RELATED SECTIONS

A. Section 16110 - Conduit: Flexible conduit connections.

B. Section 16170 - Grounding and Bonding.

1.3 REFERENCES

A. NEMA ST 1 - Specialty Transformers (Except General-Purpose Type).

B. NEMA ST 20 - Dry-Type Transformers for General Applications.

C. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment (International Electrical Testing Association).

D. NFPA 70 - National Electrical Code.

1.4 SUBMITTALS FOR REVIEW

A. Product Data: Provide outline and support point dimensions of enclosures and accessories, unit weight, voltage, kVA, and impedance ratings and characteristics, tap configurations, insulation system type, and rated temperature rise.

1.5 SUBMITTALS FOR INFORMATION

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years experience.

1.7 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.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

B. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to transformer internal components, enclosure, and finish.

2 PART 2 PRODUCTS

2.1 TWO-WINDING TRANSFORMERS

A. Manufacturers:
1. Square D Model EE.
2. General Electric Model QMS; QL.
3. Substitutions: Permitted.

B. Description: NEMA ST 20, factory-assembled, air cooled dry type transformers, ratings as indicated.

C. Primary Voltage: 480 volts, 3 phase.

D. Secondary Voltage: 208/120 volts, 3 phase.

E. Insulation system and average winding temperature rise for rated kVA as follows:
1. 1-15 kVA: Class 185 with 80 degrees C rise.
2. 16-500 kVA: Class 220 with 80 degrees C rise.

F. Winding Taps:
1. Transformers Less than 15 kVA: Two 5 percent below rated voltage, full capacity taps on primary winding.
2. Transformers 15 kVA and Larger: NEMA ST 20.

G. Sound Levels: NEMA ST 20.

H. Basic Impulse Level: 10 kV.

I. Ground core and coil assembly to enclosure by means of a visible flexible copper grounding strap.

J. Mounting:
1. 1-15 kVA: Suitable for wall mounting.
2. 16-75 kVA: Suitable for floor mounting.

3. Larger than 75 kVA: Suitable for floor mounting.

K. Coil Conductors: Continuous copper windings with terminations brazed or welded.

L. Enclosure: NEMA ST 20, Type 1 ventilated. Provide lifting eyes or brackets.

M. Isolate core and coil from enclosure using vibration-absorbing mounts.

N. Nameplate: Include transformer connection data.

2.2 SOURCE QUALITY CONTROL

A. Production test each unit according to NEMA ST20.

3 PART 3 EXECUTION

3.1 INSTALLATION

A. Set transformer plumb and level.

B. Use flexible conduit, under the provisions of Section 16110, 2 feet minimum length, for connections to transformer case. Make conduit connections to side panel of enclosure.

C. Mount wall-mounted transformers using integral flanges or accessory brackets furnished by the manufacturer.

D. Mount floor-mounted transformers on vibration isolating pads suitable for isolating the transformer noise from the building structure.

E. Provide grounding and bonding in accordance with Section 16170.

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 7.2.

3.3 ADJUSTING

A. Measure primary and secondary voltages and make appropriate tap adjustments.

END OF SECTION

SECTION 16470 PANELBOARDS

1 PART 1 GENERAL

1.1 SECTION INCLUDES

A. Distribution panelboards.

B. Branch circuit panelboards.

C. Load centers.

1.2 RELATED SECTIONS

A. Section 16170 - Grounding and Bonding.

B. Section 16195 - 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 NEHB for 480 volt and NQOD 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

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 16170.

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 16510 LUMINAIRES

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.

D. Furnish two of each ballast type.

2 PART 2 PRODUCTS

2.1 LUMINAIRES

A. Manufacturers:
1. Lithonia.
2. Hubbell.
3. Cooper.
4. Substitutions: Permitted.

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 FLUORESCENT BALLASTS

A. Manufacturers:
1. Howard.
2. Advance.
3. Substitutions: Permitted.

B. Furnish products as specified in schedules.

2.5 HIGH INTENSITY DISCHARGE (HID) BALLASTS

A. Furnish products as specified in schedules.

2.6 LAMPS

A. Lamp Types: As specified for luminaire. Refer to schedules.

B. Reflector Lamp Beam Patterns: ANSI C78.379.

C. Fluorescent lamps to be warm white, 3500 deg. K, T8. LED fixtures to be 3000 deg K.

2.7 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 16130.

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.

END OF SECTION

SECTION 16720 FIRE ALARM SYSTEM

PART 1.0 - GENERAL

1.1. DESCRIPTION:

A. This section of the specification includes the furnishing, installation, connection and testing of the microprocessor controlled, conventional or intelligent reporting fire alarm equipment required to form a complete, operative, coordinated system. It shall include, but not be limited to, alarm initiating devices, alarm notification appliances, Fire Alarm Control Panel (FACP), auxiliary control devices, annunciators, and wiring as shown on the drawings and specified herein.

B. The fire alarm system shall comply with requirements of NFPA Standard No. 72 for Protected Premises Signaling Systems except as modified and supplemented by this specification. The system field wiring shall be supervised either electrically or by software-directed polling of field devices and other applicable standards.

1. The Secondary Power Source of the fire alarm control panel will be capable of providing at least 24 hours of backup power with the ability to sustain 5 minutes in alarm at the end of the backup period.

C. The fire alarm system shall be manufactured by an ISO 9001 certified company and meet the requirements of BS EN9001: ANSI/ASQC Q9001-1994.

D. The FACP and peripheral devices shall be manufactured 100% by a single U.S. manufacturer (or division thereof).

E. Underwriters Laboratories Inc. (UL) - USA:

No. 38 Manually Actuated Signaling Boxes
No. 50 Cabinets and Boxes
No. 864 Control Units for Fire Protective Signaling Systems
No. 268 Smoke Detectors for Fire Protective Signaling Systems
No. 268A Smoke Detectors for Duct Applications
No. 346 Waterflow Indicators for Fire Protective Signaling Systems
No. 464 Audible Signaling Appliances
No. 521 Heat Detectors for Fire Protective Signaling Systems
No. 1971 Visual Notification Appliances

F. The installing company shall employ NICET (minimum Level III) technicians on site to guide the final check-out and to ensure the systems integrity. All fire alarm system components, except conduit and boxes and cable, shall be installed by the licensed fire alarm company technician, NO EXCEPTIONS.

1.2. SCOPE:

A. An intelligent or conventional, microprocessor-controlled, fire alarm detection system shall be installed in accordance to the project specifications and drawings.

B. Basic Performance:

1. Alarm, trouble and supervisory signals from all intelligent reporting devices shall be encoded on NFPA Style 4 Signaling Line Circuits (SLC).

2. Initiation Device Circuits (IDC) shall be wired Class B as part of an addressable device connected by the SLC Circuit.

3. Notification Appliance Circuits (NAC) shall be wired Class B as part of an addressable device connected by the SLC Circuit.

4. All circuits shall be power-limited, per 1995 UL864 requirements.

5. A single ground fault or open circuit on the system Signaling Line Circuit shall not cause system malfunction, loss of operating power or the ability to report an alarm.

6. Alarm signals arriving at the main FACP shall not be lost following a primary power failure or outage of any kind until the alarm signal is processed and recorded.

C. BASIC SYSTEM FUNCTIONAL OPERATION

When a fire alarm condition is detected and reported by one of the system initiating devices, the following functions shall immediately occur:

1. The system Alarm LED on the FACP shall flash.

2. A local sounder with the control panel shall sound.

3. A backlit 80-character LCD display on the intelligent FACP shall indicate all information associated with the fire alarm condition, including the type of alarm point and its location within the protected premises.

4. In response to a fire alarm condition, the system will process all control programming and activate all system outputs (alarm notification appliances and/or relays) associated with the point(s) in alarm

1.3. SUBMITTALS

A. General:

1. Six copies of all submittals shall be submitted to the Architect/Engineer for review.

2. All references to manufacturer's model numbers and other pertinent information herein is intended to establish minimum standards of performance, function and quality. Equivalent compatible UL-listed equipment from other manufacturers may be substituted for the specified equipment as long as the minimum standards are met.

3. For equipment other than that specified, the contractor shall supply proof that such substitute equipment equals or exceeds the features, functions, performance, and quality of the specified equipment.

B. Shop Drawings:

1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.

2. Include manufacturer's name(s), model numbers, ratings, power requirements, equipment layout, device arrangement, complete wiring point-to-point diagrams, and conduit layouts.

3. Show annunciator layout, configurations, and terminations.

C. Manuals:

1. Submit simultaneously with the shop drawings, complete operating and maintenance manuals listing the manufacturer's name(s), including technical data sheets.

2. Wiring diagrams shall indicate internal wiring for each device and the interconnections between the items of equipment.

3. Provide a clear and concise description of operation that gives, in detail, the information required to properly operate the equipment and system.

D. Software Modifications

1. Provide the services of a qualified technician to perform all system software modifications, upgrades or changes. Response time of the technician to the site shall not exceed 4 hours.

2. Provide all hardware, software, programming tools and documentation necessary to modify the fire alarm system on site. Modification includes addition and deletion of devices, circuits, zones and changes to system operation and

custom label changes for devices or zones. The system structure and software shall place no limit on the type or extent of software modifications on-site. Modification of software shall not require power-down of the system or loss of system fire protection while modifications are being made.

1.4. GUARANTY:

All work performed and all material and equipment furnished under this contract shall be free from defects and shall remain so for a period of at least one (1) year from the date of acceptance. The full cost of maintenance, labor and materials required to correct any defect during this one year period shall be included in the submittal bid.

1.5. APPLICABLE STANDARDS AND SPECIFICATIONS:

The specifications and standards listed below form a part of this specification. The system shall fully comply with the latest issue of these standards, if applicable.

A. National Fire Protection Association (NFPA) - USA:

No. 13 Sprinkler Systems
No. 70 National Electric Code (NEC)
No. 72 National Fire Alarm Code
No. 101 Life Safety Code

B. The system and its components shall be Underwriters Laboratories, Inc. listed under the appropriate UL testing standard as listed herein for fire alarm applications and the installation shall be in compliance with the UL listing.

C. Local and State Building Codes.

D. All requirements of the Authority Having Jurisdiction (AHJ).

1.6. APPROVALS:

A. The system shall have proper listing and/or approval from the following nationally recognized agencies:

UL Underwriters Laboratories Inc

ULC Underwriters Laboratories Canada

FM Factory Mutual

MEA Material Equipment Acceptance (NYC)

CSFM California State Fire Marshal

1.7. CONTRACTOR REQUIREMENTS:

A. The contractor shall have a full-time employee who is a state licensed Fire Alarm System Planning Superintendent. They shall be responsible for the design of the system submitted and shall sign all submittal drawings.

