SPECIFICATIONS

FOR

A New Restroom Building
At Quad #2

RIO CONCHO COMMUNITY CITY PARK
TEXAS BANK SPORTS COMPLEX
CITY OF SAN ANGELO, TEXAS

KINNEY FRANKE ARCHITECTS AIA
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(325) 653-2900

SKG ENGINEERING
STRUCTURAL CONSULTANT
(325) 655-1288

POWER SYSTEMS INC.
MEP CONSULTANT
(325) 659-2235

Project Manual
December 01, 2017

PROJECT NO. 261-08-0917

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A NEW RESTROOM BUILDING AT QUAD #2

RIO CONCHO COMMUNITY CITY PARK
TEXAS SPORTS BANK COMPLEX
CITY OF SAN ANGELO
SAN ANGELO, TEXAS
DECEMBER 01, 2017
KFA PROJECT # 261-08-0917

12-01-17

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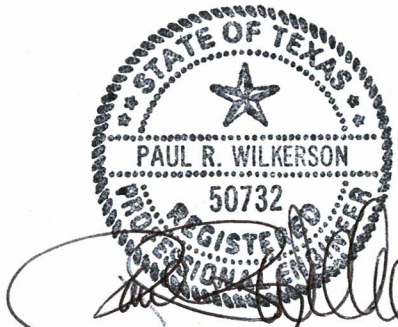

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12-1-17

DOCUMENT 00 7200

GENERAL CONDITIONS

1.1SUMMARY

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."

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.

.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 870 square foot restroom 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

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.

E. Substitutions will not be considered if:
   1. They are indicated or implied on Shop Drawings or other submittals without submittal of a substitution request.
   2. Approval will require substantial revision of Contract Documents without additional compensation to Architect.

F. Submit electronically in Adobe PDF format.

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

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

END OF SECTION

DOCUMENT 01 2519

SUBSTITUTION REQUEST FORM

DATE: _____

TO: _____

ATTENTION: _____

PROJECT: _____

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

Section No.	Paragraph	Specified Product
_____	_____	_____

Proposed Substitution: _____

_____

Reason for Substitution: _____

_____

Product Data:

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

Samples:

___ Attached ___ Will be furnished upon request

Does the substitution affect dimensions shown on Drawings?

___ No ___ Yes (explain) _____

_____

Effects of proposed substitution on other Work:

_____

_____

Differences between proposed substitution and specified Product:

_____

_____

Manufacturer's warranties of the proposed substitution are:

___ Same ___ Different (explain) _____

_____

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

_____

_____

Previous installations where proposed substitution may be seen:

Project: _____ Project: _____

Owner: _____ Owner: _____

Architect: _____ Architect: _____

Date Installed: _____ Date Installed: _____

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

_____

Change to Contract Time, if proposed substitution is approved:

___ No Change ___ Add _____ days ___ Deduct _____ days

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

Submitted by Contractor:

_____
Signature

_____
Firm

For Use by Architect:

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

___ Approved ___ Approved as Noted ___ Rejected

Submit Additional Information: _____

_____

By: _____ Date: _____

SECTION 01 2900

PAYMENT PROCEDURES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Schedule of Values.
   2. Applications for Payment.

B. Related Sections:
   1. Section 01 7700 - Closeout Procedures.

1.2 SCHEDULE OF VALUES

A. General:
   1. Submit a Schedule of Values to Architect at least 20 days prior to submitting first Application for Payment.
   2. Upon request of Architect, furnish additional data to support values given that will substantiate their correctness.
   3. Approved Schedule of Values will be used as basis for reviewing 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

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, if requested:
   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.

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

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.

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.
   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

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.

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

SECTION 01 5800

PROJECT IDENTIFICATION

PART 1 GENERAL

1.1 SUMMARY

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

1.2 QUALITY ASSURANCE

A. Project Sign:
   1. Design sign and structure to withstand 50 MPH wind velocity.
   2. Sign Maker: Experienced as a professional for minimum 3 years.
   3. Finishes: Adequate to withstand weathering, fading, and chipping for duration of construction.

B. Do not erect other signs at site without Owner's approval, except those required by governing authorities.

1.3 SUBMITTALS

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

PART 2 PRODUCTS

2.1 MATERIALS

A. Structure and Framing: New lumber, structurally adequate.

B. Sign Surfaces: Exterior grade plywood with medium density overlay, nominally 3/4 inch thick, standard large sizes to minimize joints.

C. Rough Hardware: Galvanized steel or aluminum.

D. Paints: Latex type, exterior quality, satin sheen.

2.2 FABRICATION

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

PART 3 EXECUTION

3.1 INSTALLATION

A. Install project identification sign within 30 days after date of Notice to Proceed.

B. Erect at designated location.

C. Erect supports and framing on secure foundation, rigidly braced and framed to resist wind loadings.

D. Install sign surface plumb and level, with butt joints. Anchor securely.

E. Paint exposed surfaces of sign, supports, and framing.

3.2 MAINTENANCE

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

3.3 REMOVAL

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

END OF SECTION

SECTION 01 6000

PRODUCT REQUIREMENTS

PART 1 GENERAL

1.1 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

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

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.

