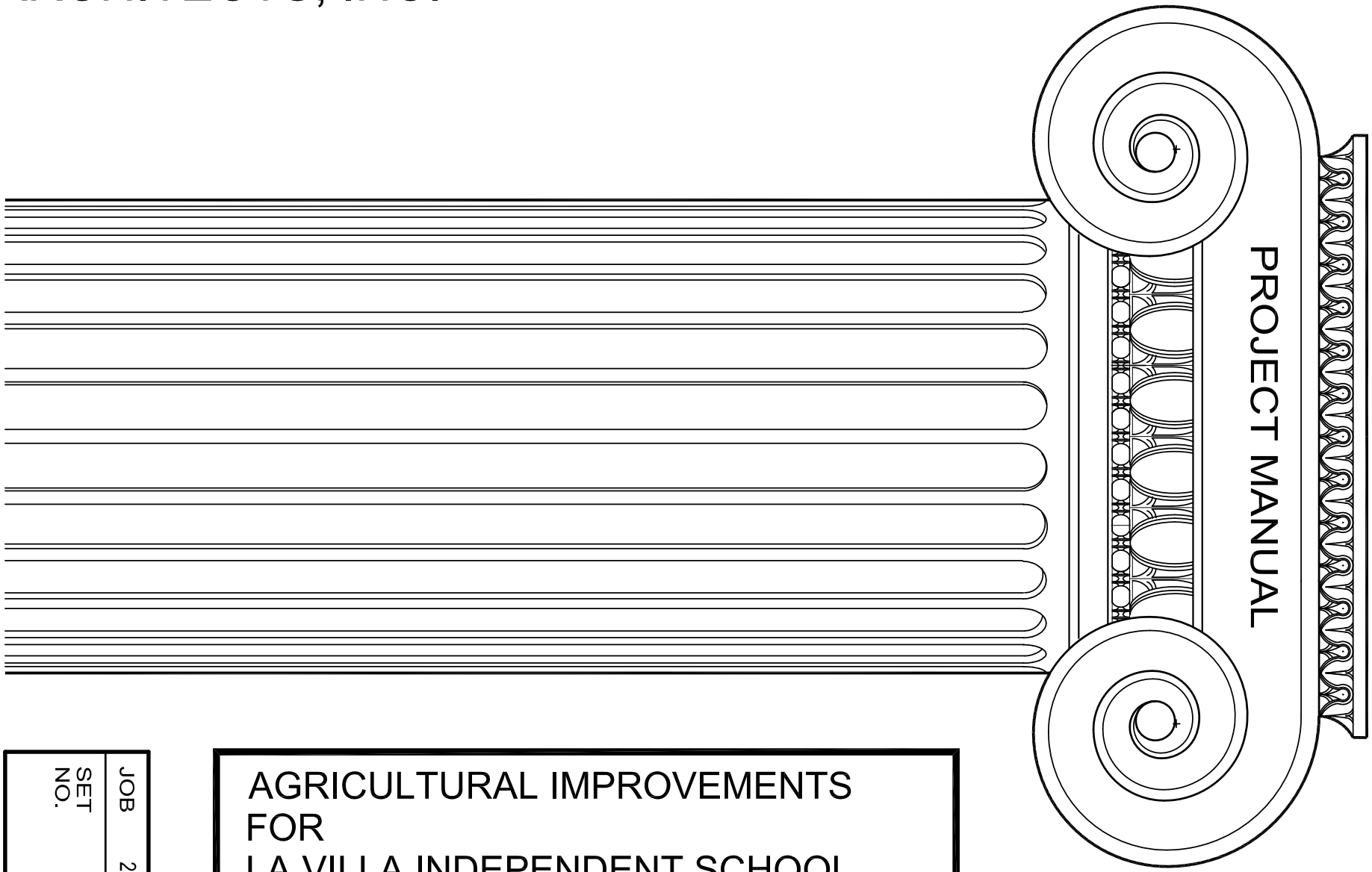
RIKE - OGDEN - FIGUEROA - ALLEX

ARCHITECTS, INC.



JOB 2018.07

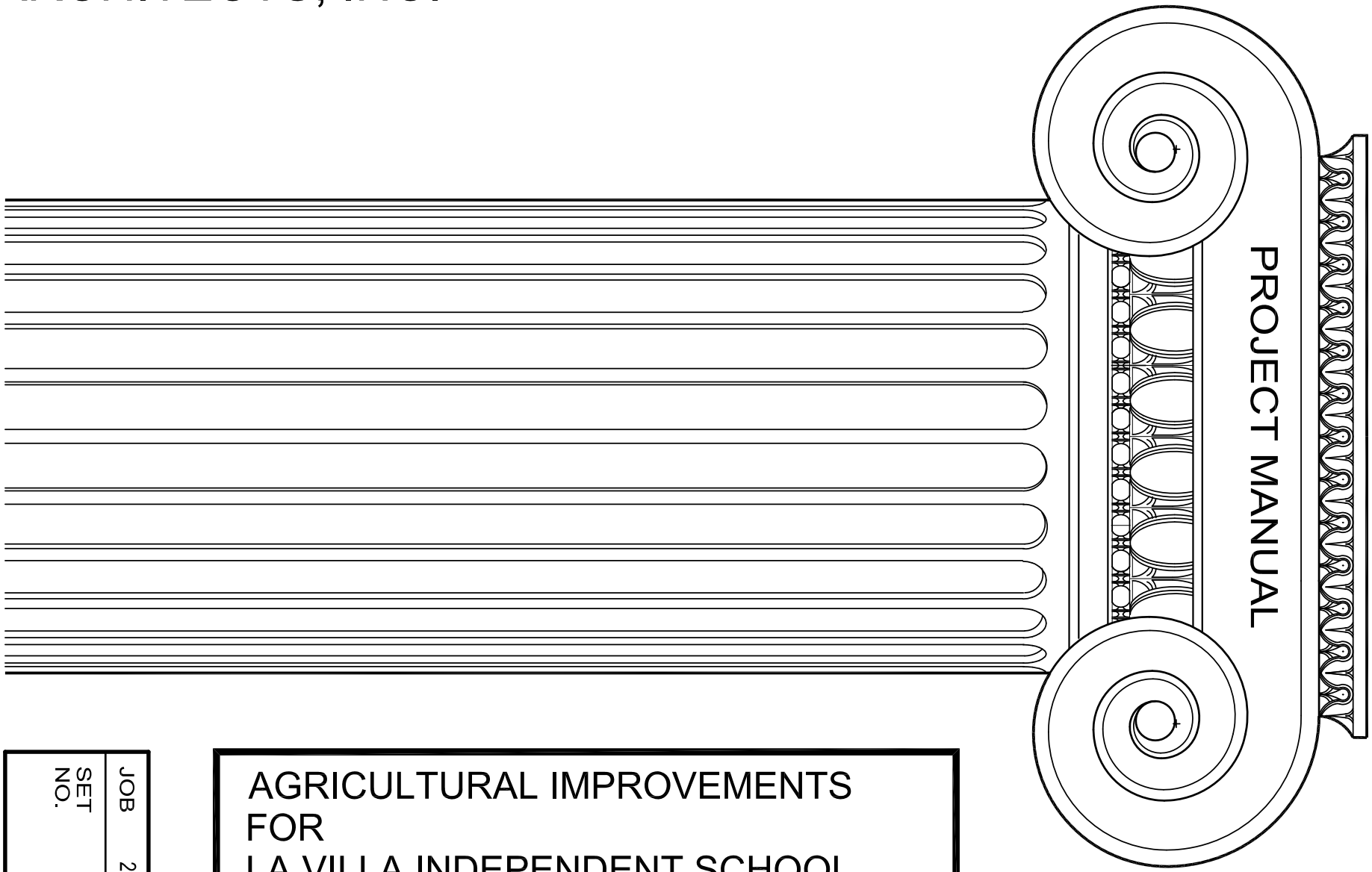
SET NO.

AGRICULTURAL IMPROVEMENTS FOR LA VILLA INDEPENDENT SCHOOL DISTRICT

LA VILLA, TEXAS

RIKE - OGDEN - FIGUEROA - ALLEX

ARCHITECTS, INC.



JOB 2018.07

SET NO.

AGRICULTURAL IMPROVEMENTS FOR LA VILLA INDEPENDENT SCHOOL DISTRICT

LA VILLA, TEXAS

PROJECT MANUAL

AGRICULTURAL IMPROVEMENTS
FOR
LA VILLA INDEPENDENT SCHOOL DISTRICT
LA VILLA, TEXAS

PROJECT NO. 2018.07

TEXAS BOARD OF ARCHITECTURAL EXAMINERS
333 Guadalupe, Suite 2-350, AUSTIN, TX 78701-3942
(Tel: 512/305-9000)
HAS JURISDICTION OVER INDIVIDUALS LICENSED UNDER
THE ARCHITECT'S REGISTRATION LAW
ARTICLE 249a, VERNON'S CIVIL STATUTES".

ROFA ARCHITECTS INC.
1007 WALNUT AVENUE
McAllen, TEXAS 78501
{956}686-7771 - FAX: {956}687-3433

PROJECT MANUAL

AGRICULTURAL IMPROVEMENTS
FOR
LA VILLA INDEPENDENT SCHOOL DISTRICT
LA VILLA, TEXAS 78562

Project No. 2018.07

DOCUMENTS

DIVISION 0 PROPOSAL CONTRACT REQUIREMENTS

TECHNICAL SPECIFICATIONS

DIVISION 1 GENERAL REQUIREMENTS

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END OF SECTION

10-26-18

TRINITY
MEP ENGINEERING

3533 Moreland Dr. Suite A | Weslaco, Texas 78596
P: 956.973.0500 | F:956.351.5750
www.trinitymep.com | Copyright 2017
Texas Registered Engineering Firm No. - F10362

10/25/2018

DIVISION 15 – PLUMBING

15140	DOMESTIC WATER PIPING
15150	SANITARY WASTE AND VENT PIPING
15430	PLUMBING SPECIALTIES

DIVISION 16 – ELECTRICAL

16010	SUMMARY OF ELECTRICAL WORK
16020	BASIC ELECTRICAL REQUIREMENTS
16050	BASIC ELECTRICAL MATERIALS AND METHODS
16055	SITE ELECTRICAL
16060	GROUNDING AND BONDING
16075	ELECTRICAL IDENTIFICATION
16120	BUILDING WIRE AND CABLE
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16190	SUPPORTING DEVICES
16521	EXTERIOR LIGHTING

SECTION 00020

INVITATION FOR COMPETITIVE SEALED BIDS

PART 1: GENERAL:

1.01 PROJECT DESCRIPTION:

A. This project consists of the construction of ***Agricultural Improvements for La Villa Independent School District, La Villa, Texas 78562***.

1.02 INSTRUCTIONS TO BIDDERS:

A. Refer to SECTION 00100 – Instructions to Bidders

1.03 PRE-BID CONFERENCE:

A. The purpose of the Pre-Bid Conference is to answer any questions that any bidder may have.

B. Date and Time: ***Thursday, November 04, 2018***

C. Location: ***Business Office (500 East 9th Street)***

P. O. Box 9 La Villa, Texas, 78562

1.04 OPENING OF BIDS:

A. Place:

1. ***Competitive sealed Bids*** will be received at the office of:

Owner: ***La Villa Independent School District***

Address: ***Business Office (500 East 9th Street)***

ATTENTION: ***Dr. Norma Salaiz, Interim Superintendent***

B. Date: **Thursday, November 15, 2018**

C. Hour**:** **4:00 P.M.**

1.05 REJECTION:

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

END OF SECTION

SECTION 00100
INSTRUCTIONS TO BIDDERS

PART 1: GENERAL:

1.01 BID SECURITY AND BOND:

A. Bid security in the amount of five percent (5%) of the Bid must accompany each Bid. Bid security shall be in the form of a Bid Bond issued by an insurance company authorized to provide bonds on work in the State of Texas and shall be made payable to the Owner.

1.02 DOCUMENTS:

A. Qualified General Contractor may obtain two {2} sets of Drawings and Project Manuals from: ***RGV REPROGRAPHICS 519 S. Broadway, McAllen, Texas 78501 (956) 686-1525.***

B. Subcontractors may obtain one {1} set of Drawings and Project Manuals from the office: ***RGV REPROGRAPHICS 519 S. Broadway, McAllen, Texas 78501(956) 686-1525.***

C. A deposit of ***ONE HUNDRED DOLLARS {$100.00}*** will be required for each set of Drawings and Project Manuals issued. Partial sets will not be issued. Make checks payable to ROFA ARCHITECTS INC.