B. All work associated with installation of the fire alarm system shall be under the direct supervision of a state licensed Fire Alarm APS.

C. The contractor shall not have any grievances or complaints of record regarding workmanship, code compliance, or service response with either the Owner or the State Fire Marshal. A contractor that has any prior finding(s) of a Fire Alarm License violation or has any litigation of this type in process with State Fire Marshal is unacceptable.

PART 2.0 PRODUCTS

2.1. EQUIPMENT AND MATERIAL, GENERAL:

A. All equipment and components shall be new, and the manufacturer's current model. The materials, appliances, equipment and devices shall be tested and listed by a nationally recognized approvals agency for use as part of a fire protective signaling system, meeting the National Fire Alarm Code.

B. All equipment and components shall be installed in strict compliance with manufacturers' recommendations. Consult the manufacturer's installation manuals for all wiring diagrams, schematics, physical equipment sizes, etc., before beginning system installation.

C. All equipment shall be attached to walls and ceiling/floor assemblies and shall be held firmly in place (e.g., detectors shall not be supported solely by suspended ceilings). Fasteners and supports shall be adequate to support the required load.

D All equipment must be available "over the counter" through the Security Equipment Distributor (SED) market and can be installed by dealerships independent of the manufacturer.

2.2. CONDUIT AND WIRE:

A. Conduit:

1. Conduit shall be in accordance with The National Electrical Code (NEC), local and state requirements. <u>All fire alarm cabling shall be installed in conduit.</u>

2. All wiring shall be installed in conduit or raceway. Conduit fill shall not exceed 40 percent of interior cross sectional area where three or more cables are

contained within a single conduit.

3. Cable must be separated from any open conductors of power, or Class 1 circuits, and shall not be placed in any conduit, junction box or raceway containing these conductors, per NEC Article 760-29.

4. Wiring for 24-volt DC control, alarm notification, emergency communication and similar power-limited auxiliary functions may be run in the same conduit as initiating and signaling line circuits. All circuits shall be provided with transient suppression devices and the system shall be designed to permit simultaneous operation of all circuits without interference or loss of signals.

5. Conduit shall not enter the fire alarm control panel, or any other remotely mounted control panel equipment or backboxes, except where conduit entry is specified by the FACP manufacturer.

6. Conduit shall be 3/4-inch (19.1 mm) minimum.

B. Wire:

1. All fire alarm system wiring shall be new. Any fire alarm system wiring that shall be found to have been installed incorrectly, as evidenced by broken or scarred insulation, nicked or bare wires, or with the insulation stripped back too far at connections shall be cause for the ENTIRE wiring in the facility to be replaced at the Contractor's expense.

2. Wiring shall be in accordance with local, state and national codes (e.g., NEC Article 760) and as recommended by the manufacturer of the fire alarm system. Number and size of conductors shall be as recommended by the fire alarm system manufacturer, but not less than 18 AWG (1.02 mm) for Initiating Device Circuits and Signaling Line Circuits, and 14 AWG (1.63 mm) for Notification Appliance Circuits.

3. All wire and cable shall be listed and/or approved by a recognized testing agency for use with a protective signaling system.

4. Wire and cable not installed in conduit shall have a fire resistance rating suitable for the installation as indicated in NEC 760 (e.g., FPLR). (N/A)

5. Wiring used for the multiplex communication circuit (SLC) shall be twisted and support a minimum wiring distance of 10,000 feet when sized at 12 AWG. The design of the system shall permit use of IDC and NAC wiring in the same conduit with the SLC communication circuit. Shielded wire shall not be required.

6. All field wiring shall be electrically supervised for open circuit and ground fault.

7. The fire alarm control panel shall be capable of T-tapping Class B (NFPA Style 4) Signaling Line Circuits (SLCs). Systems which do not allow or have restrictions in, for example, the amount of T-taps, length of T-taps etc., are not acceptable.

C. Terminal Boxes, Junction Boxes and Cabinets:

1. All boxes and cabinets shall be UL listed for their use and purpose.

D. The fire alarm control panel shall be connected to a separate dedicated branch circuit, maximum 20 amperes. This circuit shall be labeled at the main power distribution panel as FIRE ALARM. Fire alarm control panel primary power wiring shall be 12 AWG. The control panel cabinet shall be grounded securely to either a cold water pipe or grounding rod. The control panel enclosure shall feature a quick removal chassis to facilitate rapid replacement of the FACP electronics.

1. The FACP shall be capable of coding Notification Appliance Circuits in March Time Code (120 PPM), Temporal (NFPA 72 A-2-2.2.2), and California Code. Main panel notification circuits (NACs 1 & 2) shall also automatically synchronize any of the following manufacturer's notification appliances connected to them: System Sensor, Wheelock, or Gentex with no need for additional synchronization modules.

2.3. MAIN FIRE ALARM CONTROL PANEL:

A. The FACP shall be equal to Notifier Fire Warden 50 and shall contain a microprocessor-based Central Processing Unit (CPU). The CPU shall communicate with and control the following types of equipment used to make up the system: intelligent addressable smoke and thermal (heat) detectors, addressable modules, printer, annunciators, and other system controlled devices.

B. Operator Control

1. Acknowledge Switch:

a. Activation of the control panel Acknowledge switch in response to new alarms and/or troubles shall silence the local panel piezo electric signal and change the alarm and trouble LEDs from flashing mode to steady-ON mode. If multiple alarm or trouble conditions exist, depression of this switch shall advance the 80-character LCD display to the next alarm or trouble condition.

b. Depression of the Acknowledge switch shall also silence all remote annunciator piezo sounders.

2. Alarm Silence Switch:

Activation of the alarm silence switch shall cause all programmed

alarm notification appliances and relays to return to the normal condition after an alarm condition. The selection of notification circuits and relays that are silenceable by this switch shall be fully field programmable within the confines of all applicable standards. The FACP software shall include silence inhibit and auto-silence timers.

3. Alarm Activate (Drill) Switch:

The Alarm Activate switch shall activate all notification appliance circuits. The drill function shall latch until the panel is silenced or reset.

4. System Reset Switch:

Activation of the System Reset switch shall cause all electronically-latched initiating devices, appliances or software zones, as well as all associated output devices and circuits, to return to their normal condition.

5. Lamp Test:

The Lamp Test switch shall activate all system LEDs and light each segment of the liquid crystal display.

C. System Capacity and General Operation

1. The control panel shall provide, or be capable of, expansion to 198 intelligent/addressable devices.

2. The control panel shall include Form-C Alarm, Trouble and Supervisory relays rated at a minimum of 2.0 amps @ 30 VDC. It shall also include programmable Notification Appliance Circuits (NACs) capable of being wired as Class B (NFPA Style Y) or Class A (NFPA Style Z).

3. The fire alarm control panel shall include an operator interface control and annunciation panel that shall include a backlit Liquid Crystal Display (LCD), individual color-coded system status LEDs, and an alphanumeric keypad for the field programming and control of the fire alarm system.

4. All programming or editing of the existing program in the system shall be achieved without special equipment and without interrupting the alarm monitoring functions of the fire alarm control panel. The system shall be fully programmable, configurable, and expandable in the field without the need for special tools, PROM programmers or PC based programmers. It shall not require replacement of memory ICs to facilitate programming changes. The control unit will support the ability to upgrade its operating program using FLASH memory technology. The unit shall provide the user with the ability to program from either the included keypad, a standard PS2-style PC keyboard or from a computer running upload/download software.

5. The system shall allow the programming of any input to activate any output or group of outputs. Systems which have limited programming (such as general alarm), have complicated programming (such as a diode matrix), or REQUIRE a laptop personal computer are not considered suitable substitutes.

6. The FACP shall provide the following features:

a. Drift compensation to extend detector accuracy during the accumulation of dust and foreign material.

b. Detector sensitivity test, meeting requirements of NFPA 72, Maintenance alert, with two levels (maintenance alert/maintenance urgent), to warn of excessive smoke detector dirt or dust accumulation.

c. The ability to display or print system reports.

d. Alarm verification, with counters and a trouble indication to alert maintenance personnel when a detector enters verification an excessive number of times.

e. Positive Alarm Sequence (PAS presignal), meeting NFPA 72 3-8.3 requirements.

f. Rapid manual station reporting.

g. Non-alarm points for general (non-fire) control.

h. Periodic detector test, conducted automatically by the software.

i. Walk test, with a check for two detectors set to same address.

7. The FACP shall be capable of coding Notification Appliance Circuits in March Time Code (120 PPM), Temporal (NFPA 72 A-2-2.2.2), and California Code. Main panel notification circuits (NACs 1 & 2) shall also automatically synchronize the following manufacturer's notification appliances connected to them: System Sensor, Wheelock, or Gentex with no need for additional synchronization modules.

D. Central Microprocessor

1. The microprocessor shall be a state-of-the-art, high speed, 16-bit RISC device and it shall communicate with, monitor and control all external interfaces. It shall include an EPROM for system program storage, non-volatile memory for building-specific program storage, and a "watch dog" timer circuit to detect and report microprocessor failure.

2. The microprocessor shall contain and execute all specific actions

to be taken in the condition of an alarm. Control programming shall be held in non-volatile programmable memory, and shall not be lost even if system primary and secondary power failure occurs.

3. The microprocessor shall also provide a real-time clock for time annotation of system displays, printer, and history file.

4. A special program check function shall be provided to detect common operator errors.

5. An auto-programming capability (self-learn) shall be provided to quickly identify devices connected on the SLC and make the system operational.

6. For flexibility and to ensure program validity, an optional Windows(TM) based program utility shall be available. This program shall be used to off-line program the system with batch upload/download. This program shall also have a verification utility which scans the program files, identifying possible errors. It shall also have the ability to compare old program files to new ones, identifying differences in the two files to allow complete testing of any system operating changes. This shall be in incompliance with the NFPA 72 requirements for testing after system modification.

E. Local Keyboard Interface

1. In addition to an integral keypad, the fire alarm control panel will accept a standard PS2-style keyboard for programming, testing, and control of the system. The keyboard will be able to execute the system functions ACKNOWLEDGE, SIGNALS SILENCED, DRILL and RESET.