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

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 the foundation details of the structural engineering drawings.

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 02220

EXCAVATING, BACKFILLING, AND COMPACTING

PART 1 - GENERAL

1.1 SECTION INCLUDES:

A. Preparation.

B. Excavating.

C. Backfilling and compaction.

1.2 FIELD MEASUREMENTS

A. Verify that survey benchmark, control point, and intended elevations for the Work are as shown on drawings.

1.3 COORDINATION

A. Verify work associated with lower elevation utilities is complete before placing higher elevation utilities.

B. This specification does not pertain to work covered by the Structural Engineer's scope.

PART 2 - PRODUCTS

2.1 FILL MATERIALS

A. Embedment material shall be shown on the plans or as approved by the Engineer.

B. Backfill material shall be as shown on the plans or as approved by the Engineer.

PART 3 - EXECUTION

3.1 PREPARATION

A. Identify required lines, levels, contours, and datum locations.

B. Protect plant life, lawns, and other features remaining as a portion of final landscaping.

C. Protect bench marks, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

D. Maintain and protect above the below grade utilities which are to remain.

E. Cut out soft areas of subgrade not capable of compaction in place. Backfill with secondary backfill and compact to density equal to or greater than requirements for

subsequent backfill material.

3.2 EXCAVATING

A. Conduct excavation of materials as required to provide the grades and elevations shown of the drawings and as required in the specifications.

B. Existing pavement, concrete, and other material required to be removed to facilitate the work shall be removed by the contractor and disposed of as required by law.

C. Stockpile excavated material in area designated by the engineer and remove excess material not to be reused or stockpiled from site.

3.3 BACKFILLING AND COMPACTION

A. Backfill Material: Place and compact material in equal continuous layers not exceeding 8 inches compacted depth.

B. Maintain optimum moisture content of fill materials to attain required compaction density and moisture content.

3.4 TOLERANCES

A. Top Surface of General Backfilling: Plus or minus 0.10 feet of existing elevations or as shown on the plans.

3.5 FIELD QUALITY CONTROL

A. Compaction testing will be performed at a rate of three tests per job-site or one test per 3,000 square yards, whichever is greater. The engineer may accept the work provided not more than one (1) out of five (5) consecutive density test performed is below the specified density, and provided that the failing test is no more than one (1%) percent below the specified density.

B. Thickness measurement will occur at a rate of three tests per job-site or one test per 3,000 square yards, whichever is greater.

C. If tests indicate Work does not meet specified requirements, remove Work, replace and retest.

3.6 PROTECTION OF FINISHED WORK

A. Reshape, recompact, and maintain fills subjected to vehicular traffic during construction.

END OF SECTION

SECTION 03 3100

UNDER SLAB VAPOR RETARDER

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Vapor retarder under concrete slabs and related accessories.
1.02 RELATED REQUIREMENTS
A. Division 1: Administrative, procedural, and temporary work requirements.
1.03 REFERENCES
A. ASTM C 168 - Terminology Relating to Thermal Insulating Materials; current edition.
B. ASTM E 1643 - Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs; current edition.
C. ASTM E 1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs; current edition.
1.04 DEFINITIONS
A. Vapor Retarder: A material or system that impedes the transmission of water vapor under specified conditions.
B. Vapor Barrier: A term used synonymously with vapor retarder in accordance with ASTM C 168.
1.05 SUBMITTALS
A. See Division 1 for submittal procedures.
B. Product Data: Provide manufacturer's descriptive product literature indicating compliance with specified requirements.
C. Samples: Submit two vapor retarder samples, 6 x 6 inch in size. Submit two seaming tape samples, 6 inches long.
D. Certificates: Certify that products of this section meet or exceed specified requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS
A. Fortifiber Building Systems "Moistop Ultra 15": www.fortifiber.com.
B. Insulation Solutions, "Viper Vaporcheck II 15-Mil": www.insulationsolutions.com.
C. Raven Industries "Vapor Block 15": www.vaporblock.com.
D. Stego Industries "Stego Wrap Vapor Barrier": www.stegoindustries.com.
E. W.R. Meadows "Perminator Vapor-Mat 15": www.wrmeadows.com.
F. Substitutions: Not permitted.
2.02 PERFORMANCE CRITERIA
A. Vapor retarder shall fully comply with requirements of ASTM E 1745, Class A.
2.03 MATERIALS
A. Vapor Retarder: Single ply polyethylene film, minimum 15 mils thick.
2.04 ACCESSORIES
A. Tape: High density polyethylene tape with pressure sensitive adhesive. Minimum 4 inches wide.
B. Pipe Boots: Construct pipe boots from vapor retarder material and pressure sensitive tape per manufacturer's instructions or use prefabricated boots constructed of vapor retarder material.