D. Deposits will be refunded to those submitting Bids provided that all sets are returned along with all addendums to ***RGV REPROGRAPHICS*** within ten {10} days after date of opening of Bids. The Bidder awarded the Project may retain the Bid Documents, and his deposit will be refunded upon execution of the Contract.

E. Bidders, upon returning bid documents, must obtain a receipt indicating that set{s} were returned to the Architects. Deposit amount will be refunded to the Bidders as soon as practical, provided sets are in good condition. Costs of reproducing missing or damaged sheets or pages will be deducted from the deposit amount.

F. General Contractors may obtain additional sets by paying the cost of reproduction, which will not be refunded, and complete sets shall be returned to the Architects.

G. Complete sets of Bid Documents shall be used in preparing bids; neither the Owner nor the Architect assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

H. The Owner or Architect in making copies of the Bid Documents available on the above terms, does so only for the purpose of obtaining bids on the work and does no confer a license or grant for any other use.

I. Complete sets of Drawings and Project Manuals are on file at the following locations and subcontractors may examine them there:

ROFA Architects Inc.
1007 Walnut Avenue
McAllen, Texas 78501

AGC PLAN ROOMS
Pharr, Harlingen, Brownsville

McGraw-Hill Construction Dodge
http://www.dodgeplans.construction.com

VIRTUAL BUILDERS EXCHANGE
San Antonio, Texas 78217
askme@virtuallbx.com

1.03 EXAMINATION:

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

B. Extra payments will not be authorized for work that could have been foreseen by careful examination of the site. Submission of a Bid shall constitute acceptance, by the Bidder, of existing site conditions as a part of the requirements for this work.

C. Bidders shall carefully examine the Bid Documents to verify that they agree with the Table of Contents in the Project Manual, the Index of Drawings Sheet on the Drawings, and the Cover Page of all Addenda. Bidders shall be responsible for obtaining any pages or sheets which have been inadvertently left out during the printing process.
   1. All entities bidding on any portion of the work contained in the Contract Documents shall ascertain the completeness of the set of documents.
   2. The Contract Documents are printed by an independent vendor and, although the Architect endeavors to check the documents for completeness, the Architect has, in the past, discovered missing or misplaced sheets in the Drawings and the Specifications.
   3. Each entity receiving a set of Contract Documents shall check the indexes against the sheets or pages contained in the sets.
   4. Should pages or sheets be found to be misplaced or missing, immediately notify the Architect who will give direction as to placement or provide the sheets or pages that are missing.
   5. Failure to notify the Architect means the Bidder is providing a proposal based on a complete set of Contract Documents.

1.04 INTERPRETATION OF BID DOCUMENTS:

A. Bidders shall promptly notify the Architect of any ambiguity, inconsistency or error which they may discover upon examination of the Bid Documents or of the site and local conditions.

B. Submit all questions regarding clarification or interpretation of Bid Documents to the Office of the Architects: RIKE-OGDEN-FIGUEROA-ALLEX, ARCHITECTS, 1007 Walnut Avenue, McAllen, TX 78501. ***(Attn: Humberto Rodriguez, AIA*** - {956}686-7771; email: humbertor@rofainc.com

C. Submit all questions in writing. In the interest of time, requests may be made by telephone, but they must be confirmed in writing the same day. Replies to questions will be issued to all Bidders in the form of an Addenda. ***General contractor and subcontractors shall submit questions in writing forty-eight (72) hours prior to opening of proposals***.

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

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

1.05 BASIS OF BIDS:

A. Bids shall be on a lump sum basis and shall include all costs for this Project as described and indicated by the Contract Documents. Basis for Bidding shall be on brands, materials, processes, products, persons or organizations, etc., indicated in the Contract Documents.

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

1.06 ALTERNATES:

A. The Owner may, at his option, elect to proceed with any or all Alternates as set forth in the Bidding Requirements.

B. Amount shown in Bid for each Alternate shall include profit, insurance, contingencies and other costs incidental to performance under such Alternative.

C. Amount shown in Bid for each Alternate shall include the making of all changes and the installation of all materials and equipment necessary to the accomplishment of the Alternate requirements.

1.07 SUBSTITUTIONS:

A. Approval Required:

1. The Contract is based on the standards of quality established in the Contract Documents.

2. All products proposed for use, including those specified by required attributes and performance, shall require approval by the Architect before being incorporated into the work.

3. Do not substitute materials, equipment, or methods unless such substitution has been specifically approved for this work by the Architect.

4. Product substitution requests shall be submitted no later than 7 days prior to Opening of Bids (Proposals) as noted in Section 00020.

1.08 BIDS:

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

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

C. Any alteration or erasure to information entered in the blank spaces must be initialed by the signer of the Bid. Bidder shall make no additional stipulations on the Bid Form nor qualify his bid in any other manner.

D. Original typed sheets shall be submitted, signed in longhand below the typed name of the person authorized to bind the Bidder to a Contract.

E. Where Bidder is a corporation, Bid must be signed with the legal name of the corporation followed by the name of the State of Incorporation and the legal signature of a person authorized to bind the corporation to a Contract.

F. Failure to submit a Bid on the form requested, or the inclusion of conditions, limitations or provisions distorting the intent of the Bid Documents, may render the Bid irregular and subject to rejection.

1.09 SUBMITTALS:

A. Submit ***one (1) original Bid, Bid Security and all required data and forms in an opaque, sealed envelope and one (2) Copies. Submit bids at the time and place shown in the Invitation to Bid***.

B. Envelope shall be addressed to the Owner and identified with the Project Name and the name and address of the Bidder.

C. If the Bid is sent by mail, the sealed envelope shall be enclosed in a separate mailing envelope with the notation "BID ENCLOSED" on the face thereof. No envelopes shall be opened until bid opening date and time.

1.10 MODIFICATION OR WITHDRAWAL OF BID:

A. A bid may not be modified, withdrawn or canceled by the Bidder during the stipulated time period following the time and date designated for the receipt of Bids, unless the award of Contract has been delayed more than sixty (60) days.

B. Prior to the time and date designated for receipt of Bids, bids submitted early may be modified or withdrawn only by notice to the party receiving Bids at the place and prior to the time designated for receipt of Bids.

C. Modification of Bids shall be in writing over the signature of the Bidder or be by telegram; if by telegram, written confirmation over the signature of Bidder must have been mailed and postmarked on or before the date and time set for receipt of Bids; it shall be so worded as not to reveal the amount of the original Bid.

D. Withdrawn Bids may be resubmitted up to the time designated for the receipt of Bids provided that they are then fully in conformance with these Instructions to Bidders.

E. Bid security shall be in an amount sufficient for the Bid as modified or resubmitted.

1.11 CONSIDERATION OF BIDS:

A. Properly identified Bids received on time will be opened publicly and Bidders will be informed of the Apparent Low Bidder within a reasonable time.

B. The Owner shall have the right to reject any or all Bids and in particular to reject a Bid not accompanied by any required bid security or data required by the Bidding Documents or a Bid in any way incomplete or irregular.

C. The Owner shall have the right to waive any formality or irregularity in any Bid received.

D. If the Owner accepts any Alternates, he shall have the right to accept them in any order or combination.

E. It is the intent of the Owner to award a contract to the lowest responsible Bidder provided the Bid has been submitted in accordance with the requirements of the Bidding Documents, is judged to be reasonable, and does not exceed the funds available.

F. For the purpose of preliminary consideration, the Apparent Low Bidder will be determined by Base Bid amount without Alternates or Unit Prices.

G. Award of Contract may include full consideration of Unit Prices and Alternates. Owner may accept or reject any or all Alternates.

1.12 LOCATION AND ACCESS TO PREMISES:

A. The project site location: ***Refer to vicinity map on drawings.***

B. The Contractor shall have free access to the premises for the purpose of acquainting himself with the conditions, delivering equipment, and performing the work necessary to fulfill his contract. He shall cooperate with the other contractors who may concurrently be working on the premises, integrating his work with that of others, all to the best interest of the total work and its orderly completion.

1.13 STATE SALES TAX:

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

END OF SECTION

SECTION 00220

SOIL INVESTIGATION DATA

PART 1: GENERAL:

1.01 SUBSURFACE SOIL INVESTIGATION:

A. Subsurface borings have been taken at the Project Site and a Final Report on Foundation Soil investigation has been prepared.

B. The information was obtained for use in preparing the foundation design, but is indicative only of the soil conditions where the boring is taken.

C. Bidders are expected to examine the site and the record of investigation to determine character of materials to be encountered.

D. If soil conditions other than those indicated are encountered during construction, notify the Architect before work continues.

E. Complete reports are available at the office of the Architect and may be examined there.

END OF SECTION

SECTION 00310
BID FORM FOR COMPETITIVE SEALED BIDS

BID FROM: _____

ATTN: Dr. Norma Salaiz, Interim Superintendent

RE: Agricultural Improvements for La Villa Independent School District , La Villa, Texas

The Undersigned proposes to furnish all labor, services, materials, tools, and necessary equipment for the construction of the ***Agricultural Improvements For La Villa Independent School District,*** and to perform the work required for the construction of said project at the location set out by the Drawings, Project Manual and Specifications, in strict accordance with the Contract Documents for the completed work.

In submitting this Proposal, it is understood that this Proposal may not be altered or withdrawn for sixty (60) calendar days and that the Owner has reserved the right to reject any and all Proposals.

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

BASE BID: _____

_____ ($_____) DOLLARS

ADD ALTERNATE NO. 1 UPGRADE EXISTING SWALE: That amount to add materials and labor to clean existing swale and provide a 36" wide concrete valley gutter at the flow line of the ditch with positive slope to drain to existing drain ditch. Clean existing drain pipe at drain ditch as indicated on drawings and specifications:

_____ ($_____) DOLLARS

The Undersigned further agrees that in case of authorized variations of quantities from those shown or specified, the attached ***UNIT PRICE SCHEDULE*** will be used in adjusting the Contract Price.

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

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

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

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

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

I HEREBY ACKNOWLEDGE RECEIPT OF THE FOLLOWING ADDENDUM:

_____

BONDING COMPANY(IES):

_____
(Name and address)

If awarded this contract, the offerer intends to use the following subcontractors:

ELECTRICAL:_____

PLUMBING:_____

STRUCTURAL STEEL FABRICATOR: _____

AISC Certificate Number: _____
Or
IAS - ICC Certificate Number: _____
Or
IBC - Certificate Number: _____

Respectfully Submitted:

BY: _____

FIRM: _____ If corporation affix seal here

TITLE: _____

DATE: _____

SECTION 00310
BID PROPOSAL FORM (UNIT PRICES)

A. In case of additions or deletions to the Work from the Work shown in the Contract Documents, the following Unit Prices shall be used in adjusting the Contract Price. All Unit Prices shall remain in effect until completion of the Project. All Unit Prices shall be the total cost for material, labor, tax if applicable insurance mark-ups, overhead and profit.

	ITEM	ADD	DEDUCT
1.	*4" Concrete sidewalk*	*$ /S.F.*	*$ /S.F.*
2.	*Multi-purpose wall outlet – empty box, blank cover plate. Include 9 ft. ¾" conduit, empty.*	*$ /each*	*$ /each*
3.	*Light Switch, in wall -Empty wall box, cover plate. Include 10 ft of ½" C and No. 12 wires.(assume new circuit is not required).*	*$ /each*	*$ /each*
4.	*Water hose bib (exterior) with 50 ft. of 3" copper line including tee and 2 els. 24" deep trench.*	*$ /each*	*$ /each*
5.	*Masonry partitions, provide for material and labor:* *a) 8"x 8" x 16" CMU installed with mortar, reinforcement & grouting.*	*$ /S.F.*	*$ /S.F.*

Respectfully Submitted:

By:

Date:

Business Address Complete:

Seal, If Bid is by a Corporation.

SECTION 00410
SECURITY BOND

PART 1: GENERAL:

1.01 SECURITY BOND FORM:

A. The "Security Bond", AIA Document A310, February ***2010 Edition***, will be the form used as a Bid Bond for this Project. Amount of the Security Bond shall be set forth in the Proposal Instructions.