F. Display

1. The display shall provide all the controls and indicators used by the system operator and may also be used to program all system operational parameters.

2. The display shall include status information and custom alphanumeric labels for all intelligent detectors, addressable modules, internal panel circuits, and software zones.

3. The display shall contain an alphanumeric, text-type display and dedicated LEDs for the annunciation of AC POWER, FIRE ALARM, SUPERVISORY, TROUBLE, MAINTENANCE, ALARM SILENCED, DISABLED, BATTERY, and GROUND conditions.

4. The display keypad shall be part of the standard system and have the capability to command all system functions, entry of any alphabetic or numeric information, and field programming. Two different password levels shall be provided to prevent unauthorized system control or programming.

5. The display shall include the following operator control switches: ACKNOWLEDGE, ALARM SILENCE, DRILL (alarm activate), and SYSTEM RESET.

G. Signaling Line Circuit (SLC)

1. The SLC interface shall provide power to and communicate with up to 99 intelligent detectors (ionization, photoelectric or thermal) and 99 intelligent modules (monitor or control) for a system capacity of 198 devices. Each SLC shall be capable of NFPA 72 Style 4, Style 6, or Style 7 (Class A or B) wiring.

2. The CPU shall receive information from all intelligent detectors to be processed to determine whether normal, alarm, prealarm, or trouble conditions exist for each detector. The software shall automatically compensate for the accumulation of dust in each detector up to allowable limits. The information shall also be used for automatic detector testing and for the determination of detector maintenance conditions.

3. The detector software shall meet NFPA 72, Chapter 7 requirements and be certified by UL as a calibrated sensitivity test instrument.

H. Serial Interfaces

1. The system shall provide a means of interfacing to UL Listed Electronic Data Processing (EDP) peripherals using the EIA-232 communications standard.

2. One EIA-232 interface may be used to connect an UL-Listed 80-column printer. The printer shall communicate with the control panel using an interface complying with Electrical Industries Association standard EIA-232D.

I. The control panel will have the capability of Reverse Polarity Transmission or connection to a Municipal Box for compliance with applicable NFPA standards.

J. Digital Alarm Communicator Transmitter (DACT). The DACT is an interface for communicating digital information between a fire alarm control panel and a UL-Listed central station.

1. The DACT shall be stand-alone communicator installed at the telephone board. Communicators installed in the FACP shall not be permitted. Do not power from FACP.

2. The DACT shall include connections for dual telephone lines (with voltage detect), per UL/NFPA/FCC requirements. It shall include the ability for split

reporting of panel events up to three different telephone numbers.

3. The DACT shall be completely field programmable via PC software connected to the panel serial port. The DACT shall support upload/download of programming parameters from a remote location over a phone line using upload/download PC software

4. The DACT shall be capable of transmitting events in at least 15 different formats. This ensures compatibility with existing and future transmission formats.

5. Communication shall include vital system status such as:

- Independent Zone (Alarm, trouble, non-alarm, supervisory)
- Independent Addressable Device Status
- AC (Mains) Power Loss
- Low Battery and Earth Fault
- System Off Normal
- 12 and 24-Hour Test Signal
- Abnormal Test Signal (per UL requirements)
- EIA-485 Communications Failure
- Phone Line Failure

6. The DACT shall support independent zone/point reporting when used in the Contact ID format. In this format, the DACT shall support the transmission of up addressable points with the system. This format shall enable the central station to have exact details concerning the location of the fire for emergency response.

K. Stand Alone Voice Evacuation Control Panel (N/A)

1. A stand-alone Voice Evacuation Control Panel shall be available from the same manufacturer of the main fire alarm system.

2. This Voice Control Panel shall work stand alone or as a slave to the Main Fire Alarm Control Panel.

3. Shall have as minimum requirements:

a. Integral 25 Watt, 25 Vrms audio amplifier with optional converter for 70.7-volt systems. The system shall be capable of expansion to 50 watts total via the insertion of an additional 25-watt audio amplifier module into the same cabinet.

b. Speaker circuit that can be wired both Class A or B.

c. Integral Digital Message Generator with a memory

capacity for up to 60 seconds of messaging. The Digital Message Generator shall be capable of producing five distinct messages (12 seconds each). These messages shall field programmable without the use of additional equipment.

d. Built in alert tone generators with steady, slow whoop, high/low and chime tone field programmable.

e. The Voice Control Panel will be capable of detecting and annunciating the following conditions: Loss of Power (AC and DC), System Trouble, Ground Fault, Alarm, Microphone Trouble, Message Generator Trouble, Tone Generator Trouble, and Amplifier Fault.

4. The Voice Control Panel shall be fully supervised including microphone, amplifier output, message generator, speaker wiring, and tone generation.

5. Speaker outputs shall be fully power-limited.

6. Amplifiers will be supplied power independently to eliminate a short on one circuit from affecting other circuits.

7. The Voice Control Panel will provide full supervision on both active (alarm or music) and standby conditions.

8. An optional zone splitter version shall be available that permits splitting speaker circuits into 8 specific zones.

9. An optional distributed amplifier unit shall be available that permits splitting speaker circuits into up to a total of 24 zones when two distributed amplifiers are combined with the master unit.

L. Speakers (N/A):

1. All speakers shall operate on 25 VRMS or with field selectable output taps from 0.5 to 2.0 Watts.

2. Speakers in corridors and public spaces shall produce a nominal sound output of 84 dBA at 10 feet (3m).

3. Frequency response shall be a minimum of 400 HZ to 4000 HZ.

4. The back of each speaker shall be sealed to protect the speaker cone from damage and dust.

M. Enclosures:

1. The control panel shall be housed in a UL-listed cabinet suitable

for surface or semi-flush mounting. The cabinet and front shall be corrosion protected, given a rust-resistant prime coat, and manufacturer's standard finish.

2. The back box and door shall be constructed of steel with provisions for electrical conduit connections into the sides and top.

3. The door shall provide a key lock and shall provide for the viewing of all indicators.

4. The cabinet shall accept a chassis containing the PCB and to assist in quick replacement of all the electronics including power supply shall require no more than two bolts to secure the panel to the enclosure back box.

N. Signaling Power Supply: The FASPS or FCPS is a device designed for use as either a remote 24-volt power supply or as a booster for powering Notification Appliances (N/A)

1. The FCPS shall offer up to 8.0 amps (6.0 amps continuous) of regulated 24-volt power. It shall include an integral charger designed to charge 18.0 amp hour batteries.

2. The Field Charging Power Supply shall have two input triggers. The input trigger shall be a Notification Appliance Circuit (from the fire alarm control panel) or a control relay. Four NAC outputs, wired NFPA Style Y or Z, shall be available for connection to the Notification devices.

3. The FCPS shall optionally provide synchronization of all connected strobes or horn strobe combinations when System Sensor, Wheelock, or Gentex devices are installed.

4. The FCPS shall function as a sync follower as well as a sync generator.

5. The FCPS shall include a surface mount backbox.

6. The Field Charging Power Supply shall include the ability to delay the reporting of an AC fail condition per NFPA requirements.

7. The FCPS shall provide 24 VDC regulated and power-limited circuitry per 1995 UL standards.

O. Power Supply:

1. The main power supply for the fire alarm control panel shall provide 6.0 amps of available power for the control panel and peripheral devices.

2. Provisions will be made to allow the audio-visual power to be increased as required by adding modular expansion audio-visual power supplies.

3. Positive-Temperature-Coefficient (PTC) thermistors, circuit breakers, or other over-current protection shall be provided on all power outputs. The power supply shall provide an integral battery charger or may be used with an external battery and charger systems. Battery arrangement may be configured in the field.

4. The main power supply shall continuously monitor all field wires for earth ground conditions.

5. The main power supply shall operate on 120 VAC, 60 Hz, and shall provide all necessary power for the FACP.

P. Programmable Electronic Sounders:

1. Electronic sounders shall operate on 24 VDC nominal.

2. Electronic sounders shall be field programmable without the use of special tools, to provide slow whoop, continuous, or interrupted tones with an output sound level of at least 90 dBA measured at 10 feet from the device.

3. Shall be flush or surface mounted as show on plans.

Q. Strobe lights shall meet the requirements of the ADA, UL Standard 1971 and shall meet the following criteria:

1. The maximum pulse duration shall be 2/10 of one second.

2. Strobe intensity shall meet the requirements of UL 1971.

3. The flash rate shall meet the requirements of UL 1971.

R. Audible/Visual Combination Devices:

1. Shall meet the applicable requirements of Section A listed above for audibility.

2. Shall meet the requirements of Section B listed above for visibility.

3. Shall be equal to Gentex Commander 2 series, white in color, no exceptions.

S. Manual Fire Alarm Stations

1. Manual fire alarm stations shall be non-code type.

2. Provide stopper II or equal cover if installed in public space.

3. An operated station shall automatically condition itself so as to be visually detected, as operated, at a minimum distance of 100 feet (30.5 m) front or side.

4. Manual stations shall be constructed of metal, with operating instructions provided on the cover. The word FIRE shall appear on the manual station in letters one half inch (12.7 mm) in size or larger.

U. Conventional Photoelectric Area Smoke Detectors

1. Photoelectric smoke detectors shall be a 24 VDC, two-wire, ceiling-mounted, light scattering type using an LED light source.

2. Each detector shall contain a remote LED output and a built-in test switch.

3. The detector shall be of a separate head-in-base design.

4. The detector shall automatically provide drift compensation to minimize nuisance alarms.

5. A visual indication of an alarm shall be provided by dual latching Light Emitting Diodes (LEDs), on the detector, which may be seen from ground level over 360 degrees. These LEDs shall flash every 5 seconds, indicating that power is applied to the detector.

6. The detector shall not go into alarm when exposed to air velocities of up to 3000 feet (914.4 m) per minute.

7. The detector screen and cover assembly shall be easily removable for field cleaning of the detector chamber.

8. All field wire connections shall be made to the base through the use of a clamping plate and screw.

W. Duct Smoke Detectors (N/A)

1. Duct smoke detectors shall be a 24 VDC type with visual alarm and power indicators, and a reset switch. Each detector shall be installed upon the composite supply/return air ducts(s), with properly sized air sampling tubes. Each detector shall be powered from a 120 volt circuit independent of the HVAC unit.

X. Projected Conventional Beam Detector (N/A)

1 The projected beam type shall be a 4-wire 24 VDC conventional smoke detector device.

2 The detector shall be listed to UL 268 and shall consist of a single transmitter\receiver and corresponding non powered reflector.