PART 3 EXECUTION

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

3.03 FIELD QUALITY CONTROL

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

3.04 CLEANING

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

END OF SECTION

SECTION 03 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 03 3950

SEALING CONCRETE FLOORS

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Single application cure-seal-hardener for new concrete floors.

1.02 RELATED REQUIREMENTS
A. Division 1: Administrative, procedural, and temporary work requirements.
B. Section 03300 - Cast-in-Place Concrete: Concrete slabs.

1.03 SUBMITTALS
A. See Division 1 for submittal procedures.
B. Product Data: Manufacturer's data sheets, including product specifications, test data, preparation instructions and recommendations, storage and handling requirements and recommendations, and installation methods.
C. Closeout Submittals:
1. Submit in accordance with Division 1 requirements.
2. Maintenance instructions, including precautions for avoiding staining after application.

1.04 QUALITY ASSURANCE
A. Installer Qualifications:
1. Supervision: Applicator shall maintain a full time supervisor who is on job site during times that specified work is in progress, and, who is experienced in apply products similar to type and scope required for this project.
2. Manufacturer Acceptance: Applicator shall be certified, approved, licensed, or acceptable to manufacturer to apply products.
3. Manufacturer's Representation: Technical representative shall be present for application of products.

1.05 DELIVERY, STORAGE, AND HANDLING
A. Deliver product in factory numbered and sealed drums, with numbers recorded for Owner's records.
B. Store products in manufacturer's unopened drums until ready for installation.

1.06 FIELD CONDITIONS
A. No satisfactory procedures are available to remove petroleum or rust stains from concrete. Prevention is therefore essential. Take precautions to prevent staining of concrete prior to application of cure-seal-hardener and for minimum of three months after application:
1. Prohibit parking of vehicles on concrete slab.
2. If vehicles must be temporarily parked on slab, place drop cloths under vehicles during entire time parked.
3. If construction equipment must be used for application, diaper all components that might drip oil, hydraulic fluid, or other liquids.
4. Prohibit pipe cutting using pipe cutting machinery on concrete slab.
5. Prohibit temporary placement and storage of steel members on concrete slab.
B. Do not install products under environmental conditions outside manufacturer's absolute limits.
C. Do not use frozen material; thaw and agitate prior to use.

1.07 WARRANTY
A. See Division 1 for additional warranty requirements.
B. Provide manufacturer's 20 year warranty that a structurally sound concrete surface prepared and treated according to the manufacturer's directions will remain permanently dustproof, hardened and water repellent. If after the specified sealing period the treated surface does not remain dustproof, hardened and water repellent, provide, at manufacturer's expense, sufficient material to reseal defective areas.

PART 2 PRODUCTS

2.01 MANUFACTURERS
A. Basis of Design: Curecrete Distribution, Inc; Product "Ashford Formula": www.ashfordformula.com.
B. Substitutions: See Division 1.

2.02 APPLICATIONS
A. See Section 09000 for locations for sealed concrete (SC).

2.03 MATERIALS
A. Cure-Seal-Hardener: Water-based chemically-reactive penetrating sealer and hardener that seals by densifying concrete so that water molecules cannot pass through but air and water vapor can, while allowing concrete to achieve full compressive strength, minimizing surface crazing, and eliminating dusting.
1. Colorless, transparent, odorless, non-toxic, non-flammable.

2. Containing no solvents or volatile organic compounds.
3. Abrasion: 32.5 percent increase when tested in accordance with ASTM C 779.
4. Hardening: 40 percent at 7 days and 38 percent at 28 days increase in compressive strength when tested in accordance with ASTM C 39.
5. Permeability: Seepage rate on 0.0083 cc/hr using 7 inch head of water on 4.91 square inch surface area.
6. Chemical Resistance: No adverse effects due to motor and fuel oils.
7. Weathering: No adverse effect to ultraviolet light or water spray exposure when tested in accordance with ASTM G 23.
B. Water: Clean, potable.