B. A copy of the Standard AIA Document may be examined at the office of the Architect. To purchase original blank forms, visit www.aia.org. Copies may be purchased from the American institute of Architects, 1735 New York Avenue, N.W., Washington, D.C., 20006.

C. Each proposal shall be accompanied by a Security Bond pledging that the Offeror will enter into contract with the Owner on the terms stated in his Proposal and will furnish bonds covering the faithful performance of the Contract and the payment of all obligations arising thereunder.

D. Should the offeror refuse to enter into such a Contract or fail to furnish such bonds, the amount of the security bond shall be forfeited to the Owner as liquidated damages, not as a penalty.

E. The attorney-in-fact who executes the bond on behalf of the surety shall affix to the bond a certified or current copy of his power of attorney.

F. The Owner will have the right to retain the security bond of Offerors to whom an award is being considered until the Contract has been executed and the bonds have been furnished, or the specified time has elapsed so that Proposals may be withdrawn, or all Proposals have been rejected.

G. A cashiers check payable to owner in the amount of five percent (5%) of the greatest amount bid is acceptable.

END OF SECTION

SECTION 00510
AGREEMENT (STIPULATED SUM)

PART 1: GENERAL:

1.01 AGREEMENT FORM:

A. The "Standard Form of Agreement Between Owner and Contractor where the Basis of Payment is a Stipulated Sum", AIA Document A101, ***2007 Electronic Format Edition***, will be the form used as a Contract for this Project.

B. A copy of the Standard AIA Document may be examined at the office of the Architect. To purchase original blank forms, visit www.aia.org. Copies may be purchased from the American Institute of Architects, 1735 New York Avenue, N.W., Washington, D.C., 20006.

D. Modification may be made to the above agreement or an Owner provided agreement may be utilized. Either of which will be provided to contractor for review upon award of project, for final execution of the contract.

END OF SECTION

SECTION 00615

PERFORMANCE BOND AND
LABOR AND MATERIAL PAYMENT BOND

PART 1: GENERAL:

1.01 PERFORMANCE BOND AND LABOR AND MATERIAL PAYMENT BOND:

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

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

C. 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 his Power of Attorney.

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

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

END OF SECTION

SECTION 00710
GENERAL CONDITIONS OF THE CONTRACT

PART 1: GENERAL:

1.01 GENERAL CONDITIONS:

A. The General Conditions of this Contract is the American Institute of Architects Document A201,"General Conditions of the Contract for Construction", ***2007, Fourteenth Edition***, hereinafter referred to as the "General Conditions".

B. A copy of the Document is available at the Architect's office, and shall apply to each and every Section of the Work as though written in full therein. To purchase original forms, visit www.aia.org.

C. Modifications may be made to the above General Conditions or Owner provided General Conditions may be utilized. Either of which will be provided contractor for review upon award of project, for final execution of the contract.

D. ***See Section 00811 Supplementary Conditions.***

END OF SECTION

SECTION 00811
SUPPLEMENTARY CONDITIONS

PART 1: GENERAL:

1.01 SUPPLEMENTARY CONDITIONS:

A. The Supplementary Conditions modify, change, delete from or add to the General Conditions and shall apply to each and every Section of the Work as though written in full therein.

B. The following paragraphs and subparagraphs take precedence over the General Conditions. Where any part of the General Conditions is modified or deleted by the Supplementary Conditions, the unaltered provisions remain in effect.

C. Paragraph numbers and titles refer to like numbers and titles in the General Conditions.

1.2 EXECUTION, CORRELATION AND INTENT

Add the following subparagraphs.

1.2.4 Scope paragraphs placed at the beginning of the SECTIONS present a brief indication of the principal Work included in that SECTION, but do not limit Work to subject mentioned nor purport to itemize Work that may be included.

1.2.5 The Relation of Specifications and Drawings shall be equal in authority and priority. Should they disagree in themselves, or with each other, bids shall be based on the most expensive combination of quality and quantity of work indicated. The appropriate Work, in the event of the above mentioned disagreements, shall be determined by the Architect, at no additional cost to the Owner.

1.2.6 Failure to report a conflict in the Contract Documents, prior to opening of Proposal, shall be deemed evidence that the Contractor has elected to proceed in the more expensive manner, at no additional cost to the Owner.

1.2.7 The Specifications have been partially "streamlined" and some words and phrases have been intentionally omitted. Missing portions shall be supplied by inference as with notes on drawings.

1.2.8 The words “approved”, inspected”, “directed”, “selected”, and similar words and phrases shall be presumed be followed by Architect". The words "satisfactory", "submitted", "reported", and similar words and phrases shall be presumed to be followed by "to Architect". Words like "install", "provide", "locate", "furnish", and "supply" shall be construed to include complete furnishing and installing of construction. Words like “Bids”, “Bidders”, may be construed to be “Proposals”, Proposers” or “offers”, offerors”, respectively.

2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

Delete 2.2.5 and replace with the following subparagraph.

2.2.5 The General Contractor will be furnished, free of charge, ***fifteen (15)*** sets of Drawings and Specifications for use in construction of this Project. Additional Drawings and Specifications will be furnished the General Contractor at the Contractor's expense, but shall remain the property of the Architect. Cost of additional sets will be the cost of reproduction. General Contractor shall use one set to be submitted with closing documents as “as-built” set. This set shall reflect as-built conditions as noted in Section 01720 Paragraph 1.01

3.4 LABOR AND MATERIALS

Add the following subparagraphs 3.4.4 and 3.4.5 to 3.4:

3.4.4 After the Contract has been executed, the Owner and the Architect will consider a formal request for the substitution of products in place of those specified only under the conditions set forth in the General Requirements (Division 1 of the Specifications), ***unless noted otherwise in Section 00100.***

3.4.5 By making requests for substitutions based on subparagraph 3.4.4 above, the Contractor:

1. Represents that the Contractor has personally investigated the proposed substitute product and determined that it is equal or superior in all respects to that specified; Including cost and quality.

2. Represents that the Contractor will provide the same warranty for the substitution that the Contractor would for that specified;

3. Will coordinate the installation of the accepted substitute, making such changes as may be required for the Work , and related work, to be complete in all respects at no additional cost to the Owner.

7.3 CONSTRUCTION CHANGE DIRECTIVES /CHANGE ORDERS

7.3.3.1 CHANGE TO READ:

Mutual acceptance of a lump sum properly itemized in accordance with 7.3.6.1, 7.3.6.2 and 7.3.6.3. Items listed in 7.3.6.4 and 7.3.6.5 shall be a part of the overhead scheduled in 7.3.10 following. Items shall be supported by sufficient substantiating data to permit evaluation;

7.3.6 In the first sentence, delete the words "a reasonable allowance for overhead and profit" and substitute "an allowance for overhead and profit in accordance with Clauses 7.3.10.1 through 7.3.10.6 following:

7.3.6.4 DELETE the final "and" then add the following to the sentence: “are a part of overhead scheduled in 7.3.10 following".

7.3.6.5 ADD the following to the sentence: "are a part of overhead scheduled in 7.3.10 following".

ADD the following subparagraph 7.3.10 to 7.3:

7.3.10 In subparagraph 7.3.6, the allowance for the combined overhead and profit included in the total cost to the Owner shall be based on the following schedule:

1. For the Contractor, for Work performed by the Contractor's own forces, 10 percent of the cost.
2. For the Contractor, for Work performed by the subcontractor, 6 percent of the amount due the Subcontractor.
3. For each Subcontractor or Sub-subcontractor involved, for Work performed by that Subcontractor's or Sub-subcontractor's own forces, 10 percent of the cost.
4. For each Subcontractor, for Work performed by the Subcontractor's, Sub-subcontractor's, 6 percent of the amount due the Sub-subcontractor.
5. Cost to which overhead and profit is to be applied shall be determined in accordance with Subparagraph 7.3.6.
6. **In order to facilitate checking of quotations for extras or credits, all proposals, except those so minor that their propriety can be seen by inspection, shall be accompanied by a complete itemization of costs including labor, materials and Subcontracts. Labor and materials shall be itemized in the manner prescribed above. Where major cost items are Subcontracts, they shall be itemized also. In no case will a change involving over $500.00 be approved without such itemization.**

8.1 DEFINITIONS

Add the following subparagraph.

8.1.5 The term working Day as used in the Contract Documents for extensions of time shall mean normal working day excluding weekends and legal holidays.

8.3 DELAYS AND EXTENSIONS OF TIME

Delete paragraph 8.3.2 and replace with the following subparagraph.

8.3.2 Any claim for extension of time shall be made in writing to the Architect not more than ten (10) days after the commencement of the delay; otherwise, it shall be waived. In case of a continuing delay only one claim is necessary. In case of claims for extensions of time because of adverse weather, such extensions of time shall be granted only when such adverse weather prevented the execution of major items of Work on normal working days and exceeds the number of days included in the Contract time. Claim shall include respective daily construction progress report and construction photographs to support cost of claim. The Contractor shall provide an estimate of the probable effect of such delay on the progress of the Work. In the event an extension of time is granted such extension shall be the complete claim allowed. Contractor shall not be entitled to additional compensation such as, but not limited to, compensable extended overhead or lost profit.

9.6 PROGRESS PAYMENTS

Add the following subparagraph to 9.6.1

.1 Unless otherwise indicated in the Agreement, the Owner will pay ninety-five (95%) percent of the amount due the Contractor on account of progress payments until final payment.

Add the following paragraphs 9.11 to Article 9:

9.11 LIQUIDATED DAMAGES:

9.11.1 If the Contractor neglects, fails or refuses to complete the Work within the time specified in the Contract, or any proper extension thereof granted by the Owner, then the Contractor does hereby agree, as a part consideration of the awarding of this Contract, to pay the Owner the amount of ***FIVE HUNDRED DOLLARS ($500.00)*** not as a penalty but as liquidated damages for such breach of Contract as hereinafter setforth, for each and every ***calendar day*** that the Contractor shall be in default after the time stipulated in the Contractor for completing the Work.

9.11.2 The said amount is fixed and agreed upon by and between the Contractor and the Owner because of the impracticability and extreme difficulty of fixing and ascertaining the actual damages the Owner would, in such event, sustain.

11.1 Article 11.1 Modify to include the following: The last sentence of paragraph 11.1.3
The Contractor shall furnish three (3) copies of insurance certificates to the Architect's office two (2) days after award of the project and before signing of the contract. The Certificate of Insurance shall include thirty (30) Day Notice of Cancellation; Architect and Owner shall receive the same notice in regard to any policy changes.
Owner and Architect shall be named as additional insured by the Contractor but not with respect to payment of premiums due under Contractor's policies. Coverage shall include any off-site work on adjacent public or private property.

Insurance Company/Carrier issuing the certificates must be listed by A.M. Best and have an "A" rating or better and based in the United States Mainland.

The insurance as required in Article 11.1 shall have "Minimum Limits" as follows:

A. WORKER'S COMPENSATION INSURANCE: Statutory Requirements -
1. All States Endorsements (Broad)
2. Voluntary Compensation
3. Waiver of Subrogation Endorsement

B. MINIMUM EMPLOYER'S LIABILITY: $100,000/$100,000/$500,000

C. COMPREHENSIVE GENERAL LIABILITY INSURANCE MINIMUM LIABILITY AND COVERAGE:

1. Bodily Injury $500,000 each person/$500,000 each occurrence
2. Property Damage $100,000 each occurrence/$100,000 aggregate
   - OR - $500,000 Combined Single Limit Per Occurrence Bodily Injury and Property Damage.

a. Premises and operations coverage
b. Explosion and collapse hazard coverage
c. Underground hazard coverage
d. Products/completed operation hazard coverage with limits and coverage continuing one(1)year after job completion.
e. Broad Form property damage coverage
f. Personal injury coverage
g. Waiver of subrogation endorsement
h. Contractual liability (Broad Form) coverage
i. Independent contractors coverage (Owners, Architects, and Contractors protective)

NOTE: If General Liability coverage is written on a "Claims Made" basis, the Certificate of Insurance should so indicate. If so written, Contractor agrees that coverage so certified beyond job completion and that coverage written will apply to claims made DURING CONSTRUCTION AND FOR ONE (1) YEAR THEREAFTER.