3 The detector shall operate in either a short range (16' - 230') or long range (16' - 328') when used with an extender module.

4. The temperature range of the device shall be -22 degrees F to 131 degrees F.

5. The detector shall feature an optical sight and 2-digit signal strength meter to ensure proper alignment of unit without need of special tools.

6. The unit shall be both ceiling and wall mountable.

7. The detector shall have the ability to be tested using calibrated test filters or magnet-activated remote test station.}

Y. Projected Conventional Beam Detector (N/A)

1 The projected beam type shall be a 4-wire 24 VDC conventional smoke detector device.

2 The detector shall be listed to UL 268 and shall consist of a single transmitter\receiver and corresponding non powered reflector.

3 The detector shall operate in either a short range (16' - 230') or long range (16' - 328') when used with an extender module.

4. The temperature range of the device shall be -22 degrees F to 131 degrees F.

5. The detector shall feature an optical sight and 2-digit signal strength meter to ensure proper alignment of unit without need of special tools.

6. The unit shall be both ceiling and wall mountable.

7. The detector shall have the ability to be tested using calibrated test filters or magnet-activated remote test station.

8. The detector shall be equipped with an integral sensitivity test feature that consists of a test filter attached to a servomotor inside the detector optics. Using the remote test station, the motor shall be activated and shall move the filter in the pathway of the light beam, thereby testing detector sensitivity. This integral sensitivity

test feature shall allow the user to quickly and easily meet the annual maintenance/test requirements of NFPA 72.

Z. Automatic Conventional Heat Detectors (N/A)

1. Automatic heat detectors shall have a combination rate of rise and fixed temperature rated at 135 degrees Fahrenheit (57.2 Celsius) for areas where ambient temperatures do not exceed 100 degrees (37.7 Celsius), and 200 degrees (93.33 Celsius) for areas where the temperature does not exceed 150 degrees (65.5 Celsius).

2. Automatic heat detectors shall be a low profile, ceiling mount type with positive indication of activation.

3. The rate of rise element shall consist of an air chamber, a flexible metal diaphragm, and a factory calibrated, moisture-proof, trouble free vent, and shall operate when the rate of temperature rise exceeds 15 degrees F (9.4 degrees C) per minute.

4. The fixed temperature element shall consist of a fusible alloy retainer and actuator shaft.

5. Automatic heat detectors shall have a smooth ceiling rating of 2500 square feet (762 square meters).

AA. Waterflow Indicator:

1. Waterflow Switches shall be an integral, mechanical, non-coded, non-accumulative retard type.

2. Waterflow Switches shall have an alarm transmission delay time which is conveniently adjustable from 0 to 60 seconds. Initial settings shall be 30-45 seconds.

3. All waterflow switches shall come from a single manufacturer and series.

4. Waterflow switches shall be provided and connected under this section but installed by the mechanical contractor.

5. Where possible, locate waterflow switches a minimum of one (1) foot from a fitting which changes the direction of the flow and a minimum of three (3) feet from a valve.

BB. Sprinkler and Standpipe Valve Supervisory Switches:

1. Each sprinkler system water supply control valve riser, zone

control valve, and standpipe system riser control valve shall be equipped with a supervisory switch. Standpipe hose valves, and test and drain valves shall not be equipped with supervisory switches.

2. PIV (post indicator valve) or main gate valves shall be equipped with a supervisory switch.

3. The switch shall be mounted so as not to interfere with the normal operation of the valve and adjusted to operate within two revolutions toward the closed position of the valve control, or when the stem has moved no more than one-fifth of the distance from its normal position.

4. The supervisory switch shall be contained in a weatherproof aluminum housing, which shall provide a 3/4-inch (19 mm) conduit entrance and incorporate the necessary facilities for attachment to the valves.

5. The switch housing shall be finished in red baked enamel.

6. The entire installed assembly shall be tamper proof and arranged to cause a switch operation if the housing cover is removed, or if the unit is removed from its mounting.

7. Valve supervisory switches shall be provided and connected under this section and installed by mechanical contractor.

CC. Specific System Operations (Addressable only)

1. Alarm Verification: Each of the intelligent addressable smoke detectors in the system may be independently programmed for verification of alarm signals. The alarm verification time period shall not exceed 2 minutes.

2. Point Disable: Any addressable device or conventional circuit in the system may be enabled or disabled through the system keypad.

3. Point Read: The system shall be able to display the following point status diagnostic functions:

a. Device status
b. Device type
c. Custom device label
d. Device zone assignments

4. System Status Reports: Upon command from an operator of the system, a status report will be generated and printed, listing all system status.

5. System History Recording and Reporting: The fire alarm control

panel shall contain a history buffer that will be capable of storing up to 1000 events. Each of these activations will be stored and time and date stamped with the actual time of the activation. The contents of the history buffer may be manually reviewed, one event at a time, or printed in its entirety.

The history buffer shall use non-volatile memory. Systems that use volatile memory for history storage are not acceptable substitutes.

6. Automatic Detector Maintenance Alert: The fire alarm control panel shall automatically interrogate each intelligent detector and shall analyze the detector responses over a period of time. If any intelligent detector in the system responds with a reading that is above or below normal limits, then the system will enter the trouble mode, and the particular detector will be annunciated on the system display. This feature shall in no way inhibit the receipt of alarm conditions in the system, nor shall it require any special hardware, special tools or computer expertise to perform.

7. Pre-Alarm Function: The system shall provide two levels of pre-alarm warning to give advance notice of a possible fire situation. Both pre-alarm levels shall be fully field adjustable. The first level shall give an audible indication at the panel. The second level shall give an audible indication and may also activate control relays. The system shall also have the ability to activate local detector sounder bases at the pre-alarm level, to assist in avoiding nuisance alarms.

8. The fire alarm control panel shall include Silent and Audible Walk Test functions - Silent and Audible. It shall include the ability to test initiating device circuits and Notification Appliance Circuits from the field without returning to the panel to reset the system. The operation shall be as follows:

a. The Silent Walk Test will not sound NACs but will store the Walk Test information in History for later viewing.

b. Alarming an initiating device shall activate programmed outputs, which are selected to participate in Walk Test.

c. Introducing a trouble into the initiating device shall activate the programmed outputs.

d. Walk Test shall be selectable on a per device/circuit basis. All devices and circuits which are not selected for Walk Test shall continue to provide fire protection and if an alarm is detected, will exit Walk Test and activate all programmed alarm functions.

e. All devices tested in walk test shall be recorded in the history buffer.

9. Waterflow Operation

An alarm from a waterflow detection device shall activate the appropriate alarm message on the control panel display; turn on all programmed Notification Appliance Circuits and shall not be affected by the Signal Silence switch.

10. Supervisory Operation

An alarm from a supervisory device shall cause the appropriate indication on the control panel display, light a common supervisory LED, but will not cause the system to enter the trouble mode.

11. Signal Silence Operation

The FACP shall have the ability to program each output circuit (notification circuit or relay) to deactivate upon depression of the Signal Silence switch.

12. Non-Alarm Input Operation

Any addressable initiating device in the system may be used as a non-alarm input to monitor normally open contact type devices. Non-alarm functions are a lower priority than fire alarm initiating devices.

2.4. SYSTEM COMPONENTS: (ADDRESSABLE)

A. Addressable Pull Box (manual station)

1. Addressable pull boxes shall, on command from the control panel, send data to the panel representing the state of the manual switch and the addressable communication module status. They shall use a key operated test-reset lock, and shall be designed so that after actual emergency operation, they cannot be restored to normal use except by the use of a key.

2. All operated stations shall have a positive, visual indication of operation and utilize a key type reset.

3. Manual stations shall be constructed of Lexan with clearly visible operating instructions provided on the cover. The word FIRE shall appear on the front of the stations in raised letters, 1.75 inches (44 mm) or larger.

B. Intelligent Multi-Sensing Detector (N/A)

1. The intelligent detector shall be an addressable device which is capable of detecting multiple threats by employing photoelectric and thermal technologies in a single unit. This detector shall utilize advanced electronics which react to slow smoldering fires (photoelectric) and heat (thermal) all within a single sensing device.

2. The multi-detector shall include two bicolor LEDs for 360-degree viewing.

3 Automatically adjusts sensitivity levels without the need for operator intervention or programming. Sensitivity increases with heat.

C. Intelligent Photoelectric Smoke Detector (N/A)

1. The detectors shall use the photoelectric (light-scattering) principal to measure smoke density and shall, on command from the control panel, send data to the panel representing the analog level of smoke density.

2. The detectors shall be ceiling-mounted and available in an alternate model with an integral fixed 135-degree heat-sensing element.

3. Each detector shall contain a remote LED output and a built-in test switch.

4. Detector shall be provided on a twist-lock base.

5. It shall be possible to perform a calibrated sensitivity and performance test on the detector without the need for the generation of smoke. The test method shall test all detector circuits.

6. A visual indication of an alarm shall be provided by dual latching Light Emitting Diodes (LEDs), on the detector, which may be seen from ground level over 360 degrees. These LEDs shall periodically flash to indicate that the detector is in communication with the control panel.

7. The detector shall not go into alarm when exposed to air velocities of up to 1500 feet per minute (fpm).

8. The detector screen and cover assembly shall be easily removable for field cleaning of the detector chamber.

9. All field wire connections shall be made to the base through the use of a clamping plate and screw.

D. Projected Addressable Beam Detector (N/A)

1. The projected beam type shall be a 4-wire 24 VDC intelligent, addressable projected beam smoke detector device.

2. The detector shall be listed to UL 268 and shall consist of a single transmitter\receiver and corresponding non powered reflector.

3. The detector shall operate in either a short range (16' - 230') or long range (16' - 328') when used with an extender module.

4. The temperature range of the device shall be -22 degrees F to 131 degrees F.

5. The detector shall feature an optical sight and 2-digit signal strength meter to ensure proper alignment of unit without need of special tools.

6. The unit shall be both ceiling and wall mountable.

7. The detector shall have the ability to be tested using calibrated test filters or magnet-activated remote test station.

E. Projected Addressable Beam Detector (N/A)

1. The projected beam type shall be a 4-wire 24 VDC intelligent, addressable projected beam smoke detector device.

2. The detector shall be listed to UL 268 and shall consist of a single transmitter\receiver and corresponding non powered reflector.