PART 3 EXECUTION

3.01 EXAMINATION
A. Do not begin installation until substrates have been properly prepared and are suitable for application of product.
B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
3.02 PREPARATION
A. Clean surfaces thoroughly prior to installation.
B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
3.03 INSTALLATION
A. Install in accordance with manufacturer's instructions.
B. If this is the applicator's first project using this product, provide the manufacturer's technical representative on-site to familiarize installers with proper procedures.
C. Prevent damage to and soiling of adjacent work.
D. New Concrete: Apply cure-seal-hardener to new concrete as soon as the concrete is firm enough to work on after troweling, except on colored concrete wait minimum of 30 days.
1. Spray on at rate of 200 square feet per gallon.
2. Keep surfaces wet with cure-seal-hardener for minimum soak-in period of 30 minutes, without allowing drying out or becoming slippery. In hot weather slipperiness may appear before the 30 minute time period has elapsed. If that occurs, apply more cure-seal-hardener as required to keep entire surface in a non-slippery state for the first 15 minutes. For the remaining 15 minutes, mist the surface as needed with water to keep the material in a non-slippery state.
3. After this period, when treated surface becomes slippery lightly mist with water until slipperiness disappears.
4. Wait for surface to become slippery again and then flush entire surface with water removing all residue of cure-seal-hardener.
5. Squeegee surface completely dry, flushing any remaining slippery areas until no residue remains.
6. Wet vacuum or scrubbing machines may be used to remove residue, provided manufacturer's instructions are followed.
E. Prior to Substantial Completion, and at the time recommended by manufacturer, apply second coat of compound to all areas that received a first application.
F. High speed burnish to develop shine.
3.04 CLEANING
A. Waste Management: Comply with requirements of Section 01732 for removal and disposal of construction debris and waste.
3.05 PROTECTION
A. Protect installed floors until chemical reaction process is complete; at least three months.
1. Comply with precautions listed under PROJECT CONDITIONS.
2. Clean floor regularly in accordance with manufacturer's recommendations to accelerate the sealing process.
3. Clean up spills immediately and spot-treat stains with good degreaser or oil emulsifier.
B. Protect installed floors from subsequent construction operations.

END OF SECTION

SECTION 04 1000

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 05120

STRUCTURAL STEEL

1 PART 1 GENERAL

1.1 SECTION INCLUDES

A. Structural steel framing members, support members, suspension cables sag rods, and struts.

B. Base plates, shear stud connectors, and expansion joint plates.

C. Grouting under base plates.

1.2 RELATED SECTIONS

A. Section 05500 - Metal Fabrications:

1.3 REFERENCES

A. AISC - Code of Standard Practice - Manual of Steel Construction - Allowable Stress Design (ASD).

B. AISC - Section 10 - Architecturally Exposed Structural Steel.

C. ASTM A36/A36M - Structural Steel.

D. ASTM A53 - Hot-Dipped, Zinc-coated Welded and Seamless Steel Pipe.

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

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

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

H. ASTM A242/A242M - High-Strength Low-Alloy Structural Steel.

I. ASTM A307 - Carbon Steel Externally Threaded Standard Fasteners.

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

K. ASTM A449 - Quenched and Tempered Steel Bolts and Studs.

L. ASTM A490 - Quenched and Tempered Alloy Steel Bolts for Structural Steel Joints.

M. ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes.

N. ASTM A501 - Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.

O. ASTM A502 - Steel Structural Rivets.

P. ASTM A514/A514M - High-Yield Strength, Quenched and Tempered Alloy Steel Plate, Suitable for Welding.

Q. ASTM A529/A529M - Structural Steel with 42 KSI Minimum Yield Point (1/2 in. Maximum Thickness).

R. ASTM A563 - Carbon and Alloy Steel Nuts.

S. ASTM A568/A568M - General Requirements for Steel, Carbon and High-Strength Low-Alloy Hot-Rolled Sheet and Cold-Rolled Sheet.

T. ASTM A572/A572M - High-Strength Low-Alloy Columbium-Vanadium Steels of Structural Quality.

U. AWS A2.4 - Symbols for Welding, Brazing, and Nondestructive Examination.

V. AWS D1.1 - Structural Welding Code.

W. FM - Roof Assembly Classifications.

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

Y. UL - Fire Resistance Directory.

1.4 SUBMITTALS FOR REVIEW

A. Section 01300 - Submittals: Procedures for submittals.

B. Shop Drawings:
   1. Indicate profiles, sizes, spacing, locations of structural members, openings, attachments, and fasteners.
   2. Connections.
   3. Indicate welded connections with AWS A2.0 welding symbols. Indicate net weld lengths.

1.5 SUBMITTALS FOR INFORMATION

A. Section 01300 - Submittals: Procedures for submittals.

B. Manufacturer's Mill Certificate: Certify that Products meet or exceed specified requirements.

C. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within the previous 12 months.

1.6 QUALITY ASSURANCE

A. Fabricate structural steel members in accordance with AISC Code of Standard Practice.

B. Perform Work in accordance with AISC Section 10.

C. Maintain one copy of each document on site.

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

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

F. 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.

2 PART 2 PRODUCTS

2.1 MATERIALS

A. Structural Steel Members: ASTM A36/A36M. ASTM A992, GRADE 50.

B. Structural Tubing: ASTM A500, Grade B. ASTM A501.

C. Pipe: ASTM A53, Grade B.

D. Bolts, Nuts, and Washers: ASTM A307. ASTM A325 bolts.

E. Anchor Bolts: ASTM F1554, GRADE 36.

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

G. Sliding Bearing Plates: Teflon coated.

H. Grout: Non-shrink type, pre-mixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing additives, capable of developing a minimum compressive strength of 7,000 psi at 28 days;

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

J. Touch-Up Primer for Galvanized Surfaces: [SSPC 20 [Type I Inorganic.]

2.2 FABRICATION

A. Space shear stud connectors as required.

B. Continuously seal joined members by intermittent welds and plastic filler or continuous welds. Grind exposed welds smooth.