D. AUTOMOBILE LIABILITY INSURANCE with minimum limits of:

1. Bodily Injury: $250,000 each person/$500,000 each occurrence
2. Property Damage: $250,000 each occurrence/$500,000 Combined Single Limit per Occurrence Bodily Injury and Property Damage.
3. Automobile Liability Insurance shall include coverage for owned, non-owned, and hired vehicles with limits not less than shown above.

E. OWNER'S AND CONTRACTOR'S PROTECTIVE LIABILITY:

1. Bodily Injury $500,000 Single limit each occurrence
2. Property Damage $250,000 each occurrence/$250,000 aggregate

F. UMBRELLA LIABILITY:

Minimum combined single limits ***$2,000,000*** with same inception and expiration dates as underlying liability policies and with coverage no less broad than in primary program.

G. BUILDER'S RISK INSURANCE:

The Contractor shall FURNISH, PAY FOR and issue a Certificate of Builder's Risk Coverage to the Owner/Architect in accordance with the General Conditions and Conditions of the Contract.

H. ARTICLE 11.4: PERFORMANCE BOND AND PAYMENT BOND:

Delete in its entirety and substitute the following:

11.4.1: Prior to signing of the Contract, the CONTRACTOR, at HIS/HER OWN EXPENSE, shall furnish a Performance Bond, and a Labor and Materials Payment Bond for one hundred (100%) percent of the Contract price on such form and with such sureties as the Owner may approve. **Surety company furnishing the Bond must be listed by A.M. BEST and have an "A" rating or better and be based in the United States Mainland and authorized to provide such bonds on public work in the State of Texas.**

Any Payment Bond and Performance Bond furnished pursuant to the provisions of Art. 5160, Vernon's Texas Civil Statutes, connected with this project, shall be furnished by a corporate surety or corporate or corporate sureties in accordance with Article 7.19-1, Vernon's Texas Insurance Code, that has a stated capital and surplus (as reported by it to the Texas Insurance Commission in its most recent report) that is in excess of ten times the stated amount of the Payment bond or the Performance Bond. Provided however, that if any Payment Bond or any Performance Bond is in an amount in excess of ten percent (10%) of the surety company's capital and

surplus (as reported to the Texas Insurance Commission in its most recent report), as a condition to accepting the bond, the Owner must receive written certification and information, satisfactory in form and substance to the Owner, that the surety company has reinsured the portion of the risk that exceeds ten percent (10%) of the surety company's capital and surplus, with one or more reinsurers who are duly authorized, accredited or trusteed to do business in the State of Texas. For the purpose of this requirement, any amount reinsured by any reinsurer may not exceed ten percent (10%) of the reinsurer's capital and surplus (as reported to the Texas Insurance Commission by the reinsurer in its most recent report). In the event there is one or more reinsurer, the surety company must provide all necessary information and certification related to the current financial condition of the surety company and any and all reinsurers required by the Owner, together with copies of all reinsurance contracts with the surety company, before any such Payment Bond and Performance Bond is eligible to be considered acceptable by the Owner.

END OF SECTION

SECTION 00900

ADDENDUM AND MODIFICATIONS

PART 1: GENERAL:

1.01 All issued Addenda and Modifications to the Contract Documents shall be inserted immediately following this page.

1.02 INDEX OF ADDENDA:

No.	Issue Date	General Description
1		
2		
3		
4		
5		
6		

1.03 INDEX OF MODIFICATIONS:

No.	Issue Date	General Description
1		
2		
3		
4		
5		
6		

END OF SECTION

SECTION 01010

SUMMARY OF WORK

PART 1: GENERAL

1.01 GENERAL:

A. The Work for this Contract comprises of the general construction of ***AGRICULTURAL IMPROVEMENTS FOR LA VILLA INDEPENDENTS SCHOOL DISTRICT*** located at ***La Villa, Texas.***

1.02 ASSIGNED CONTRACTS:

A. Relations and responsibilities between Contractor and assigned subcontractors shall be identical to that between Contractor and subcontractors he has selected.

B. Assigned subcontractors shall furnish to Contractor bonds covering faithful performance of the subcontract work and payment of all obligations thereunder, when Contractor is required to furnish such bonds to Owner.

C. Employ subcontractors assigned by the Owner for:
   1. None

1.03 WORK BY OTHERS:

A. Work on the Project will be executed concurrent with the Work of this Contract, and which is excluded from this Contract, are as follows:
   1. Utilities and Drainage Contract, beyond project site boundaries, unless otherwise indicated on Drawings.
   2. Owner provided and installed F.F.E.
   3. Certain alternates, if not accepted, may be bid separately at a later date.

1.04 CONTRACTOR'S USE OF PREMISES:

A. Assume full responsibility for the protection and safekeeping of Products under this Contract, stored on the site.

B. Move any stored Products, under Contractor's control, which interfere with operations of the Owner and separate contractor.

1.05 PRE-ORDERED PRODUCTS:

A. None

1.06 OWNER-FURNISHED PRODUCTS:

A. Products furnished and paid for by the Owner, described in specification sections:
   1. Furniture, Fixtures, and Equipment (FFE): Owner furnished; Owner installed.

B. Owner's Responsibilities:
   1. Arrange and pay for products delivery to the site and installation thereof, in accordance with the construction schedule.
   2. Inspect deliveries.
   3. Submit claims for transportation damage.
   4. Arrange for manufacturer's warranties, bonds, services, inspections, as required.

C. Contractor's Responsibilities:
   1. Protect products from exposure to elements and from damage until Substantial Completion.

END OF SECTION

SECTION 01020
ALLOWANCES

PART 1: GENERAL:
1.01 GENERAL:

A. Include in the Contract Sum the following allowances and cause the work so covered to be performed in accordance with the Contract Documents.

B. Refer to Conditions of the Contract for general requirements with regard to allowances. Allowance sum covers materials delivered to the job site only, unless otherwise indicated.

C. Allowance money may, if required, be returned to the Owner by Change Order for purpose of payment for materials or services specified.

D. Where allowance is indicated as a cost, this is to establish the quality of material, and Contractor shall be responsible for ascertaining the total quantity required, including waste, necessary to complete the installation.

E. The amount of each allowance includes:
1. The cost of the Contractor of materials and equipment delivered to the site.
2. All required taxes, unless exempt from State sales tax.
3. Labor required under the allowance, only when labor is specified to be included in the allowance.
4. Respective overhead and profit per Section 00811, Paragraph 7.3.10.

F. In addition to the amount of each allowance, include in the Contract sum an amount of 6% of the Allowance as Contractor's cost for:
1. Handling at the Site; including unloading, uncrating, and storage.
2. Labor for installation and finishing, except where labor is specified to be a part of the Allowance.
3. Protection from the elements and from damage.
4. Other expenses contemplated or required for stated allowance.
5. Contractor's overhead and profit per Section 00811 paragraph 7.3.10.2.

1.01 CONTINGENCY ALLOWANCE:

A. Include in the Contract Sum a lump sum CONTINGENCY ALLOWANCE of ***TWENTY THOUSAND*** **($*20,000.00*) DOLLARS** including respective labor.

B. At the closeout of Contract, balance of monies remaining in the CONTINGENCY ALLOWANCE and applicable contractor's cost of 6% of the Contingency Allowance balance will be credited to the Owner by Change Order.

C. At the closeout of Contract, balance of monies remaining in the CONTINGENCY ALLOWANCE and applicable contractor's cost of 6% of the Contingency Allowance balance will be credited to the Owner by Change Order.

END OF SECTION

SECTION 01045

CUTTING AND PATCHING

PART 1: GENERAL:

1.01 DESCRIPTION:

A. Contractor shall be responsible for all cutting, fitting and patching, including attendant excavation and backfill, required to complete the Work and to make its several parts fit together properly.

1.02 SUBMITTALS:

A. Submit a written request to Architect well in advance of executing any cutting or alteration which affects the structural value or integrity of any structural element of the Project. Obtain Architect's approval prior to executing any of the foregoing.

PART 2: PRODUCTS:

2.01 MATERIALS:

A. Comply with applicable specifications section for each specific product involved.

PART 3: EXECUTION:

3.01 INSPECTION:

A. Report unsatisfactory or questionable conditions to the Architect in writing; do not proceed with the work until the Architect has provided further instructions.

3.02 PREPARATION:

A. Provide adequate temporary support as necessary to assure the structural value or integrity of the affected portion of the Work.

B. Provide devices and methods to protect other portions of the Project from damage.

C. Provide protection from the elements for that portion of the Project which may be exposed by cutting and patching work, and maintain excavations free from water.

3.03 PERFORMANCE:

A. Execute cutting by methods which will prevent damage to other work, and will provide proper surfaces to receive installation of repairs.

B. Execute excavating and backfilling by methods which will prevent settlement or damage to other work.

C. After installation of the Work, carefully fit around, close up, repair, patch and/or point up all such work to match adjoining surface by use of proper tools and materials and by skilled workmen to which the work belongs.

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

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

F. Fit work airtight to pipes, sleeves, ducts, conduit and other penetrations through surfaces.

G. Refinish entire surfaces as necessary to provide an even finish to match adjacent finishes. For continuous surfaces, refinish to nearest intersection. For an assembly, refinish the entire unit.

END OF SECTION

SECTION 01050

FIELD ENGINEERING

PART 1: GENERAL:

1.01 GENERAL:

A. The Contractor shall, at his expense, engage a Texas licensed Surveyor, to locate all surveyor marks, including bench marks in order that the exact lines of the property, building and grades will be determined and verified.

B. Surveyor shall layout out entire Project prior to start of construction.

C. On completion of foundation walls and major site improvements, the Surveyor shall furnish a certified plat verifying property lines and building lines in accordance with the plot plan.

D. Any discrepancies arising in locating the work in respect to property and building lines shall be reported immediately to the Owner and the Architect.

E. Locate and protect control points prior to starting work, and preserve all permanent reference points during construction. Replace project control points which may be lost or destroyed.

F. Establish a minimum of two permanent bench marks on the site, referenced to data established by survey control points. Record locations, with horizontal and vertical data, on Project Record Documents.

G. Establish all construction lines and levels, by instrumentation and similar appropriate means.

END OF SECTION

SECTION 01085

APPLICABLE STANDARDS

PART 1: GENERAL:

1.01 DESCRIPTION:

A. Work Included:

1. Throughout the Contract Documents, reference is made to codes and standards which establish qualities and types of workmanship and materials, and which establish methods for testing and reporting on the pertinent characteristics.
2. Where materials or workmanship are required by these Contract Documents to meet or exceed the specifically named code or standard, it is the Contractor's responsibility to provide materials and workmanship which meet or exceed the specifically named code or standard.
3. It is also the Contractor's responsibility, when so required by the Contract Documents or by written request from the Architect, to deliver to the Architect all required proof that the materials or workmanship, or both, meet or exceed the requirements of the specifically named code or standard. Such proof shall be in the form requested in writing by the Architect, and generally will be required to be copies of a certified report of tests conducted by a testing agency approved for that purpose by the Architect.

B. Related Work Described Elsewhere:
Specific naming of codes or standards occurs on the Drawings and in other Sections of these specifications.

1.02 QUALITY ASSURANCE:

A. Familiarity with pertinent codes and standards: In procuring all items used in this work, it is the Contractor's responsibility to verify the detailed requirements of the specifically named codes and standards and to verify that the items procured for use in this work meet or exceed the specified requirements.

B. Rejection of non-complying items: The Architect reserves the right to reject items incorporated into the work which fail to meet the specified minimum requirements. The Architect further reserves the right, and without prejudice to other recourse the Architect may take, to accept non-complying items subject to an adjustment in the Contract Amount as approved by the Architect and the Owner.