3. The detector shall operate in either a short range (16' - 230') or long range (16' - 328') when used with an extender module.

4. The temperature range of the device shall be -22 degrees F to 131 degrees F.

5. The detector shall feature an optical sight and 2-digit signal strength meter to ensure proper alignment of unit without need of special tools.

6. The unit shall be both ceiling and wall mountable.

7. The detector shall have the ability to be tested using calibrated test filters or magnet-activated remote test station.

8 The detector shall have four standard sensitivity selections along with two automatic self-adjusting settings. When either of the two automatic settings is selected the detector will automatically adjust its sensitivity using advanced software algorithms to select the optimum sensitivity for the specific environment.

F. Intelligent Ionization Smoke Detector (N/A)

1. The detectors shall use the dual-chamber ionization principal to measure products of combustion and shall, on command from the control panel, send data

to the panel representing the analog level of products of combustion.

G. Intelligent Thermal Detectors (N/A)

1. Thermal detectors shall be intelligent addressable devices rated at 135 degrees Fahrenheit (58 degrees Celsius) and have a rate-of-rise element rated at 15 degrees F (9.4 degrees C) per minute. It shall connect via two wires to the fire alarm control panel signaling line circuit.

H. Intelligent Duct Smoke Detector (N/A)

1. The smoke detector housing shall accommodate either an intelligent ionization detector or an intelligent photoelectric detector, of that provides continuous analog monitoring and alarm verification from the panel.

2. When sufficient smoke is sensed, an alarm signal is initiated at the FACP, and appropriate action taken to change over air handling systems to help prevent the rapid distribution of toxic smoke and fire gases throughout the areas served by the duct system.

I. Addressable Dry Contact Monitor Module

1. Addressable monitor modules shall be provided to connect one supervised IDC zone of conventional alarm initiating devices (any normally open dry contact device) to one of the fire alarm control panel SLCs.

2. The monitor module shall mount in a 4-inch square (101.6 mm square), 2-1/8 inch (54 mm) deep electrical box.

3. The IDC zone shall be suitable for Style D or Style B operation. An LED shall be provided that shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel.

4. For difficult to reach areas, the monitor module shall be available in a miniature package and shall be no larger than 2-3/4 inch (70 mm) x 1-1/4 inch (31.7 mm) x 1/2 inch (12.7 mm). This version need not include Style D or an LED.

J. Two-Wire Detector Monitoring

1. Means shall be provided for the monitoring of conventional Initiating Device Circuits populated with 2-wire smoke detectors as well as normally open contact alarm initiating devices (pull stations, heat detectors, etc).

2. Each IDC of conventional devices will be monitored as a distinct address on the polling circuit by an addressable module. The module will supervise the IDC for alarms and circuit integrity (opens).

3. The monitoring module will be compatible, and listed as such, with all devices on the supervised circuit.

4. The IDC zone may be wired for Class A or B (Style D or Style B) operation. An LED shall be provided that shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel.

5. The monitoring module shall be capable of mounting in a 4-inch square (101.6 mm square), 2-1/8 inch (54 mm) deep electrical box or in a surface mount backbox.

K. Addressable Control Relay Module

1. Addressable control relay modules shall be provided to control the operation of fan shutdown and other auxiliary control functions.

2. The control module shall mount in a standard 4-inch square, 2-1/8 inch deep electrical box, or to a surface mounted backbox.

3. The control relay module will provide a dry contact, Form-C relay. The relay coil shall be magnetically latched to reduce wiring connection requirements, and to insure that 100% of all auxiliary relays may be energized at the same time on the same pair of wires.

4. The control relay module shall be suitable for pilot duty applications and rated for a minimum of 0.6 amps at 30 VDC.

L. 6 Output Addressable Control Relay Module

1. Up to 6 Addressable intelligent control relay modules combined on one circuit board shall be provided to control the operation of fan shutdown and other auxiliary control functions.

2. Using rotary address switches, the first module shall be addressed from 01 to 154 while the remaining modules shall be automatically assigned to the next five higher addresses. Note: binary dipswitches for setting address are not acceptable.

3. Provision shall be included for disabling a maximum of three unused modules

4. A single isolated set of dry relay form C contacts shall be provided for each of the 6 module addresses, which shall be capable of being wired for either a normally open or normally closed operation.

5. The module shall allow an addressable control panel to switch these contacts on command.

6. The module shall contain removable plug in terminal blocks capable of supporting 12 AWG to 18 AWG wire.

7. The control relays mounted on the module shall be suitable for pilot duty applications and rated for a maximum of 3.0 amps at 30 VDC, resistive, non-coded and 2.0 amps at 30 VDC maximum, resistive, coded.

M. Six-Zone Interface Module

1. A six-zone interface module shall be provided as an interface between the addressable panel and two-wire conventional detection zones.

2. A common SLC input shall be used for all modules, and the initiating device circuits shall share a common external supervisory supply and ground.

3. The first address on the interface module shall be addressed from 01 to 154 while the remaining modules are automatically assigned to the next five higher addresses.

4. Address shall be set using decimal encoded rotary address switches. Binary address switches are not acceptable.

5. Provision shall be included for disabling a maximum of two unused addresses of the six available.

6. All two-wire detectors being monitored shall be two-wire compatibility listed with the six zone input module.

7. The six zone input module shall transmit the status of a zone of two-wire detectors to the fire alarm control panel. Status shall be reported as normal, open or alarm.

8. Removable plug-in terminals shall be provided capable of accepting from 18 AWG up to 12 AWG wire.

N. Multiple Two-Wire Detector Monitoring

1. A single multi input module shall be provided for the monitoring of up to 10 conventional Initiating Device Circuits populated with 2-wire smoke detectors as well as normally-open contact alarm initiating devices (pull stations, heat detectors, etc).

2. Each IDC of conventional devices will be monitored as a distinct

address on the polling circuit by an addressable point. The module will supervise the IDC for alarms and circuit integrity (opens).

3. The first address on the 10 input boards shall be set from 01 to 150 and the remaining module addresses shall be automatically assigned to the next nine higher addresses.

4. Provision shall be included for disabling a maximum of two unused addresses.

5. The supervised state (normal, open, or short) of the monitored device shall be sent back to the panel. A common SLC input shall be used for all modules, and the initiating device loops shall share a common supervisory supply and ground.

6. The IDC zone may be wired for Class A or B (Style D or Style B) operation. A green LED for each circuit shall be provided that shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel. LEDs shall latch on when a circuit is in alarm.

O. Isolator Module

1. Isolator modules shall be provided to automatically isolate wire-to-wire short circuits on an SLC Style 6 (Class A) or Style 4 (Class B branch). The isolator module shall limit the number of modules or detectors that may be rendered inoperative by a short circuit fault on the SLC loop segment or branch. At least one isolator module shall be provided for each floor or protected zone of the building.

2. If a wire-to-wire short occurs, the isolator module shall automatically open-circuit (disconnect) the SLC. When the short circuit condition is corrected, the isolator module shall automatically reconnect the isolated section.

3. The isolator module shall not require any address setting, and its operations shall be totally automatic. It shall not be necessary to replace or reset an isolator module after its normal operation.

4. The isolator module shall mount in a standard 4-inch (101.6 mm) deep electrical box or in a surface mounted backbox. It shall provide a single LED that shall flash to indicate that the isolator is operational and shall illuminate steadily to indicate that a short circuit condition has been detected and isolated.

P. Serially Connected Annunciator

1. The annunciator shall communicate with the fire alarm control panel via a two wire EIA 485 (multi-drop) communications circuit.

2. The annunciator shall require no more than four wires for operation. Annunciation shall include: intelligent addressable points, system software zones, control relays, and notification appliance circuits. The following operations shall also be provided:

a. Up to 32 annunciators, each with up to 64 points may be installed on the system.

b. The annunciator shall include a single electrical key switch to disable all switch functions.

c. The annunciator shall provide alarm and trouble resound, with flash for new conditions.

d. This unit shall provide for each zone: alarm indications, using a red alarm and yellow trouble LEDs, and switches for the control of fire alarm control panel functions. The annunciator will also have an ON-LINE LED, local piezo electric signal, local acknowledge/lamp test switch, and custom slide-in zone/function identification labels.

e. Switches shall be available for remote annunciation and control of output points in the system, system acknowledge, telephone zone select, speaker select, global signal silence, and global system reset within the confines of all applicable standards.

3. This system shall provide a means of interfacing to graphic style annunciator.

4. The graphic annunciator interface will possess the capability of individually annunciating each individual addressable device in the system.

Q. Alphanumeric LCD Type Annunciator:

1. The alphanumeric display annunciator shall be a supervised, remotely located backlit LCD display containing a minimum of eighty (80) characters for alarm annunciation in clear English text.

2. The LCD annunciator shall display all alarm and trouble conditions in the system.

3. An audible indication of alarm shall be integral to the alphanumeric display.

4. The display shall be UL listed for fire alarm application.

5. It shall be possible to connect up to 32 LCD displays and be

capable of wiring distances up to 6,000 feet from the control panel.

6. The annunciator shall connect to a separate, dedicated "terminal mode" EIA-485 interface. This is a two-wire loop connection and shall be capable of distances to 6,000 feet. Each terminal mode LCD display shall mimic the main control panel.

R. Door Holders:

1. Door Holders will be available in 120 VAC and 24 VDC models.

2. 120 VAC models will be transient-protected against surges up to 600 volts.

3. Door holders will be designed for Fail Safe operation (power failure release door to close).

S. Elevator Recall (N/A):

1. Smoke detectors will be installed in the elevator hoist shaft. An alarm from such devices will signal the elevator to initiate emergency procedures. All lift call buttons; door buttons and signals will become inoperative in the lift bank serving the machine room. Lifts will immediately be sent to the main floor of egress (ground level) where they will be decommissioned until the alarm condition has been cleared or manually taken over by Fire Department personnel.

2 Smoke detectors will be installed in each elevator lobby. These detectors will function to signal the elevator to recall to the primary floor of egress (ground level) in the event of an alarm. Detectors on the first floor will signal the elevator to recall to the secondary floor of egress.

T. Field Wiring Terminal Blocks

For ease of service all panel I/O wiring terminal blocks shall be removable, plug-in types and have sufficient capacity for #18 to #12 AWG wire. Terminal blocks which are permanently fixed are not acceptable.