C. Fabricate connections for bolt, nut, and washer connectors.

D. Develop required camber for members.

2.3 FINISH

A. Prepare structural component surfaces in accordance with SSPC SP.

B. Shop prime structural steel members. Do not prime surfaces that will be fireproofed, field welded, in contact with concrete, or high strength bolted.

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. Allow for erection loads, and for sufficient temporary bracing to maintain structure safe, plumb, and in true alignment until completion of erection and installation of permanent bracing.

B. Field weld components and shear studs indicated on drawings or shop drawings.

C. Field connect members with threaded fasteners; torque to required resistance.

D. Do not field cut or alter structural members without approval of Architect/Engineer.

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

F. Grout under base plates in accordance with manufacturer=s recommendations. Trowel grouted surface smooth, splay neatly to 45 degrees.

3.3 ERECTION TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.

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

3.4 FIELD QUALITY CONTROL

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

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 05311

STEEL ROOF DECK

1 PART 1 GENERAL

1.1 SECTION INCLUDES

A. Steel roof deck and accessories.

B. Formed steel cant strips, eave strips, and valley strips.

C. Framing for openings up to and including 18 inches.

D. Bearing plates and angles.

1.2 RELATED SECTIONS

A. Section 05120 - Structural Steel:

1.3 REFERENCES

A. ASTM A36 - Structural Steel.

B. ASTM A446 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip process, Structural (Physical) Quality.

C. ASTM A525 - Steel Sheet, Zinc-Coated, Galvanized by the Hot-Dip Process.

D. ASTM A611 - Steel, Cold-Rolled Sheet, Carbon, Structural.

E. AWS D1.1 - Structural Welding Code.

F. FM - Roof Assembly Classifications.

G. SDI (Steel Deck Institute) - Design Manual for Composite Decks, Form Decks, Roof Decks, Cellular Metal Floor Deck with Electrical Distribution.

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

I. UL - Fire Resistance Directory.

1.4 PERFORMANCE REQUIREMENTS

A. Design metal deck in accordance with SDI Design Manual.

B. Calculate to structural working stress design and maximum vertical deck deflection of 1/240.

C. Lateral deflection of diaphragm shall not exceed 1/500 of the storey height.

1.5 SUBMITTALS FOR REVIEW

A. Section 01300 - Submittals: Procedures for submittals.

B. Shop Drawings: Indicate deck plan, support locations, projections, openings pertinent details, and accessories.

C. Product Data: Provide deck profile characteristics and dimensions, structural properties, and finishes.

1.6 SUBMITTALS FOR INFORMATION

A. Section 01300 - Submittals: Procedures for submittals.

B. Certificates: Certify that Products meet or exceed specified requirements.

C. Submit manufacturer's installation instructions.

D. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within the previous 12 months.

1.7 QUALITY ASSURANCE

A. Installer: Company specializing in performing the work of this Section with minimum two years documented experience.

B. Design deck layout, spans, fastening, joints, and under direct supervision of a Professional Engineer experienced in design of this work and licensed in the State of Texas.

1.8 DELIVERY, STORAGE, AND HANDLING

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

B. Cut plastic wrap to encourage ventilation.

C. Store deck on dry wood sleepers; slope for positive drainage.

2 PART 2 PRODUCTS

2.1 MATERIALS

A. Manufacturers:
   1. Vulcraft or approved equal.

   2. Section 01600 - Material and Equipment: Product options and substitutions. Substitutions: Permitted as approved by the engineer.

B. Sheet Steel: ASTM A446, Grade A Structural Quality; with G90 galvanized coating conforming to ASTM A525.

C. Sheet Steel: ASTM A446, Grade A Structural Quality; with G90 galvanized coating, precoated with silicone coating of color as selected from manufacturer's standard range.

D. Sheet Steel: ASTM A611, Grade C, one coat of standard shop primer paint.

E. Bearing Plates and Angles: ASTM A36 steel, unfinished.

F. Welding Materials: AWS D1.1.

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

H. Touch-Up Primer for Galvanized Surfaces: SSPC 20 Type I B inorganic.

2.2 ACCESSORIES

A. Flute Closures: Closed cell foam rubber, 1 inch thick; profiled to fit tight to the deck.

B. Acoustical Insulation: Glass fiber type, minimum 1.1 lb/cu ft density; profiled to suit deck.

C. Sump Pans, Sump Plates, Valley Strips, Eave Strips: Fabricated of metal of same type and finish as deck.

2.3 FABRICATION

A. Metal Deck: Sheet steel, configured as follows:
   1. Span Design: multiple
   2. Minimum Metal Thickness Excluding Finish: 22 gage.
   3. Nominal Height: 1-1/2 inch, fluted profile to SDI.
   4. Formed Sheet Width: Standard Manufacturer=s width.
   5. Side Joints: lapped

B. Acoustic Deck: Sheet steel, plain vertical face perforated with 1/8 inch diameter holes staggered 3/8 inch oc, configured as follows:
   1. Span Design: multiple
   2. Minimum Metal Thickness Excluding Finish: 20 gage
   3. Nominal Height: inch
   4. Formed Sheet Width: Standard Manufacturer=s width
   5. Side Joints: lock seam

C. Corrugated Form Deck: Sheet steel, vent clips, deformed ends for ventilation of concrete:
   1. Minimum Metal Thickness: Excluding Finish: 20 gage
   2. Nominal Height: 1.5 inch
   3. Formed Sheet Width: Standard Manufacturers width
   4. Side Joints: lapped

D. Related Deck Accessories: Metal closure strips, wet concrete stops, cover plates, cant strips, 20 gage thick galvanized sheet steel; of profile and size as required.