C. Applicable standards listed in these specifications include, but are not necessarily limited to, standards promulgated by the following agencies and organizations:

1. AASHTO =American Association of State Highway and Transportation Officials, 341 National Press, Washington, D.C. 20004

2. ACI = American Concrete Institute, Box 19150, Redford Station, Detroit, Michigan 48129

3. AISC = American Institute of Steel Construction, Inc., 1221 Avenue of the American, New York, New York 10020.

4. ANSI = American National Standards Institute (successor to USASI and ASA), 1430 Broadway, New York, New York 10018.

5. ASTM = American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.

6. AWS = American Welding Society, Inc., 2501 N.W. 7th Street, Miami, Florida 33125.

7. AWWA = American Water Works Association, Inc., 6666 West Quincy Avenue, Denver, Colorado 80235.

8. CRSI = Concrete Reinforcing Steel Institute, 228 North LaSalle Street, Chicago, Illinois 60610.

9. CS = Commercial Standard of NBS, U.S. Department of Commerce, Government Printing Office, Washington, D.C. 20402.

10. FGMA = Flat Glass Marketing Association, 3310 Harrison, Topeka, Kansas 66611

11. NAAMM = National Association of Architectural Metal Manufacturers, 1033 South Boulevard, Oak Park, Illinois 60403.

12. NEC = National Electrical Code (see NFPA).

13. NEMA = National Electrical Manufacturers Association, 155 East 44th Street, New York, New York 10017.

14. NFPA = National Fire Protection Association, 470 Atlantic Avenue, Boston, Massachusetts 02210.

15. SDI = Steel Deck Institute, 135 Addison Avenue, Elmhurst, Illinois 60125.

16. SSPC = Steel Structures Painting Council, 4400 5th Avenue, Pittsburgh, Pennsylvania 15213.

17. TCA = Tile Council of America, Inc., P.O. Box 326, Princeton, New Jersey 08540.

18. UL = Underwriter's Laboratories, Inc., 207 East Ohio Street, Chicago, Illinois 60611.

19. FED SPECS and FED STANDARDS:
Specifications Sales (3FRI), Bldg. 197, Washington Navy Yard, General Services Administration, Washington, D.C. 20407.

20. INTERNATIONAL BUILDING CODE 2012 or latest edition. 2009 Energy Conservation Code.

21. NATIONAL FIRE PROTECTION ASSOCIATION STANDARDS:/CURRENT EDITION

22. INTERNATIONAL PLUMBING CODE – 2012 or latest edition.

23. ANSI A 17.1, -Safety Code for Elevators, Dumbwaiters, Escalators and Moving Walks; and Supplement ANSI A17.1a, current edition.

24. American Society of Heating, Refrigerating and Air Conditionings Engineers ANSI/ASHREA/IES Standard 90.1-2010- Energy Conservation in New Building Design, current edition.

25. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHREA)-Standard No.52- - Methods of Testing Air Cleaning Devices Used in General Ventilation for Removing Particulate Matter , current edition.

26. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHREA)-Handbook of Applications, current edition.

27. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHREA)-Handbook of Fundamentals, current edition.

28. American Society for Testing and Materials (ASTM)-Standard No.E 84- Method of Test for Surface Burning Characteristic of Building Materials, current edition.

29. INTERNATIONAL MECHANICAL CODE – 2012 or latest edition.

30. National Bureau of Standards (NBS) (available through GPO - Technical No.#708 - Appendix II, GPO SD Catalog No. C13.45, 708, NTIS COM:72:50062-Inner Laboratory Evaluation of Smoke Density Chamber. Appendix II-Test Method for Measuring the Smoke Generation Characteristics of Solid Materials.

31. Underwriter's Laboratories, Inc. (UL) - Standard No.181, - Factory Made Air Duct Material and Air Duct Connectors.

32. State Purchasing and General Services Commission-Commission's Rules and Regulations for the Elimination of Architectural Barriers.

33. Texas Department of Licensing and Regulation, Texas Architectural Barriers Act.

END OF SECTION

SECTION 01100
ALTERNATES

PART 1 - GENERAL:

1.01 SCOPE:

A. Quote as additions or deductions to the Base Proposal, Alternates to the various sections of the Work, which may be included in the Contract Price.

B. Price all Alternates complete, furnished and installed, including taxes, insurance, overhead and profit. Alternates shall be listed in the order shown on Proposal Form and shall be shown as one figure only; that is, the credit and/or extra involved for any one alternate shall have been reconciled into one figure, which can at Owner's option be added to (or deducted from - as the case may be) the Base Proposal, thus deleting or adding the applicable work in Proposal.

C. Include in the price quoted for each Alternate, any changes required in other Sections as a result of the Alternate.

D. Refer to the respective Section for complete Specifications of each Alternate.

E. If an Alternate is accepted, it shall be included as a part of the Contract Documents.

ADD ALTERNATE NO. 1 UPGRADE EXISTING SWALE: That amount to add materials and labor to clean existing swale and provide a 36" wide concrete valley gutter at the flow line of the ditch with positive slope to drain to existing drain ditch. Clean existing drain pipe at drain ditch as indicated on drawings and specifications:

END OF SECTION

SECTION 01152
APPLICATIONS FOR PAYMENT

PART 1: GENERAL:

1.01 GENERAL:

A. Submit Applications for Payment to Architect for each site in accordance with the schedule established by Conditions of the Contract and Agreement Between Owner and Contractor.

B. Submit applications on original AIA DOCUMENT G702 - Application and Certificate for Payment. Use AIA DOCUMENT G703 for Architect approval of itemized schedule of values. Forms can be downloaded via www.lrgv.org/documents/.

C. Application for payment shall also be accompanied by a written notarized statement from the surety confirming that the surety has reviewed the application for payment and approves, without reservation, of its payment by the Owner.

1.02 PREPARATION OF APPLICATION:

A. Application Form:

1. Fill in required information, including that for Change Orders executed prior to the date of submittal of application.
2. Fill in summary of dollar values to agree with the respective totals indicated on the continuation sheets.
3. Indicate percentage of retainage for completed work and for stored materials as agreed upon in the Owner-Contractor Agreement.
4. Execute notarized certification with the signature of a responsible officer of the Contract firm.

B. Continuation Sheets:

1. Fill in total list of all scheduled component items of Work, with item number and the scheduled dollar value for each item.
2. Fill in the dollar value in each column for each scheduled line item when work has been performed or products presently stored.
   a. Round off values to nearest dollar, or as specified for the Schedule of Values.
3. List any change to Contract Sum or Allowance and description, executed prior to the date of submission, at the end of the continuation sheets unless otherwise agreed upon.

C. Construction Schedule:

1. **Provide original construction schedule with first application for payment.**
2. **With subsequent applications provide updated construction schedule indicating deviations from original construction schedule.**

1.03 SUBMITTAL PROCEDURE:

A. Submit three (3) notarized, original AIA – G702 Application and Certificate for Payment to Architect at the times agreed upon in Pre-Construction meeting.

B. When Architect finds the Application properly completed and correct, he will transmit a certificate of payment to Owner. If an adjustment in the requested amount is made, he will advise the Contractor in writing.

END OF SECTION

SECTION 01153

CHANGE ORDER PROCEDURES

PART 1: GENERAL:

1.01 PROPOSED CHANGES:

A. Upon discovery of circumstances or conditions leading to the conclusion that a construction change should be made, the Architect will issue a Request for Change Order Proposal (R.F.P.) form.

B. Any work done by Contractor not authorized by the Owner shall be subject to removal at the Contractor's expense.

C. Upon determination that a proposed change appears feasible, the Architect will assign a R.F.P. number and log the information. The Architect will then prepare necessary drawings, specifications or descriptions as required for pricing.

D. The Architect will forward the package to the Contractor for pricing. Typically, ten (10) working days will be allowed for pricing; however, additional time will be allowed for more extensive changes.

E. The Contractor shall submit his price proposal along with all required back-up information to the Architect. The submittal shall include separate breakdowns for general contract and subcontract work.

F. The breakdowns shall show materials by quantities and unit prices. Cost including labor, tax, insurance mark-ups, and equipment costs. Overhead and profit shall be shown separately. Quotation shall include all costs. No additional costs will be allowed for a proposed change.

G. The Contractor's proposed change quotations will be reviewed by the Architect within a reasonable amount of time, usually not more than ten (10) working days. Conformance with the contract and the proposed change documents, as well as material, labor and equipment quantities and costs, and allowed mark-up percentages will be verified. Requests for additional time will also be evaluated based on the contractor's written evidence submitted along with a revised construction schedule proving impact on final completion date. Lack of such written evidence shall cause the request for time extension to be rejected. In case of differences, discrepancies, errors, etc. the Contractor will take action to obtain necessary revisions or corrections to the quotation.

H. "Cost of Doing business" items such as, but not limited to, supervision, field and home office expenses, warranty reserve, clean-up, and expendable supplies are a part of the overhead expense and as such shall not be included as a part of the change order proposal.

I. Bond premiums may be included as an expense item in an additive R.F.P. if also included in a deductive R.F.P. Percentage allowed shall be limited to actual percentage paid by General Contractor to bonding agent. Premiums for subcontractor bonds, if required by General Contractor, shall not be passed on the Owner.

J. When a price quotation has been considered acceptable, the Architect will forward his recommendations and all back-up information to the Owner. A recommendation either for or against the proposed change will accompany this submittal from the Architect.

1.02 AUTHORIZATION FOR CONSTRUCTION TO PROCEED:

A. Within a reasonable time, the Owner will notify the Architect whether the change will be implemented. If the change is approved, the Architect will issue a Change Order. The Change Order may be issued, at the Architect's discretion, immediately or in conjunction with several other approved RFP’s if considered appropriate.

END OF SECTION

SECTION 01200
PROJECT MEETINGS

PART 1 - GENERAL:

1.01 DESCRIPTION:

A. Contractor shall schedule and administrate monthly or bi-weekly Architect Owner Contractor (AOC) meetings, and special called meeting throughout the progress of the project.

1. Prepare agenda for meetings.
2. Distribute written notice of each meeting and the agenda four (4) working days in advance of meeting date.
3. Make physical arrangements for meetings.
4. Preside at meetings.
5. Record the minutes; include all significant proceedings and decisions.
6. Reproduce and distribute copies of minutes within three (3) working days after each meeting.

B. Representative of contractors, subcontractors and suppliers attending the meetings shall be qualified and authorized to act on behalf of the entity each represents.

C. Architect's and Owner's Representative may attend meetings.

1.02 PRE-CONSTRUCTION MEETING:

A. Architect shall schedule a Pre-Construction meeting within fifteen (15) days after date of Notice to Proceed.

B. Location: RIKE-OGDEN-FIGUEROA-ALLEX ARCHITECTS INC.
1007 Walnut Avenue, McAllen, Texas 78501

C. Attendance:

1. Owner's Representative.
2. Architect and his professional consultants.
3. Contractor's project manager and superintendent.
4. Major Subcontractors.
5. Others as appropriate.

1.03 PROGRESS MEETINGS:

A. Schedule regular bi-weekly or monthly meetings at **a scheduled time** on an agreed upon date.

B. Hold called meetings as required by progress of the Work.

C. Location of the meetings: on site or designated meeting place.

D. Attendance:

1. Owner representative.
2. Architect and his professional consultants needed.
3. Contractor's project manager and superintendent.
4. Subcontractors and suppliers as appropriate to agenda.
5. Others as appropriate.

END OF SECTION

SECTION 01300
SUBMITTALS AND SUBSTITUTIONS

PART 1: GENERAL:

1.01 DESCRIPTION:

A. Work Included:

1. Wherever possible throughout the Contract Documents, the minimum acceptable quality of workmanship and materials has been defined by manufacturer's name and catalog numbers, reference to recognized industry and government standards, or description of required attributes and performance.

2. To ensure that the specified products are furnished and installed in accordance with design intent, procedures have been established for advance submittal of design data and for their review by the Architect.

3. Make all submittals required by the Contract Documents, and revise and resubmit as necessary to establish compliance with the specified requirements. Submittals should include cut sheets of original specified items.

4. ***Product substitutions request shall be submitted no later than 7 days prior to opening of Bids (Proposals) as noted in Section 00020***.

B. Related Work Described Elsewhere: Individual requirements for submittals are described in pertinent other Sections of these Specifications.

1.02 QUALITY ASSURANCE:

A. Coordination of Submittals: Prior to each submittal, carefully review and coordinate all aspects of each item being submitted and verify that each item and the submittal for it conforms in all respects with the requirements of the Contract Documents. By affixing the Contractor's signature to each submittal, Contractor certifies that this coordination has been performed. Contractor shall approve all submittals prior to submission to Architect. Contractor shall verify all dimensions and conditions on the job.

B. Certificate of Compliance:

1. Certify that all materials used in the work comply with all specified provisions thereof. Certification shall not be construed as relieving the Contractor from furnishing satisfactory materials if, after tests are performed on selected samples, the material is found to not meet specified requirements.