2.5. SYSTEM COMPONENTS - ADDRESSABLE DEVICES

A. Addressable Devices - General

1. Addressable devices shall employ the simple-to-set decade addressing scheme. Addressable devices which use a binary-coded address setting method, such as a DIP switch, are not an allowable substitute.

2. Detectors shall be addressable and intelligent, and shall connect

with two wires to the fire alarm control panel signaling line circuits.

3. Addressable smoke and thermal (heat) detectors shall provide dual alarm and power/polling LEDs. Both LEDs shall flash under normal conditions, indicating that the detector is operational and in regular communication with the control panel, and both LEDs shall be placed into steady illumination by the control panel, indicating that an alarm condition has been detected. An output connection shall also be provided in the base to connect an external remote alarm LED.

4. Using software in the FACP, detectors shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance. The detectors shall be listed by UL as meeting the calibrated sensitivity test requirements of NFPA Standard 72, Chapter 7.

5. Detectors shall be ceiling-mount and shall include a separate twist-lock base with tamper proof feature. Base options shall include a base with a built-in (local) sounder rated for a minimum of 85 DBA, a relay base and an isolator base designed for Style 7 applications.

6. Detectors shall provide a test means whereby they will simulate an alarm condition and report that condition to the control panel.

7. Detectors shall also store an internal identifying type code that the control panel shall use to identify the type of device (ION, PHOTO, THERMAL).

8. Detectors shall provide address-setting means using decimal switches.

2.6. BATTERIES:

A. Upon loss of Primary (AC) power to the control panel, the batteries shall have sufficient capacity to power the fire alarm system for required standby time (24 or 60 hours) followed by 5 minutes of alarm.

B. The batteries are to be completely maintenance free. No liquids are required. Fluid level checks for refilling, spills, and leakage shall not be required.

C. If necessary to meet standby requirements, external battery/charger systems may be used.

PART 3.0 - EXECUTION

3.1. INSTALLATION:

A. Installation shall be in accordance with the NEC, NFPA 72, local and state codes, as shown on the drawings, and as recommended by the major equipment

manufacturer.

B. All conduit, junction boxes, conduit supports and hangers shall be concealed in finished areas and may be exposed in unfinished areas. Smoke detectors shall not be installed prior to the system programming and test period. If construction is ongoing during this period, measures shall be taken to protect smoke detectors from contamination and physical damage.

C. All fire detection and alarm system devices, control panels and remote annunciators shall be flush mounted when located in finished areas and may be surface mounted when located in unfinished areas.

D. Manual pull stations shall be suitable for surface mounting or semi flush mounting as shown on the plans, and shall be installed 48 inches (122 mm) above the finished floor to the top of the device.

3.2. TEST:

The service of a competent, factory-trained engineer or technician NICET Level III shall be provided to technically supervise and participate during all of the adjustments and tests for the system. All testing shall be in accordance with NFPA 72, Chapter 7.

A. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.

B. Close each sprinkler system flow valve and verify proper supervisory alarm at the FACP.

C. Verify activation of all waterflow switches.

D. Open initiating device circuits and verify that the trouble signal actuates.

E. Open and short signaling line circuits and verify that the trouble signal actuates.

F. Open and short notification appliance circuits and verify that trouble signal actuates.

G. Ground all circuits and verify response of trouble signals.

H. Check presence and audibility of tone at all alarm notification devices.

I. Check installation, supervision, and operation of all intelligent smoke detectors using the walk test.

J. Each of the alarm conditions that the system is required to detect should

be introduced on the system. Verify the proper receipt and the proper processing of the signal at the FACP and the correct activation of the control points.

K. When the system is equipped with optional features, the manufacturer's manual shall be consulted to determine the proper testing procedures. This is intended to address such items as verifying controls performed by individually addressed or grouped devices, sensitivity monitoring, verification functionality and similar.

3.3. FINAL INSPECTION:

A. At the final inspection a minimum NICET Level III technician shall demonstrate that the system functions properly in every respect.

3.4. INSTRUCTION:

A. Instruction shall be provided as required for operating the system. Hands-on demonstrations of the operation of all system components and the entire system including program changes and functions shall be provided.

B. The contractor or installing dealer shall provide a user manual indicating "Sequence of Operation."

3.5. FINAL DOCUMENTATION

A. Record drawings provide information that is essential to those who test and maintain the fire alarm system. These drawings must be developed during the installation by the installer and consist of the original fire alarm system shop drawings that have been annotated during the installation of the system to show exactly where the fire alarm system components (Including remote power extenders and control units or modules) have been installed, how the cable and conduit has been routed, wiring sequences, wiring methods and the locations of all terminal and junction boxes. Record drawings account for all field changes that were made during the installation. They also show details of how each conductor of each fire alarm system circuit was installed, the locations of raceways, the number and color codes of the conductors used, the actual location of each device and appliance, terminal cabinets, terminal identifications, and dates of software and system revisions. Any changes made throughout the life of the fire alarm system must be noted on the record drawings. The record drawings, once completed by the contractor, should be transmitted to the designer for review and acceptance before delivering them to the owner or authority having jurisdiction. Contractor shall comply with all items listed in this paragraph.

B. A detailed narrative description of the system inputs, evacuation signaling, ancillary functions, annunciation, intended sequence of operations, expansion capability, application considerations and limitations.

C. Operator instructions for basic system operations, including alarm

acknowledgment, system reset, interpretation of system output (LEDs, CRT display, and printout), operation of manual evacuation signaling and ancillary function controls, and change of printer paper.

D. A detailed description of routine maintenance and testing as required and recommended and as would be provided under a maintenance contact, including testing and maintenance instructions for each type of device installed. This information should include a listing of the individual system components that required periodic testing; step-by-step instructions detailing the requisite testing and maintenance procedures, and the intervals at which these shall be performed; and a schedule that correlates the testing and maintenance procedures recommended.

E. A service directory, including a list of names and telephone numbers of those who provide service for the system.

END OF SECTION

SECTION 16780 COMMUNICATIONS AND COMPUTER SYSTEMS

1 PART 1 GENERAL

1.1 SECTION INCLUDES

A. Equipment mounting.

B. Premises wiring and outlets.

1.2 RELATED SECTIONS

A. Section 16110 - Conduit.

B. Section 16120 - Building Wire and Cable

C. Section 16785 – COSA Systems Wiring Standards. This section has precedence over all items in Section 16780.

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 section to be performed by Contractor.

1.5 QUALIFICATIONS

A. Installer: Company specializing in installing telephone premises wiring with minimum years experience.

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 16120 for complete description of all cables.

2.2 WIRING DEVICES

A. Computer terminations: Leviton Quick Port modules or equal. Provide one module for telephone module, one module for RJ-45 connector and one blank in 3 port wall plate.

B. Telephone terminations: Leviton Quick Port modules or equal. Provide two modules for telephone jacks in 2 port wall plate.

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 Category 6 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 category 6 cable and other cable as required to each box serving telephone or computer outlets. Install category 6 cable from outlet to electrical room to location of computer hub.

E. All communications and computer outlets to have minimum 3/4" conduit stubbed to 6" above ceiling.

END OF SECTION

City of San Angelo Network Wiring Specifications

(Gigabit Speed Copper Cable and Fiber Optic)

Revised April 14, 2010

This standard covers cabling for Copper Data, Fiber Optic.

1. Data Cabling Standards –

1.1. Copper Cable

1.1.1. Install, label, and test (plenum or non-plenum-rated for above ceiling locations depending on local fire codes and ventilation systems), Gigabit Ethernet (1000BaseT) unshielded twisted pair (UTP), 24 AWG 4 pair wire, in each. The wiring is to be home run from each station location marked on the building plans. A patch panel mounted on a relay rack and a mounted cable rack in the appropriate wiring closet will be provided by the vendor. During the warranty period, the vendor must resolve all installation and hardware problems on site within a two hour time frame. All wiring will be a complete Commscope, Systimax, Ortronics, Panduit, Leviton, Hitachi, ADC solution, or vendors of like quality.

1.1.2. Each floor of city hall will have a dedicated 48 port Cat-6 Patch Panel(s) (vendor provided) located in the IT server room in the basement for cable termination. The vendor will provide relay rack, cable trays, Panduit cable management for relay rack, and cable ladders.

1.1.3. Cables will be terminated in the Patch Panel in a sequential order by room number or location. The only exception would be when a new cable is added to an existing patch panel and the next consecutive location is taken. In this case the next available empty jack will be used. Each floor will start with drop 1 and position 1 on the Patch Panel.

1.1.4. Designate each as follows: Wiring Closet Termination Point, Room, Drop, Position, and Jack ID Label (Sample shown below). This information will be recorded and the data provided to the city I.T. department.

Example:

Closet	Room	Floor	Drop/Position	Length	Jack ID
Basement	B122	1	1	75	1, 1

1.1.5. All work will be done in accordance with Category 6 specifications as published in TIA/EIA standards 568, 568-B, 569, 570, 606, and 607 and applicable standards for 1000BaseT. Additions are listed in TSB31, 36, and 40 and The National Electric Code

for low voltage wiring. BICSI Telecommunications Standards will be considered as the standard for all installation practices. In addition, all installation will be compliant with ISDN BRI (ISO 8877). Cable connectors shall meet IEEE 802.3i specifications. All Jacks will be wired in accordance with the TIA/EIA 568-B wiring method.

1.1.6. If any fire rated wall is penetrated it must be sealed to maintain the fire rating that existed prior to the penetration.

1.1.7. All interior or exterior wall penetrations will be appropriately sealed. Interior wall penetration will, at the minimum, be sealed with fire resistant, insulating foam. Exterior penetrations will be sealed with cement, metal, caulking, or foam where appropriate.

1.1.8. All exterior wall penetrations will have a commercial weather head installed.

1.2. Conduit and Cable Bends

1.2.1. If running cables "bare" or on cable trays, cables must be plenum rated if required by local fire codes.

1.2.2. Neatness in cabling, ensuring that all cables are "hidden" from open view or run in wall mounted raceway, is mandatory. Floor area runs are to be avoided. Cables shall not be stapled to walls, abutments, supports, or any other objects. Concurrent data cable runs shall be bundled together neatly and loosely.

1.3. Wiring Drop and Connector Specifications

1.3.1. Each wiring drop will include: as a minimum a single port wall plate with one (1) terminated cable. One (1) GigaSpeed cable per plate terminated and tested. Multiple drops can be installed in the same box with multi-port face plates when the drops will be in close proximity to each other.