E. Roof Sump Pan: Fabricate of 14 gage sheet steel, flat bottom, sloped sides, recessed 1-1/2 inches below roof deck surface, bearing flange 3 inches wide, sealed watertight.

F. Cant Strips: Formed sheet steel, gage thick, 45 degree slope, 3 1/2 inch nominal width and height, flange for attachment.

G. Fasteners: Galvanized hardened steel, self tapping, or painted to match deck precoating color.

H. Weld Washers: Mild steel, uncoated, 3/4 inch outside diameter, 1/8 inch thick.

3 PART 3 EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

A. Erect metal deck in accordance with SDI Manual and manufacturer's instructions.

B. Bear deck on masonry, concrete, or wood support surfaces with 4 inch minimum bearing. Align and level.

C. Bear deck on steel supports with 1-1/2 inch minimum bearing. Align and level.

D. Fasten deck to steel support members at ends and intermediate supports with fusion welds, or mechanical fasteners at 18 inches oc maximum, parallel with the deck flute and at every other transverse flute.

E. Weld in accordance with AWS D1.1.

F. Mechanically fasten male/female side laps at 24 inches oc maximum or weld male/female side laps at 18 inches oc maximum.

G. Reinforce steel deck openings from 6 to 18 inches in size with 2 x 2 x 1/4 inch steel angles. Place framing angles perpendicular to flutes; extend minimum two flutes beyond each side of opening and fusion weld or mechanically attach to deck at each flute.

H. Install 6 inch minimum wide sheet steel cover plates, of same thickness as deck, where deck changes direction. Fusion weld or mechanically attach 12 inches oc maximum.

I. Install wet concrete stops at roof edge upturned to top surface of slab to contain wet concrete. Provide stops of sufficient strength to remain stationary under wet concrete without distortion.

J. Install sheet steel closures and angle flashings to close openings between deck and walls, columns, and openings.

K. Install single row of foam flute closures above walls and partitions perpendicular to deck flutes.

L. Position roof sump pans with flange bearing on top surface of deck. Fusion weld at each deck flute.

M. Place metal cant strips in position and fusion weld, or mechanically attach.

N. Immediately after welding deck and other metal components in position, coat welds, burned areas, and damaged surface coating, with touch-up prime paint.

END OF SECTION

SECTION 05 5000

METAL FABRICATIONS

PART 1GENERAL

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.

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.

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

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 06 1000

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 species.

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

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).

1. Thickness: 0.040-inch, nominal.

2. 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 07 6200

SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Metal flashings and trim
   2. Fascia
   3. Gutters and downspouts.
   4. Counterflashings at roof mounted equipment and utility penetrations.

B. Related Sections:
   1. Division 01: Administrative, procedural, and temporary work requirements.
   2. Section 07 9200 - Joint Sealers.

1.2 REFERENCES

A. American Architectural Manufacturers Association (AAMA):
   1. 611 - Voluntary Specification for Anodized Architectural Aluminum.
   2. 621 - Voluntary Specifications for High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) and Zinc-Aluminum Coated Steel Substrates.

B. American National Standards Institute/Single Ply Roofing Institute (ANSI/SPRI) ES-1 - Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems.

C. ASTM International (ASTM):
   1. A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
   2. B32 - Standard Specification for Solder Metal.
   3. B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

D. Sheet Metal and Air Conditioning Manufacturer's Association International (SMACNA) - Architectural Sheet Metal Manual.

1.3 SUBMITTALS

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

1.4 QUALITY ASSURANCE

A. Fabricator Qualifications: Minimum 10 years experience in work of this Section.

B. Design, fabricate, and install metal copings, edge flashings in accordance with ANSI/SPRI ES-1.

C. Conform to SMACNA Manual for nominal sizing of gutters, scuppers, collector boxes and downspouts for rainfall intensity determined by a storm occurrence of 1 in 100 years.

PART 2 PRODUCTS

2.1 MATERIALS

A. Precoated Aluminum-Zinc Alloy Coated Steel Sheet:

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

2.2 ACCESSORIES

A. Solder: ASTM B32.

B. Fasteners: Same material and finish as sheet metal, with neoprene gasketed washers where exposed.

C. Joint Sealers: Specified in Section 07 9200.

2.3 FABRICATION

A. Fabricate components in accordance with SMACNA Manual.

B. Profiles:
1. Gutters: SMACNA Plate, rectangular
2. Downspouts: SMACNA Plate, rectangular
3. Fabricate end caps, downspout outlets and headers, straps, brackets, and downspout strainers in profile to suit gutters and downspouts.