2. Show on each certification the name and location of the work, name and address of Contractor, quantity and date or dates of shipment or delivery to which the certificate applies, and name of the manufacturing or fabricating company. Certification shall be in the form of letter or company-standard forms containing all required data. Certificates shall be signed by an officer of the manufacturing or fabricating company.
3. In addition to the above information, all laboratory test reports submitted with Certificates of Compliance shall show the date or dates of testing, the specified requirements for which testing was performed, and results of the test or tests.

1.03 SUBMITTALS:

A. Submittals Schedule: Provide submittal schedule with first Application for Payment, and before any items are submitted for approval, submit to the Architect two copies of the schedule described in Article 2.01 of this Section.

B. Certification of Compliance: Upon completion of the Work, and as a condition of its acceptance, submit to the Architect all Certificates of Compliance.

C. Procedures: Make submittals in strict accordance with the provisions of this Section.

PART 2: PRODUCTS:

2.01 SUBMITTAL SCHEDULE:

A. General: Compile a complete and comprehensive schedule of all submittals anticipated to be made during progress of the work. Include a list of each type of item for which Contractor's drawings, shop drawings, Certificates of Compliance, material samples, guarantees, or other types of submittals are required. Upon approval by the Architect this schedule will become part of the Contract and the Contractor will be required to adhere to the schedule except when specifically, otherwise permitted. **Submittals will not be processed & reviewed until schedule is received.**

B. Coordination: Coordinate the schedule with all subcontractors and materials suppliers to ensure their understanding of the importance of adhering to the approved schedule. Coordinate as required to ensure the grouping of submittals as described in Paragraph 3.02 below.

C. Revisions: Revise and update the schedule on a monthly basis as necessary to reflect conditions and sequences. Promptly submit revised schedule to the Architect for review and comment with each application for payment.

D. It is the Contractor’s responsibility to notify the Architect in writing if and when the submittal not returned from review are going to impact the construction schedule.

2.02 SHOP DRAWINGS AND COORDINATION DRAWINGS:

A. Shop Drawings:

1. Scale and Measurements: Make all shop drawings accurately to a scale sufficiently large to show all pertinent aspects of the items and its method of connection to the work (construction document drawings shall not be traced, copied or reproduced).

2. Type of Prints Required: Submit two printed copies and one reproducible (vellum) of each submittal.

3. Review of Shop Drawings: All review comments of the Architect will be shown on the reproducible drawings when it is returned to the Contractor. The Contractor shall be responsible for making all copies required for his purpose and distributing them to the subcontractors & suppliers.

4. Failure to submit one printed & one reproducible copy will cause the submittal to be returned unchecked.

2.03 MANUFACTURERS' LITERATURE:

A. General: Where contents of submitted literature from manufacturers includes data not pertinent to the submittal, **clearly indicate which portion of the contents is being submitted for review. Highlight pertinent information with green highlighter.**

B. Number of Copies Required: ***Submit number required by the general contractor for construction plus one copy for architect, one copy for consultants, one copy for owner.*** General contractor’s copies will be returned to the contractor with all review comments of the architect and respective consultant.

2.04 SAMPLES:

A. Accuracy of Samples: Samples shall be of the precise article proposed to be furnished.

B. Number of Samples Required: Unless otherwise specified, submit all samples in the quantity which is required to be returned plus two (2) which will be retained by the Architect.

C. Reuse of Samples: In situations specifically so approved by the Architect, the Architect's retained sample may be used in the construction as one of the installed items.

2.05 COLORS AND PATTERNS:

A. Unless the precise color and pattern is specifically described in the Contract Documents, and whenever a choice of color pattern is available in a specified product, submit accurate color and pattern charts to the Architect for review and selection.

2.06 SUBSTITUTIONS:

A. Approval Required:

1. The Contract is based on the standards of quality established in the Contract Documents.

2. All products proposed for use, including those specified by required attributes and performance, shall require approval by the Architect before being incorporated into the work.

3. Do not substitute materials, equipment, or methods unless such substitution has been specifically approved for this work by the Architect.

4. Product substitution requests shall be submitted no later than 7 days prior to Opening of Bids (Proposals) as noted in Section 00020.

B. "Or Equal":

1. Where the phrase "or equal" or "or equal as approved by the Architect" occurs in the Contract Documents, do not assume that materials, equipment, or methods will be approved as equal unless the item has been specifically approved for this work by the Architect.

2. The decision of the Architect will be final.

3. It is the Contractor’s responsibility to compare all aspects of the substitute and prove the substitute is equal.

4. Coordinate submission of submittals with the different submittals related to the parts of Work so that the submittal will proceed according to the submittal schedule.

5. Processing of submittal which contain finishes for selection will not begin until all related submittals are received.

2.07 DEVIATIONS:

A. Clearly note, in written form, any deviations from the contract documents.

2.08 COMPLIANCE:

A. Clearly mark specific items which are submitted in compliance with the contract documents.

PART 3: EXECUTION:

3.01 IDENTIFICATION OF SUBMITTALS:

A. General: Identify each submittal with specification section number and project name. Accompany each submittal with a letter of transmittal containing all pertinent information required for identification and check of submittals.

B. Internal Identification: On at least the first page of each copy of each submittal, and elsewhere as required for positive identification, clearly indicate the submittal specification section number in which the item was included.

C. Resubmittals: When material is resubmitted for any reason, transmit under a "REVISED" letter of transmittal and with a "REVISED" submittal specification section number. (e.g.: 03100 becomes 03100R-1)

D. Submittal Log: Maintain an accurate submittal log for the duration of the Contract, showing current status of all submittals at all times. Make the submittal log available for the Architect's review upon request.

3.02 COORDINATION OF SUBMITTALS:

A. Coordinate, prepare, and process submittals in accordance with work to be performed.

B. General: Prior to submittal for approval, use all means necessary to fully coordinate all materials and work task activities including, but not necessarily limited to:
   1. Determine and verify all conditions, catalog numbers, and similar data.
   2. Coordinate with other trades as required.
   3. Clearly indicate all deviations from requirements of the Contract Documents.

C. Grouping of Submittals: Unless otherwise specified, make all submittals in groups containing all associated items to ensure that information is available for checking each item when it is received. Partial submittals may be rejected as not complying with the provisions of the Contract Documents and the Contractor shall be strictly liable for all delays so occasioned.

3.03 SUBMITTAL SCHEDULE:

A. Preparation: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, resubmitted, ordering, manufacturing, fabrication, and delivery when establishing dates.
   1. Coordinate Submittals Schedule with list of subcontracts, the Schedule of Values, and Contractor’s Construction Schedule.
   2. Material Submittal: Submit all material submittals required to maintain orderly progress of the Work and those required early because of long lead-time for manufacture or fabrication or for final color selection.

3.04 TIMING OF SUBMITTALS:

A. General: Make all submittals far enough in advance of scheduled dates for installation to provide all time required for reviews, for securing necessary approvals, for possible revisions and resubmittals, and for placing orders and securing delivery. Allow time for the above tasks in construction submittal schedule.

B. Submittal time schedules: Submittals shall be provided to architect for project based on:

3 months to 6 month projected completion	***1 month from date of contract for items requiring color selection and 2 months for other items.***
7 months to 12 month projected completion	***2 months from date of contract for items requiring color selection and 3 months for other items.***
13 months to 16 month projected completion	***3 months from date of contract for items requiring color selection and 4 months for other items.***
over 17 months projected completion	***4 months from date of contract for items requiring color selection and 5 months for other items.***

C. Architect's Initial Review Time: In scheduling, allow at least fifteen (15) working days for initial review by the Architect following receipt of the submittal. Items requiring color coordination will be delayed pending receipt of all items that require color coordination and owner approval.

D. Consultant's review time: In scheduling allow at least (20) work days for initial review of each submittals.

E. Delays: Delays caused by tardiness in receipt of submittals will not be an acceptable basis for extension of the Contract completion date.

3.05 ARCHITECT'S REVIEW:

A. General: Review by the Architect shall not be construed as a complete check, but only that the general method of construction and detailing is satisfactory. Review shall not relieve the Contractor from responsibility for errors which may exist.

B. Authority to Proceed: The notations "**no exception taken"** or "**make corrections noted"** authorize the Contractor to proceed with fabrication, purchase, or both, of the items so noted, subject to the revisions, if any, required by the Architect's review comments.

C. Revisions: Make all revisions required by the Architect. If the Contractor considers any required revision to be a change, he shall so notify the Architect as provided for under "Changes" in the General Conditions before proceeding with the work. Show each drawing revision by number, date, and subject in a revision block on the drawing. Make only those revisions directed or approved by Architect.

D. Revisions after Approval: When a submittal has been reviewed by the Architect, resubmittal for substitution of materials, or equipment, will not be considered.

END OF SECTION

SECTION 01310

CONSTRUCTION SCHEDULE

PART 1: GENERAL:

1.01 CONSTRUCTION SCHEDULE:

A. The Contractor shall, within thirty (30) working days after Notice to Proceed, prepare and submit to the Owner and Architect for approval, a practicable Work Schedule, showing the order in which the Contractor proposes to carry on the Work and the time at which the several milestone features will be started and completed.

B. The Contractor shall incorporate into this analysis that work being performed by each subcontractor so that all work involved is shown in the schedule for the complete project.

C. Activities shown on the schedule shall consist not only of the actual construction operations, but will include also the submittal of shop drawings and samples, procurement of materials and equipment and installation and testing of major and critical items.

D. Activities of the Owner that affect the progress, such as approvals and the deliveries of Owner-furnished materials shall also be shown.

E. Related activities shall be grouped on the schedule for simplification. The selection of activities will be subject to approval by the Owner and Architect.

F. For each activity there shall be listed an earliest and latest start time, the earliest and latest finish time and the slack time.

G. During progress of the work, any changes in the original schedule desired by the Contractor must be approved by the Owner and Architect before being put into effect.

H. When changes in the work are required and directed by the Owner and Architect under applicable paragraphs of this Contract, the original schedule may if required, be revised without delay to incorporate such changes, or new work, and indicate the effect, if any, thereof on the Project as a whole. The cost of such schedule change shall be considered as part of the overhead cost of revised work.

I. If the Contractor falls behind the original Schedule, the Contractor shall take such steps as may be necessary to improve the progress, which may require the contractor to increase the number of shifts, and/or overtime operation, days of work and/or the amount of construction plant, and to submit for approval revised schedules in the form above in order to demonstrate the manner in which the agreed rate of progress will be regained, all without additional cost to the Owner.

END OF SECTION

SECTION 01320

DAILY CONSTRUCTION PROGRESS REPORT

PART 1: GENERAL:

1.01 GENERAL:

A. The Contractor shall submit to the Architect upon request, Daily Reports, wherein the following data is provided relative to his work and the Work of his Subcontractors:

1. Location and description of work being performed.

2. Problems, if any, encountered during the course of the day's work.

3. Number of personnel on job for Contractor and each Subcontractor (broken down as to the number of journeymen, apprentices, etc.).

4. Temperature and weather conditions.

5. Report of any accident or accidents that may have occurred during the reporting period.

6. General description of delivery of material to be stored on site.

END OF SECTION

SECTION 01330

CONSTRUCTION PROGRESS DOCUMENTATION

PART 1: GENERAL:

1.01 RELATED DOCUMENTS:

A. Related Documents:

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

1.02 SUMMARY:

A. This Section includes administration and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Preliminary Construction Schedule.
2. Contractor's Construction Schedule.
3. Submittal Schedule.
4. Daily construction reports.
5. Material location reports.
6. Field condition reports.
7. Special reports.
8. Construction photographs.

B. Related Sections include the following:

1. Division 1 Section Schedule of Values for submitting the Schedule of Values.
2. Division 1 Section "Project meetings" for submitting and distributing meeting and conference minutes.
3. Division 1 Section "Submittal and Substitutions" for submitting schedules and reports.
4. Division 1 Section "Testing Laboratory Services" for submitting a schedule of tests and inspections.
5. Division 1 Section "Contract Closeout" for submitting photographic negatives as Project Record Documents at Project closeout.

1.03 DEFINITIONS:

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.

1. Critical activities are activities on the critical path. They must start and finish on the planned early start and finish times.
2. Predecessor activity is an activity that must be completed before a given activity can be started.

B. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determined when activities can be performed and the critical path of Project.

C. Critical Path: The longest continuous chain of activities through the network schedule that establishes the minimum overall Project duration and contains no float.