1.3.2. Each four pair, 24 AWG GigaSpeed cable will be terminated in an eight pin, modular jack at the work area. These connectors shall be UTP outlets, which meet all criteria, listed in TIA/EIA 568.

1.4. Wiring Description for Horizontal Cabling

1.4.1. All wiring cables with a run length of 295 feet or under shall consist of 24 AWG plastic insulated conductors formed into four twisted pairs and enclosed by a plastic jacket. Cabling will be plenum rated (if required by local fire codes). The manufacturer to be certified as Gigaspeed compliant shall rate all cables.

1.4.2. The wire O.D. of the cable shall be no less than .18 and no more than .22 trade size.

1.4.3. The pair assembly shall meet the color code according to TIA/EIA 568, section 10.2.1.1.3.

1.4.4. No wire can be bent tightly [i.e., greater than 6 X Outside Diameter (O.D.) of the cable] or kinked at the jack.

1.4.5. All cables must be tested at least once and shall perform better than the minimum requirements as outlined in TIA/EIA 568-B (including appendices) as it pertains to GigaSpeed cabling.

1.4.6. Any cable that fails to meet testing measurements will be completely re-run at the vendor's expense including equipment, parts, and time.

1.4.7. All horizontal data cabling will be yellow or blue.

1.4.8. Cable lengths are to be recorded using cable test equipment and the data provided to the City I.T. department.

1.4.9. All cabling when terminated will be untwisted the minimum distance necessary to make the connection. At no time should the untwisted strands exceed maximum length recommended by the EIA/TIA and BICSI standards.

1.5. Electrical Considerations

1.5.1. All wires must be run per the following standoff distance table:

Condition:	2kVA	2.5kVA	5kVA
Unshielded power lines or electrical equipment in proximity to open or non-metal pathways	5 inches	12 inches,	24 inches
Unshielded power lines or electrical equipment in proximity to a grounded metal conduit pathway	2.5 inches,	6 inches,	12 inches
Power lines enclosed in a grounded metal conduit in proximity to a grounded metal conduit pathway	3 inches	6 inches	

1.5.2. All wires must be run at least 6.5 feet from any electromagnetic field, such as those generated by electrical motors, converters and invertors.

1.5.3. All wires must be run at least 6 inches distant from fluorescent lights.

1.5.4. All wires must be run at least 1 foot from FAX machines, refrigerators, microwaves, and copiers.

1.6. Wiring Closets (Technology Closet)

1.6.1. The wiring closets are transition points between the horizontal distribution pathways and the backbone or part of the backbone itself.

1.6.2. The wiring closets are to contain one or more floor, wall or ceiling mounted jack strips. The placement will be (7) to more than (8) feet above the floor. There will be one RJ-45 connector per cable. There will also be a 110 Volt AC receptacle located adjacent to each jack strip.

1.7. Patch Panels (Connecting Hardware)

1.7.1. The transmission properties of the internally wired connecting devices shall meet or exceed the transmission performance requirements specified in TIA/EIA 568, section and the NEC, interfaces included.

1.7.2. Standard interface jacks and plugs shall meet the requirements of TIA/EIA-TSB-31, Ref B 1.37.

1.7.3. Interface jacks shall be eight pin jacks with pin/pair assignments according to the 568B designation with applicable color code combinations. These pin/pair assignments are compatible with ISDN BRI (ISO 8877), Ref B1.24. Wiring will be terminated with the **TIA/EIA 568B wiring method.**

1.8. All cable will be sequentially installed according to the room number or location number.

1.9. Wiring Labels and Wiring Management

1.10. Labeling all wall jacks, cables, patch cables and patch panel jacks is mandatory. The method for applying labels will be left to the discretion of the installer; however the City I.T. department will be supplied with a sample for approval prior to any installations. Labels will be of some indelible ink, non-removable, tape or under a plastic retaining strip which is part of the faceplate or jack strip.

1.11. The labels themselves shall be in accordance with the description given in this document.

1.12. Testing

1.12.1. All cable testing shall be performed at least once by the installation vendor and the resulting data provided to the city I.T. department.

1.12.2. All cables shall be tested by a certified, calibrated scanner according to an accepted and approved GigaSpeed test procedure as noted in TIA/EIA 568-B.

1.12.3. Any cable runs that fail to meet specifications in the bid and that fail the scanner test shall be completely rerun at the expense of the vendor.

1.12.4. All cables that are rerun will be tested for compliance as if they were an initial run. The results of these tests shall be treated the same as described above.

1.13. Conduit and Raceways

1.14. All wiring which cannot be installed in the walls or ceiling will be enclosed in surface mounted raceway.

1.15. Any wiring which must extend through an outdoor area must be in conduit.

1.16. Cabling will never be laid directly on the ceiling grid. It will be suspended above the ceiling grid on approved J hooks or equivalent whenever possible.

1.17. Cabling will not be attached to existing cabling, plumbing, water pipes, air ducts, ceiling supports or electrical or communications conduit.

2. Fiber Optic Cabling

2.1. All standards mentioned above for installation apply except those that are specifically for copper wiring. Fiber optic cable shall be certified to meet or exceed the current American National Standards Institute (ANSI) Fiber Distributed Data Interface (FDDI) specification.

2.2. Cabling will be a minimum of twelve strand indoor/outdoor cable, multimode, 62.5/125 micron plenum or PVC according to local fire codes. 50/125 micron multimode OM3

plenum or PVC cable will be utilized in new installations where it is not mixed with 62.5 micron fiber.

2.3. Single mode fiber will be a minimum of 1-strand 08/125 micron.
2.4. All terminations will be with ST type ceramic or stainless connectors, glued not crimped.
2.5. All cable will terminate in a City of San Angelo approved distribution enclosure.
2.6. The enclosure will be populated with sufficient ST to ST bulkhead adapters so that each fiber is connected to an adapter.
2.7. All fiber optic cable installations will be certified with an approved fiber optic certification tester and written results of testing supplied to City of San Angelo I.T. department. For multimode fibers, testing will be done at both 850 and 1300nm, using LED sources.
2.8. Conduit - All exposed fiber optic cabling exterior to a building will be installed in conduit from the point of egress from the building.
2.9. This cable shall be suitable for installation free-air, in building Risers, in Conduit, in Cable Tray and/or in interduct.
2.10. Cable Materials shall be all dielectric (no conductive materials).
2.11. Outer Sheath: The Outer Sheath shall be marked with the manufacturer's name, date of manufacture, fiber type, flame rating, UL symbol, and sequential length markings every two feet.
2.12. Temperature Range:
2.13. Storage: -40 to +70 □C (no irreversible change in attenuation)
2.14. Operating: -20 to +70 □C (OFNP)
2.15. Humidity Range: 0 to 100%
2.16. Max. Tensile Load (□ 12-fibers; Backbone, Riser, Intra-building) During Installation: 1332 Newton's (300 lb. force) (no irreversible change in attenuation). Long Term: 600 N (135 lb. force)
2.17. Bending Radius:
  2.17.1. During Installation: 20 times cable diameter
  2.17.2. No Load: 10 times cable diameter.
2.18. All optical fibers shall be sufficiently free of surface imperfections and inclusions to meet the optical, mechanical, and environmental requirements of this specification. Factory optical fiber splices are not allowed.
2.19. All fibers shall have been subjected to a minimum tensile proof test by the fiber manufacturer equivalent to 100-kpsi.
2.20. All fibers in each cable shall be guaranteed to meet the San Angelo City I.T. department's specifications.
2.21. Multi-mode Fiber cables shall be sized as needed.
2.22. Multi-mode Optical Fibers in each cable shall meet the following specifications:
  2.22.1. Fiber Type: Multi-mode; doped silica core surrounded by a concentric glass

cladding.

2.22.2. Index Profile: Graded Index
2.22.3. Transmission Windows: 850nm and 1300nm
2.22.4. Core Diameter: (nom) 50nm (microns)
2.22.5. Cladding Diameter: 125nm
2.22.6. Core-clad Concentricity: 3nm
2.22.7. Cladding Non-circularity 2.0%
2.22.8. Fiber Coating Diameter 250nm (primary coating)
2.22.9. 900-nm (nominal) Secondary coating (tight buffer)
2.22.10. All coatings shall be mechanically strippable without damaging the optical fiber.

2.23. When tested in accordance with FOTP-3, "Procedure to Measure Temperature Cycling Effects on Optical Fibers, Optical Cable, and Other Passive Fiber Optic Components", the average change in attenuation over the rated temperature range of the cable shall not exceed 0.50 dB/km with 80% of the measured fibers not exceeding 0.25 dB/km.
2.23.1. Bandwidth (min.) @ 850-nm 160-MHz*km @ 1300-nm 500 “
2.23.2. No multi-mode optical fiber shall show a point discontinuity greater than 0.2 dB at the specified wavelengths. Such a discontinuity or any discontinuity showing a reflection at that point shall be cause for rejection of that fiber by the Owner.
2.23.3. Product: Commscope, Berk-Tek, or equivalent (plenum)

2.24. All fiber optic cable will be installed in accordance with City of San Angelo Wiring Standards and within BICSI code allowances.

2.25. All new fiber optic cable will be installed in **interduct** in the ceiling and in the tunnel system and buried conduits when exterior and not aerial.

2.26. All strands will be terminated in a lockable metal box as specified in the City of San Angelo Wiring Standards or a lockable fiber optic assembly in the equipment rack co-located in lockable data cabinet.

2.27. All new fibers will be terminated with SC connectors.

2.28. If different length or termination connectors are needed for the fiber optic patch cables the vendor will supply them.

2.29. **Warranty:** Installed cabling (walls, ceiling, under floor) will be warranted for a period of 20 years. Wall jacks, and patch panels must be warranted for a period of 20 years. both 850 and 1300nm, using LED sources.

2.30. The installed fiber cable should have at least 10 feet of coiled slack cable at each end to allow for repair and relocation.

2.31. Cabling will be plenum or non-plenum depending on local fire codes and ventilation system requirements.

2.32. Interduct - All exposed fiber optic cabling interior to a building, or where deemed appropriate on the interior to a building, will be in interduct.

3. Video Cable Wiring

3.1. Office

3.1.1. All cable to the office will be RG-6 non-plenum or plenum rated cable depending on local fire codes.
3.1.2. All cables from the office will be home run to a wiring closet room.
3.1.3. Cables be terminated with "F" Type connectors on either end.
3.1.4. All terminations will be in a front corner of the room mounted just below the ceiling as specified in the floor plans and mounted in a standard cable face plate.
3.1.5. There will be a duplex 110 Volt AC receptacle installed adjacent to each cable outlet jack. If possible, the AC outlet and the cable jack should be in the same face plate.
3.1.6. The signal strength in each office should be no less than 0db.