C. Pre tin edges of sheet.

D. Pop rivet and seal joints at prefinished metal.

E. Fabricate corners in single units with minimum 18 inch long legs.

F. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.

G. Form sections accurate to size and shape, square and free from distortion and defects.

H. Provide for thermal expansion and contraction in sheet metal:
1. Gutters:
   a. Place expansion joints at maximum 50 feet on center.
   b. Locate expansion joints between downspouts; prevent water flow over joint.
2. Other sheet metal:
   a. Provide expansion joints in sheet metal exceeding 15 feet in running length.
   b. Place expansion joints at 10 feet on center maximum and maximum 2 feet from corners and intersections.
3. Joint width: Consistent with types and sizes of materials, minimum width 1/4inch.

I. Fabricate expansion joints in metal copings, edge flashings with backing and cover plates formed to flashing profile, minimum 8 inches long.

J. Unless otherwise indicated, provide minimum 3/4inch wide flat lock seams; lap in direction of water flow.

K. Fabricate cleats and starter strips of same material as sheet metal.

PART 3 EXECUTION

3.1 INSTALLATION (Verify colors of each flashing application before installation).

A. Install flashing and sheet metal as indicated and in accordance with SMACNA Manual.

B. Install cleats and starter strips before starting installation of sheet metal. Fasten at 6 inches on center maximum.

C. Expansion Joints in Metal Copings and Edge Flashings:
   1. Center backing plate between flashing pieces at end joints.
   2. Apply two continuous beads of joint sealer between backing plate and flashing sections at each end.
   3. Install flashing pieces with 1/2 inch expansion space at abutting ends; apply sealer to expansion space.
   4. Apply two continuous beads of joint sealer between cover plate and flashing sections at each end.

D. Secure flashings with concealed fasteners where possible.

E. Apply plastic cement between metal and bituminous flashings.

F. Fit flashings tight, with square corners and surfaces true and straight.

G. Seam and seal field joints.

H. Separate dissimilar metals with bituminous coating or non-absorptive gaskets.

I. Reglets:
   1. Install reglets true to line and level. Seal top of surface mounted reglet with joint sealer.
   2. Install flashings into reglets to form tight fit. Secure with lead or plastic wedges at 9 inches on center maximum. Seal remaining space with joint sealer.

J. Gutters: Secure with straps spaced maximum 36 inches on center and within 12 inches of ends.

K. Downspouts:
   1. Secure with straps spaced maximum 8 feet on center and within 2 feet of ends and elbows.
   2. Flash downspouts into gutters and fasten.
   3. Flash upper sections into lower sections minimum 2 inches at joints; fasten sections together.

L. Apply joint sealers as specified in Section 07 9200.

3.2 CLEANING

A. Clean sheet metal; remove slag, flux, stains, spots, and minor abrasions without etching surfaces.

END OF SECTION

SECTION 07 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.

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 7100

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):

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

SECTION 09 9000

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: Selected by architect from manuf. full range of colors.

B. Shower Compartments: Solid molded plastic panels, doors, and pilasters, ceiling-mounted headrail-braced.
   1. Color: Selected by architect from manuf. full range of colors.

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.

3.03 SIGNAGE SCHEDULE

A. Provide signage for the following spaces:

1. Men’s Restroom 101, Women’s Restroom 103, Janitor 104 & Electrical 105

B. Provide submittal for approval before manufacturing the signs.

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 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 Toilet 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

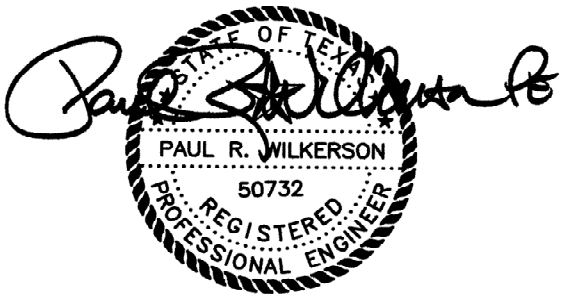
B. Install plumb and level, securely and rigidly anchored to substrate.

END OF SECTION

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
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
16470	PANELBOARDS
16510	LUMINAIRES

2009 INTERNATIONAL ENERGY CONSERVATION CODE CERTIFICATES



December 1, 2017

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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 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 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

COM*check* Software Version 4.0.5.1

Interior Lighting Compliance Certificate

Section 1: Project Information

Energy Code: **2009 IECC**
Project Title: Texas Bank Sports Complex #2
Project Type: New Construction

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	872	1.1	959
		Total Allowed Watts =	959

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 (872 sq.ft.)				
LED 1: E: Industrial Vaportite Strip: LED Panel 40W:	1	9	40	360
LED 1: K: 4' Strip: LED Panel 41W:	1	4	41	164
			Total Proposed Watts =	524

Section 4: Requirements Checklist

Interior Lighting PASSES: Design 45% better than code.