D. Event: The starting or ending point of an activity.

E. Float the measure of leeway in starting and completing an activity.

1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the following activity.
3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

F. Fragment: A partial or fragmentary network that breaks down activities into smaller activities for greater detail.

G. Major Area: A story of construction, a separate building, or a similar significant construction element.

H. Milestone: A key or critical point in time for reference or measurement.

I. Network Diagram: A graphic diagram of a network schedule, showing activities and activity relationships.

1.04 SUBMITTALS:

A. Submittals Schedule: Submit three copies of schedule. Arrange the following information in a tabular format.

1. Scheduled date for first submittal.
2. Specification Section number and title.
3. Submittal category (action or informational).
4. Name of subcontractor.
5. Description of the Work covered.
6. Scheduled date for Architect's final release or approval.

B. Contractor's Construction Schedule: The construction schedule shall be in the form of a CPM. Provide the CPM in graphic flow chart format along with reports. Submit two copies of the CPM in printed for and one in reproducible form. Concurrent with CPM schedule, submit three printed copies of each of the following computer-generated reports. Format for each activity in reports shall contain activity number, activity description, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float.

1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.
2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
3. Total Float Report: List of all activities sorted in ascending order of total float.

C. Daily Construction Progress Reports: Contractor shall maintain a daily log on the site. It shall be available for review by the Architect and Owner at any time during normal working hours.

The Contractor shall submit to the Architect upon request, Daily Reports, wherein the following data is provided relative to the work and the Work of the Subcontractors:

1. Location and description of work being performed.
2. Problems, if any, encountered during the course of the day's work.
3. Number of personnel on job for Contractor and each Subcontractor (broken down as to the number of journeymen, apprentices, etc.).
4. Temperature and weather conditions.
5. Report of any accident or accidents that may have occurred during the reporting period.
6. General description of delivery of material to be stored on site.

D. Material Location Reports: Should materials be stored off site for which the contractor is requesting payment, a complete inventory of the material shall be made. Each month the off-site inventory continues to be stored off-site then the report shall be maintained including the description of the material, the location of the material and a certification by the General Contractor that he has inventoried and examined the material at the location and certifies to the correctness of the report. The General Contractor shall accompany the Architect each month to verify the inventory prior to the progress payment.

1.05 COORDINATION:

A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.

B. Coordinate Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittals Schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from parties involved.
2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

END OF SECTION

SECTION 01370

SCHEDULE OF VALUES

PART 1: GENERAL:

1.01 SUMMARY:

A. Provide a detailed breakdown of the agreed Contract Sum showing values allocated to each of the various parts of the Work, as specified herein and in other provisions of the Contract Documents.

B. RELATED WORK:

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

2. Preparation and submittal of a Schedule of Values is required by the General Conditions.

3. Schedule of Values is required to be compatible with the "Continuation Sheet" accompanying Applications for Payment, as described in Section 01152.

1.02 SUBMITTAL:

A. With first Application for Payment, submit a proposed Schedule of Values to the Architect.

1.03 QUALITY ASSURANCE:

A. Use required means to assure arithmetical accuracy of the sums described.

B. When so required by the Architect, provide copies of the subcontracts or other data acceptable to the Architect, substantiating the sums described.

END OF SECTION

SECTION 01380

CONSTRUCTION PHOTOGRAPHS

PART 1: GENERAL:

1.01 CONSTRUCTION PHOTOGRAPHS:

A. Construction progress photographs shall be taken once a month with the time, direction of view and vantage points noted, **and submit to architect at monthly construction meeting.**

B. Photograph from locations to adequately illustrate the condition of construction and the state of the Project.

1. At successive periods of construction, take at least one photograph from the same overall view as previously and other locations to demonstrate the daily activity of construction please submit photos in electronic format in form of DVD.

END OF SECTION

SECTION 01400

TESTING LABORATORY SERVICES

PART 1: GENERAL:

1.01 DESCRIPTION:

A. Work Included: Testing includes, but is not necessarily limited to:

1. Soil Compaction
2. Concrete
3. Grout
4. Mortar

B. Related Work Described Elsewhere: Requirements for testing may be described in various specification sections.

C. Testing Laboratory: The Testing Laboratory will be selected & paid by the ***Owner.***

1.02 QUALITY ASSURANCE:

A. Qualifications of testing laboratory: The laboratory will be qualified in accordance with ASTM E-329-70 "Recommended Practice for Inspection and Testing Agencies for Concrete and Steel Used in Construction".

B. Codes and Standards: (Testing) In accordance with pertinent codes and regulations and with selected standards of the American Society for Testing and Materials.

1.03 PRODUCT HANDLING:

A. Promptly process and distribute test reports and related instructions to assure necessary retesting and/or replacement of materials with least possible delay in work.

PART 2: PRODUCTS:

2.01 PAYMENT FOR RETESTING SERVICES:

A. Retesting: When initial tests indicate non-compliance with Contract Documents, subsequent retesting shall be performed by the same laboratory and costs borne by Contractor.

2.02 CODE COMPLIANCE TESTING:

A. Inspections and test required by codes or ordinances, or by plan approval authority, and made by a legally constituted authority, shall be the responsibility of, and shall be paid for, by the Contractor.

2.03 CONTRACTOR'S CONVENIENCE TESTING:

A. Inspection or testing performed exclusively for the Contractor's convenience shall be the sole responsibility of the Contractor.

PART 3: EXECUTION:

3.01 COOPERATION WITH TESTING LABORATORY:

A. Representative of testing laboratory shall have access to Work at all times; provide facilities for such access in order that laboratory may properly perform its functions.

3.02 SCHEDULES FOR TESTING:

A. Establishing Schedule:

1. Determine with laboratory, time required to perform tests and issue findings.
2. Provide required time in construction schedule.

B. Revising Schedule: Coordinate changes of schedule with laboratory as required. Testing Laboratory shall provide a twenty-four (24) hour phone number to enable the Contractor to revise the schedule at times other than regular business hours.

C. Adherence to Schedule: When laboratory is prevented from testing or taking specimens according to the determined schedule due to incompleteness of work, extra costs attributable to delay may be backcharged to Contractor and not borne by Owner.

3.03 TAKING SPECIMENS:

A. Testing Laboratory shall perform the following services:

1. Take samples and specimens.
2. Furnish sampling equipment and personnel.
3. Deliver specimens and samples to laboratory.

END OF SECTION

SECTION 01510

TEMPORARY UTILITIES

PART 1: GENERAL:

1.01 SCOPE:

A. Furnish, install and maintain temporary utilities required for construction; remove on completion of Work.

1.02 TESTING:

A. All power, water, light or heat required for testing of Architectural, Structural, Mechanical and Electrical Work shall be paid for by the Contractor.

1.03 REQUIREMENTS OF REGULATORY AGENCIES:

A. Comply with National Electric Code.

B. Comply with Federal, State and local codes and regulations and with utility company requirements.

PART 2: PRODUCTS:

2.01 MATERIALS, GENERAL:

A. Materials and equipment may be new or used, but must be adequate in capacity for the required usage, must not create unsafe conditions, and must not violate requirements of applicable codes and standards.

2.02 TEMPORARY ELECTRICITY AND LIGHTING:

A. Provide connections and temporary metering, size to provide services required for power and lighting; Contractor shall pay for the costs of power used for construction.

B. Install ground fault interrupting circuit(s) and branch wiring, with area distribution boxes located so that power and lighting is available throughout the construction by the use of construction-type power cords.

C. Provide adequate artificial lighting for all areas of work when natural light is not adequate for work.

D. Each Sub-contractor shall provide it’s own extension cords and any additional lighting that may be required to complete it’s work.

E. Prior to final inspection remove temporary lamps and install new lamps if permanent fixtures were used for temporary lighting.

2.03 TEMPORARY HEAT AND VENTILATION:

A. Provide temporary heat and ventilation as required to maintain adequate environmental conditions to facilitate progress of the Work, to meet specified minimum conditions for the installation of materials, and to protect materials and finishes from damage due to temperature or humidity.

B. Provide adequate forced ventilation of enclosed areas for curing of installed materials to disperse humidity, and to prevent hazardous accumulations of dust, fumes, vapors or gases.

C. Portable heaters shall be standard U.L. approved units complete with controls. Pay all costs of installation, maintenance, operation and removal, and for fuel consumed.

2.04 TEMPORARY TELEPHONE SERVICE:

A. Arrange with local telephone service company, provide direct line telephone service at the construction site for the use of personnel and the Architect.

B. List telephone with information operator in the name of the Project and in the name of the Contractor.

C. Pay all costs for installation, maintenance and removal, and service charges for local calls. Contractor may install a pay telephone for sub-contractors use.

2.05 TEMPORARY WATER:

A. General Contractor shall provide water at site for construction purposes; General Contractor will pay costs of water used for construction.

B. General Contractor shall provide potable drinking water at the site.

2.06 TEMPORARY SANITARY FACILITIES:

A. Provide and maintain adequate temporary outside toilet facilities for use of persons working at the Site, same shall be padlocked at all times when no construction personnel are on Site.

B. Keep toilets clean and in sanitary condition. Provide toilet tissue in suitable holders. Comply with applicable legal, health and OSHA requirements.

2.07 TEMPORARY FIRE PROTECTION:

A. Observe and enforce throughout the work during the whole period of construction all requirements of the local City and State Fire Marshal and Insurance Authorities to minimize the fire hazard during the progress of the work.

PART 3: EXECUTION:

3.01 GENERAL:

A. Comply with applicable requirements specified in Division 15 - Mechanical, and in Division 16 - Electrical.

B. Maintain and operate systems to assure continuous service.

C. Modify and extend systems as work progress requires.

3.02 REMOVAL:

A. Completely remove temporary materials and equipment when their use is no longer required.

B. Clean and repair damage caused by temporary installation or use of temporary facilities.

C. Restore permanent facilities used for temporary services to specified condition.

END OF SECTION

SECTION 01520
CONSTRUCTION AIDS

PART 1: GENERAL:

1.01 SCOPE:

A. Furnish, install and maintain temporary personnel, traffic and materials handling facilities required for construction; remove on completion of Work.

1.02 REQUIREMENTS OF REGULATORY AGENCIES:

A. Comply with Federal, State and local codes and regulations and with utility company and insurance agencies' requirements.

PART 2: PRODUCTS:

2.01 MATERIALS, GENERAL:

A. Materials and equipment may be new or used, but must be adequate in capacity for the required usage, must not create unsafe conditions, and must not violate requirements of applicable codes and standards.

B. Provide and maintain signs to prevent damage or injury. Surround site with signs warning of construction hazards at intervals not greater than 200' apart.

C. Should it become necessary to remove runways, safety handrails, or other safety items it will be that Contractor's responsibility to replace the runway, safety handrails, or other safety items, immediately in keeping with OSHA standards.

D. Pay all costs for installation, maintenance relocation and removal, and service charges for rented equipment.

2.02 SCAFFOLDING:

A. Erect and maintain in a safe manner scaffolding, ramps, runways, platforms, guards, rails, stairs and ladders as necessary for the work.

2.03 LIFTING AND HOISTING:

A. Provide hoists, temporary elevators, lifts, cranes and towers necessary for expediting the handling of materials.

B. Install lifting and hoisting equipment to meet applicable safety requirements.

2.04 PUMPING AND DRAINING:

A. Keep working and storage areas free from water that could cause damage or that would interfere with work.

B. Do not pump or drain water onto adjacent property. Distribute discharge to prevent excessive erosion.

PART 3: EXECUTION:

3.01 GENERAL:

A. Maintain and operate systems to assure continuous service.

B. Modify and extend systems as work progress requires.

3.02 REMOVAL:

A. Completely remove temporary materials and equipment when their use is no longer required.

B. Clean and repair damage caused by temporary installations or use of temporary facilities.

C. Restore permanent facilities used for temporary services to specified condition.

END OF SECTION

SECTION 01530

BARRIERS

PART 1: GENERAL:

1.01 FENCING AND BARRICADES:

A. Provide proper and adequate barricades, runways, safety handrails, fencing or other safety items to protect and provide access in or around the site by other than construction personnel. Non construction personnel must be accompanied by general contractor, architect or architect representative, owner or owner representative.

B. Provide all vertical shafts with safe, temporary railings and supports, adequately braced.

C. Cover trenches and holes when not in use. Erect barriers at sharp changes in plane more than 3 feet high.

1.02 CONSTRUCTION FENCE:

A. Provide a construction fence around the structure and material storage areas to prevent unauthorized entry to the construction site.