3.2. Wiring Closet

3.2.1. All terminations in the wiring closet will be mounted to a passive splitter to provide easy connectivity to the video cable coming from the main video (Audio-Video).
3.2.2. If the signal strength at the wiring closet is not sufficient then an amplifier must be installed to boost the signal strength for a strength of 0db at the office termination.
3.2.3. A duplex 110 AC outlet will be mounted near the cable termination panel in the wiring closet.

COM*check* Software Version 3.9.3

Interior Lighting Compliance Certificate

2009 IECC

Section 1: Project Information

Project Type: **New Construction**
Project Title : Texas Bank Sports Complex #2

Construction Site:
1615 Rio Concho Dr.
San Angelo, TX 76905

Owner/Agent:
David Knapp
City of San Angelo
San Angelo, TX
325-657-4279

Designer/Contractor:
Paul Wilkerson
PowerSystems
Firm No. F-6257
P.O. Box 2863
San Angelo, TX 76902
325.659.2235

Section 2: Interior Lighting and Power Calculation

A Area Category	B Floor Area (ft2)	C Allowed Watts / ft2	D Allowed Watts (B x C)
Sports Arena	1155	1.1	1271
		Total Allowed Watts =	1271

Section 3: Interior Lighting Fixture Schedule

A Fixture ID : Description / Lamp / Wattage Per Lamp / Ballast	B Lamps/ Fixture	C # of Fixtures	D Fixture Watt.	E (C X D)
Sports Arena (1155 sq.ft.)				
LED 1: E: Industrial Vaportite Strip: LED Panel 40W:	1	14	40	560
LED 1: K: 4' Strip: LED Panel 41W:	1	3	41	123
			Total Proposed Watts =	683

Section 4: Requirements Checklist

Interior Lighting PASSES: Design 46% better than code.

Lighting Wattage:

❑ 1. Total proposed watts must be less than or equal to total allowed watts.

Allowed Watts	Proposed Watts	Complies
1271	683	YES

Controls, Switching, and Wiring:

❑ 2. Daylight zones under skylights more than 15 feet from the perimeter have lighting controls separate from daylight zones adjacent to vertical fenestration.

❑ 3. Daylight zones have individual lighting controls independent from that of the general area lighting.

Exceptions:

❑ Contiguous daylight zones spanning no more than two orientations are allowed to be controlled by a single controlling device.

❑ Daylight spaces enclosed by walls or ceiling height partitions and containing two or fewer light fixtures are not required to have a separate switch for general area lighting.

❑ 4. Independent controls for each space (switch/occupancy sensor).

Exceptions:

- ❑ Areas designated as security or emergency areas that must be continuously illuminated.
- ❑ Lighting in stairways or corridors that are elements of the means of egress.

❑ 5. Master switch at entry to hotel/motel guest room.

❑ 6. Individual dwelling units separately metered.

❑ 7. Medical task lighting or art/history display lighting claimed to be exempt from compliance has a control device independent of the control of the nonexempt lighting.

❑ 8. Each space required to have a manual control also allows for reducing the connected lighting load by at least 50 percent by either controlling all luminaires, dual switching of alternate rows of luminaires, alternate luminaires, or alternate lamps, switching the middle lamp luminaires independently of other lamps, or switching each luminaire or each lamp.

Exceptions:

- ❑ Only one luminaire in space.
- ❑ An occupant-sensing device controls the area.
- ❑ The area is a corridor, storeroom, restroom, public lobby or sleeping unit.
- ❑ Areas that use less than 0.6 Watts/sq.ft.

❑ 9. Automatic lighting shutoff control in buildings larger than 5,000 sq.ft.

Exceptions:

- ❑ Sleeping units, patient care areas; and spaces where automatic shutoff would endanger safety or security.

❑ 10. Photocell/astronomical time switch on exterior lights.

Exceptions:

- ❑ Lighting intended for 24 hour use.

❑ 11. Tandem wired one-lamp and three-lamp ballasted luminaires (No single-lamp ballasts).

Exceptions:

- ❑ Electronic high-frequency ballasts; Luminaires on emergency circuits or with no available pair.

Section 5: Compliance Statement

Compliance Statement: The proposed lighting design represented in this document is consistent with the building plans, specifications and other calculations submitted with this permit application. The proposed lighting system has been designed to meet the 2009 IECC requirements in COM*check* Version 3.9.3 and to comply with the mandatory requirements in the Requirements Checklist.

Name - Title	Signature	Date

Project Notes:

MEP Project #1618
September 14, 2016
PE License #50732

Architect of Record
Kinney/Franke Architects
37B West Concho
San Angelo, TX 76903
325.653.2900

COMcheck Software Version 3.9.3

Exterior Lighting Compliance Certificate

2009 IECC

Section 1: Project Information

Project Type: **New Construction**
Project Title : Texas Bank Sports Complex #2
Exterior Lighting Zone: **4 (High activity metropolitan commercial district)**

Construction Site:
1615 Rio Concho Dr.
San Angelo, TX 76905

Owner/Agent:
David Knapp
City of San Angelo
San Angelo, TX
325-657-4279

Designer/Contractor:
Paul Wilkerson
PowerSystems
Firm No. F-6257
P.O. Box 2863
San Angelo, TX 76902
325.659.2235

Section 2: Exterior Lighting Area/Surface Power Calculation

A Exterior Area/Surface	B Quantity	C Allowed Watts / Unit	D Tradable Wattage	E Allowed Watts (B x C)	F Proposed Watts
Main entry	9 ft of door width	30	Yes	270	0
Entry canopy	3420 ft2	0.4	Yes	1368	1537
Other door (not main entry)	9 ft of door width	20	Yes	180	160
			Total Tradable Watts* =	1818	1698
			Total Allowed Watts =	1818	
			Total Allowed Supplemental Watts** =	1300	

* Wattage tradeoffs are only allowed between tradable areas/surfaces.
** A supplemental allowance equal to 1300 watts may be applied toward compliance of both non-tradable and tradable areas/surfaces.

Section 3: Exterior Lighting Fixture Schedule

A Fixture ID : Description / Lamp / Wattage Per Lamp / Ballast	B Lamps/ Fixture	C # of Fixtures	D Fixture Watt.	E (C X D)
Main entry (9 ft of door width): Tradable Wattage				
Entry canopy (3420 ft2): Tradable Wattage				
LED 2: B: Floodlight: Other:	1	4	110	440
LED 3: P: Recessed Downlight: Other:	1	16	43.6	697.6
LED 3 copy 1: Q: Pole Top Mounted Light: LED Linear 20W:	1	20	20	400
Other door (not main entry) (9 ft of door width): Tradable Wattage				
LED: XP: Pole Light Mounted at 100': Other:	1	8	20	160
			Total Tradable Proposed Watts =	1698

Section 4: Requirements Checklist

Lighting Wattage:

❑ 1. Within each non-tradable area/surface, total proposed watts must be less than or equal to total allowed watts. Across all tradable areas/surfaces, total proposed watts must be less than or equal to total allowed watts.

Compliance: Passes.

Controls, Switching, and Wiring:

❑ 2. All exemption claims are associated with fixtures that have a control device independent of the control of the nonexempt lighting.

❑ 3. Lighting not designated for dusk-to-dawn operation is controlled by either a a photosensor (with time switch), or an astronomical time switch.

❑ 4. Lighting designated for dusk-to-dawn operation is controlled by an astronomical time switch or photosensor.

❑ 5. All time switches are capable of retaining programming and the time setting during loss of power for a period of at least 10 hours.

Exterior Lighting Efficacy:

❑ 6. All exterior building grounds luminaires that operate at greater than 100W have minimum efficacy of 60 lumen/watt.

Exceptions:

❑ Lighting that has been claimed as exempt and is identified as such in Section 3 table above.

❑ Lighting that is specifically designated as required by a health or life safety statue, ordinance, or regulation.

❑ Emergency lighting that is automatically off during normal building operation.

❑ Lighting that is controlled by motion sensor.

Section 5: 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 lighting system has been designed to meet the 2009 IECC requirements in COM*check* Version 3.9.3 and to comply with the mandatory requirements in the Requirements Checklist.

Name - Title	Signature	Date

COM*check* Software Version 3.9.3

Mechanical Compliance Certificate

2009 IECC

Section 1: Project Information

Project Type: **New Construction**
Project Title : Texas Bank Sports Complex #2

Construction Site:
1615 Rio Concho Dr.
San Angelo, TX 76905

Owner/Agent:
David Knapp
City of San Angelo
San Angelo, TX
325-657-4279

Designer/Contractor:
Paul Wilkerson
PowerSystems
Firm No. F-6257
P.O. Box 2863
San Angelo, TX 76902
325.659.2235

Section 2: General Information

Building Location (for weather data): **San Angelo, Texas**
Climate Zone: **3b**

Section 3: Mechanical Systems List

Quantity	System Type & Description
1	Water Heater 2: Electric Storage Water Heater, Capacity: 40 gallons Proposed Efficiency: 0.95 EF, Required Efficiency: 0.88 EF

Section 4: Requirements Checklist

Requirements Specific To: Water Heater 2 :

❑ 1. Water heating equipment meets minimum efficiency requirements: Electric Water Heater efficiency: 0.88 EF (241 SL, Btu/h (if > 12 kW))
❑ 2. First 8 ft of outlet piping is insulated
❑ 3. Hot water storage temperature controls that allow setpoint of 90°F for non-dwelling units and 110°F for dwelling units.
❑ 4. Heat traps provided on inlet and outlet of storage tanks

Generic Requirements: Must be met by all systems to which the requirement is applicable:

None

Section 5: 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 2009 IECC requirements in COM*check* Version 3.9.3 and to comply with the mandatory requirements in the Requirements Checklist.

Name - Title _____ Signature _____ Date _____

Section 6: Post Construction Compliance Statement

❑ HVAC record drawings of the actual installation, system capacities, calibration information, and performance data for each equipment provided to the owner.

❑ HVAC O&M documents for all mechanical equipment and system provided to the owner by the mechanical contractor.

❑ Written HVAC balancing and operations report provided to the owner.

The above post construction requirements have been completed.

Principal Mechanical Designer-Name	Signature	Date