Lighting Wattage:

❑ 1. Total proposed watts must be less than or equal to total allowed watts.

Allowed Watts	Proposed Watts	Complies
959	524	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 4.0.5.1 and to comply with the mandatory requirements in the Requirements Checklist.

Paul R. Wilkerson, PE	Paul Wilkerson	12-01-2017
Name - Title	Signature	Date

Project Notes:

MEP Project #1618
December 01, 2017
PE License #50732

Architect of Record
Kinney/Franke Architects
37B West Concho
San Angelo, TX 76903
325.653.2900

COM*check* Software Version 4.0.5.1

Exterior Lighting Compliance Certificate

Section 1: Project Information

Energy Code: **2009 IECC**
Project Title: Texas Bank Sports Complex #2
Project Type: New Construction
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	480 ft2	0.4	Yes	192	132
Other door (not main entry)	6 ft of door width	20	Yes	120	160
			Total Tradable Watts* =	582	292
			Total Allowed Watts =	582	
			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 (480 ft2): Tradable Wattage				
LED 3: P: Recessed Downlight: Other:	1	3	44	132
Other door (not main entry) (6 ft of door width): Tradable Wattage				
LED: XP: Pole Light Mounted at 100': Other:	1	8	20	160
			Total Tradable Proposed Watts =	292

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 4.0.5.1 and to comply with the mandatory requirements in the Requirements Checklist.

Paul R. Wilkerson, PE	Paul Wilkerson	12-01-2017
Name - Title	Signature	Date

COM*check* Software Version 4.0.5.1

Mechanical Compliance Certificate

Section 1: Project Information

Energy Code: **2009 IECC**
Project Title: Texas Bank Sports Complex #2
Project Type: New Construction

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: 30 gallons Proposed Efficiency: 0.95 EF, Required Efficiency: 0.89 EF

Section 4: Requirements Checklist

Requirements Specific To: Water Heater 2 :

- ❑ 1. Water heating equipment meets minimum efficiency requirements: Electric Water Heater efficiency: 0.89 EF (211 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 4.0.5.1 and to comply with the mandatory requirements in the Requirements Checklist.

Paul R. Wilkerson, PE	Paul Wilkerson	12-01-2017
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.

Paul R. Wilkerson, PE	Paul Wilkerson	12-01-2017
Principal Mechanical Designer-Name	Signature	Date

SECTION 31 3116

TERMITE CONTROL

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Below grade soil treatment for termite control.

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

1.2 SUBMITTALS

A. Submittals for Review:
1. Application Procedures: Indicate locations for application, application rates, and application equipment.
2. Warranty: Sample warranty form.

B. Quality Control Submittals:
1. Current EPA approval listing.
2. Certificates of Compliance: Applicator’s certification that termiticide was applied at specified concentrations and using specified methods and materials.

1.3 QUALITY ASSURANCE

A. Applicator Qualifications: Licensed for termite control by authorities having jurisdiction in State in which Project is located.

1.4 DELIVERY, STORAGE AND HANDLING

A. Protect containers from accidental opening and use.

1.5 PROJECT CONDITIONS

A. Do not apply termiticide when surface water is present.

1.6 SEQUENCING

A. Apply termiticide:
1. After completion of excavating, backfilling, and compaction.
2. Prior to placing vapor retarder.

1.7 WARRANTIES

A. Provide manufacturer’s warranty against invasion or propagation of subterranean termites and damage to building or building contents caused by termites, including repairs to building and building contents.

PART 2 PRODUCTS

2.1 MATERIALS

A. Termiticide:
1. Approved for termite treatment by Environmental Protection Agency and other authorities having jurisdiction.
2. Water based solution, uniform in composition, synthetically dyed to permit visual identification of treated soil.

2.2 MIXES

A. Mix materials in accordance with manufacturer’s instructions.

PART 3 EXECUTION

3.1 APPLICATION

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

B. Inject treatment at minimum rates recommended by manufacturer.

C. Apply treatment to areas beneath floor slabs structures and outside of building perimeter to minimum 48 inch depth below grade.

D. Saturate areas around floor slab penetrations.

E. Prevent spillage and runoff onto adjacent non treated areas.

F. Ensure complete coverage of treated areas.

G. Extend treatment onto adjacent construction and floor slab penetrations.

H. Reapply termiticide to treated soils that are disturbed after treatment.

END OF SECTION

SECTION 32 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 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. Tool expansion joint edges and other exposed edges to smooth, dense surface with 1/8 inch radius.

F. Provide sawn tooled control joints at maximum 6 feet on center.

G. Installation Tolerances: Surfaces true to plane, in longitudinal direction to required grade, within plus or minus 1/4 inch in 10 feet, noncumulative.

H. Seal expansion joints as specified in Section 07 9200.

END OF SECTION