B. Install fence at the beginning of excavation operations and maintain in good condition until removal is approved by the Architect.

C. Unless otherwise required by local codes or ordinances, construct wire mesh fence a minimum of 8'-0" high with securely anchored line, corner and gate posts.

D. Provide a minimum number of gates which will be padlocked shut during nonworking hours.

E. Locate pedestrian entrance gates as required to provide controlled personnel entry, in suitable relation to construction parking facilities.

1.03 REMOVAL:

A. Completely remove barricades and other safety barriers including foundations, when construction has progressed to the point that they are no longer needed, and when approved by Architect.

B. Clean and repair damage caused by installation, fill and grade the areas of the Site to required elevations and slopes, and clean the area.

END OF SECTION

SECTION 01580

PROJECT SIGN

PART 1: GENERAL:

1.01 PROJECT SIGN:

A. Install and maintain one (1) project sign, located as directed, 8 feet by 8 feet.

B. Construct sign of metal or 3/4" thick exterior grade plywood.

C. Support sign on a minimum of two 4x4 posts securely embedded and braced to resist wind load.

D. Letter sign with project data, including: ***name of project, Owner representatives, Architect, Engineers and Contractor.***

E. Provide vinyl 3M printed surface, Architect to provide a digital image.

F. The Architect will prepare a Drawing indicating lettering, layout and location of the sign.

G. No other signs or advertising will be permitted on the Site except as noted below.
2 foot x 4 foot signs with contractor's name may be used for directing material delivery or directing of construction traffic or for other safety issues.

H. Maintain sign in good condition for the duration of the job.

END OF SECTION

SECTION 01600
MATERIAL AND EQUIPMENT

PART 1: GENERAL:

1.01 MANUFACTURER'S INSTRUCTIONS:

A. When Contract Documents require that installation of work shall comply with manufacturer's instructions, obtain and distribute copies of such instructions to parties involved in the installation, including three (3) copies to the Architect.
   1. Maintain one set of complete instructions at the job site during installation and until completion.

B. Handle, install, connect, clean, condition and adjust products in strict accord with such instructions and in conformity with specified requirements.
   1. Should job conditions or specified requirements conflict with manufacturer's instructions, consult with Architect for further instructions.
   2. Do not proceed with work without clear instructions.

C. Perform work in accordance with manufacturer's instructions. Do not omit any preparatory step or installation procedure unless specifically modified or exempted by Contract Documents.

1.02 DELIVERY OF MATERIALS:

A. All materials shall be delivered in their original, unopened, containers which shall bear the seal, trademark or hallmark of the respective associations or councils and the identification label of the manufacturer.

B. The Contractor shall inspect all materials upon their arrival at the job and see that they conform to the requirements of these Specifications and prevent the unloading of unsatisfactory material or promptly remove same from the premises without waiting instruction from the Architect to do so.

C. Time deliveries and unloading to prevent traffic congestion and blocking of access, and to avoid interferences and delays in work.

D. Provide for continuity of any phase of work. Sufficient quantities for completion of a phase shall be on the Project Site before that phase is started.

E. Pack and handle materials to prevent damage during delivery. Store materials at designated locations to avoid interference with work and arrange in order of intended use.

1.03 STORAGE AND PROTECTION:

A. Store products in accordance with manufacturer's instructions, with seals and labels intact and legible.
   1. Store products subject to damage by the elements in weathertight enclosures.
   2. Maintain temperature and humidity within the ranges required by manufacturer's instructions.

B. Exterior Storage:
   1. Store fabricated products above the ground, on blocking or skids, to prevent soiling or staining. Cover products which are subject to deterioration with impervious sheet coverings, provide adequate ventilation to avoid condensation.
   2. Store loose granular materials in a well-drained area on solid surfaces to prevent mixing with foreign matter.

C. Arrange storage in a manner to provide easy access for inspection. Make periodic inspections of stored products to assure that products are maintained under specified conditions, and free from damage or deterioration.

D. After installation provide substantial coverings as necessary to protect installed products from damage from traffic and subsequent construction operations. Remove when no longer needed.

END OF SECTION

SECTION 01631

SUBSTITUTIONS AND PRODUCT OPTIONS

PART 1: GENERAL:

1.01 SUBSTITUTIONS:

A. Bids or proposals shall be based upon providing the specified materials, processed products, persons or organizations, etc., identified in this Specification and/or indicated on the Drawings.

B. Product substitution requests shall be submitted no later than 7 days prior to Opening of Bids (Proposals) as noted in Section 00020.

C. The burden of proof of equality rests with the Contractor, and supporting technical literature, samples, drawings and performance data must be submitted with each request for substitutions.

D. The Owner and/or Architect reserve the right to accept or reject proposed substitutions. Each request shall state the amount of savings to the Owner, if the substitution is approved.

E. Cost of any testing required for analysis of proposed substitution shall be paid for by the Contractor at a testing agency selected and approved by the Architect.

F. Should a substitution be accepted, the Contractor shall be responsible to make all necessary adjustments in the Work which may be affected as a result of the substitution at no additional cost to the Owner.

G. Should a substitution be accepted and this substitution prove to be defective within the one year guarantee period, the Contractor shall replace the substituted material with that specified and bear the costs incurred thereby.

1.02 PRODUCT OPTIONS:

A. Contractor's Options:

1. For Products specified only by reference standard, select any product meeting that standard.
2. For Products specified by naming several products or manufacturers, select any one of the products, or manufacturer's names, which complies with the Contract Documents.
3. For Products specified by naming only one Product or manufacturer, Contractor must submit a request as for substitutions for any Product or manufacturer not specifically named.
4. For Products specified by naming only one Product and manufacturer and indicated as "no substitute", there is no option.

B. Submit a separate request for each Product Substitution, supported with complete data, with drawings and samples as appropriate, including:

1. Comparison of the qualities of the proposed substitution with that specified.
   a. Cutsheets & supporting date of specified product.
   b. Cutsheets & supporting data of proposed product substitution.
2. Changes required in other elements of the work because of the substitution.
3. Effect on the Construction Schedule.
4. Cost data comparing the proposed substitution with the Product specified.
5. Any required license fees or royalties.
6. Availability of maintenance service, and source of replacement materials.

C. A request for a substitution constitutes a representation that Contractor:

1. Has investigated the proposed Product and determined that it is equal to or superior in all respects to that specified.
2. Will provide the same warranties or bonds for the substitution as for the Product specified.
3. Will coordinate the installation of an accepted substitution into the Work, and make such other changes as may be required to make the Work complete in all respects.
4. Waives all claims for additional costs, under his responsibility, which may subsequently become apparent.

D. Architect will review requests for substitutions with reasonable promptness, and notify Contractor, in writing, of the decision to accept or reject the requested substitution.

END OF SECTION

SECTION 01700
CONTRACT CLOSEOUT

PART 1: GENERAL:

1.01 REQUIREMENTS:

A. Comply with requirements stated in Conditions of Contract and in Specifications for administrative procedures in closing out the Work.

B. Related requirements in other parts of the Project Manual:

1. Fiscal provisions, legal submittals and additional administrative requirements: Conditions of the Contract.

C. Related requirements specified in other Sections:

1.	CLEANING:	Section 01710.
2.	PROJECT RECORD DOCUMENTS:	Section 01720
3.	OPERATING AND MAINTENANCE DATA:	Section 01730
4.	WARRANTIES AND BONDS:	Section 01740
5.	CONTRACTOR'S ASBESTOS FREE AFFIDAVIT:	Section 01800

D. General Contractor to provide the following:

1.) 5 DVD sets containing PDF files, organized in a PDF portfolio, containing all pertinent information in this section and related sections. File naming and organization should be as per Rike Ogden Figueroa Allex Architect's Closeout Document - Electronic Submission Form (attached).

2.) 1 Set of hard copies in binders divided into tap sections organized and named in the same way as folders are in the electronic submissions.

3.) AS-BUILT drawings and specifications incorporating all addenda's, approved change proposals/change orders, Architectural Supplemental Instructions (ASI), and Request For Information (RFI).

1.02 SUBSTANTIAL COMPLETION:

A. When Contractor considers the Work is substantially complete, he shall submit to Architect, written notice that the Work, or designated portion thereof, is substantially complete and include a list of items (Contractor's punchlist) that have already been addressed.

B. Within 10 working days of receipt of such notice, Architect will review the work to determine the status of completion.

C. Should Architect determine that the work is not substantially complete:
1. Architect will promptly notify the Contractor in writing, giving the reasons therefore including list of items to be completed or corrected.
2. Contractor shall remedy the deficiencies in the Work, and send a second written notice of substantial completion to the Architect.
3. Architect will re-review the Work.

D. When Architect concurs that the Work is substantially complete, the architect will:

1. Prepare a Certificate of Substantial Completion, accompanied by Contractor's list of items to be completed or corrected, as verified and amended by the Architect.
2. Submit the Certificate to Owner and Contractor for their written acceptance of the responsibilities assigned to them in the Certificate.

1.03 CONTRACTOR CERTIFICATION OF FINAL COMPLETION:

A. When Contractor considers the Work is complete, he shall submit **written certification** that:
   1. Contract Documents have been reviewed.
   2. Work has been inspected for compliance with Contract Documents.
   3. Work has been completed in accordance with Contract Documents.
   4. Equipment and systems have been tested in the presence of the Owner's representative and are operational.
   5. Work is completed.

B. Architect will review the work to verify the status of completion with reasonable promptness after receipt of such certification.

C. Should Architect consider that the Work is incomplete or defective:

   1. Architect will promptly notify the Contractor in writing, listing the incomplete or defective work.
   2. Contractor shall take immediate steps to remedy the stated deficiencies, and send a second written certification to Architect that the Work is complete.
   3. Architect will re-inspect the Work.

D. When the Architect finds that the Work is acceptable under the Contract Documents, the architect shall request the Contractor to make closeout submittals.

1.04 RE-REVIEW FEES:

A. Should Architect perform re-review due to failure of the Work to comply with the claims of status of completion made by the Contractor:

   1. Owner will deduct the amount of such compensation from the final payment to the Contractor, for re-review compensation to architect.

1.05 CONTRACTOR'S CLOSEOUT SUBMITTALS:

A.) List of all subcontractors and suppliers organized by specification section

B.) Contractor's Release of Lien
Provide AIA Document G707 and G706A

C.) Subcontractor's release of liens waiver.

D.) One Year Warranties – General and Subcontractors

E.) Meeting Notes: Refer to requirements of Section 1720 – Project Record Documents

F.) Submittals organized by specification section: Refer to requirements of Section 1720 – Project Record Documents

G.) Construction Photographs organized by month: Refer to requirements of Section 1720 – Project Record Documents

H.) All City and/or County Inspections

I.) All Substantial Completion & Punchlists

J.) All Certificate of Occupancy

K.) Contractor's Asbestos Free Affidavit Letter: Refer to requirements of Section 1800 – General Notes

L.) Keying Schedule: Refer to requirements of Section 08710 - Finish Hardware

M.) Training Sign-In Sheets with signatures of attendees

N.) HVAC Test and Balance Report

O.) Product Warranties organized by specification section: Refer to requirements of Section 1740 Warranties and Bonds

P.) Operating and Maintenance Data organized by specification section: Refer to requirements of Section 1730 – Operating and Maintenance Data

Q.) Material Testing: Refer to requirements of Section 1720 – Project Record Documents

R.) Material Safety and Data Sheets (MSDS) of products organized by specification section.

1.06 FINAL ADJUSTMENTS OF ACCOUNTS:

A. Submit a final statement of accounting to Architect. Statement shall reflect all adjustments to the Contract sum:

1. The original Contract sum.
2. Additions and deductions resulting from:
    a} Previous change orders.
    b} Allowances.
    c} Unit Prices.
    d} Deductions for uncorrected work.
    e} Deductions for re-review payments.
    f} Other adjustments.
3. Total Contract sum, as adjusted.
4. Previous payments.
5. Sum remaining due.

B. Architect will prepare a final Change Order, reflecting approved adjustments to the Contract sum, which were not previously made by Change Orders.

1.07 FINAL APPLICATION FOR PAYMENT:

A. Contractor shall submit the final Application for Payment, labeled as Final, and in accordance with procedures and requirements stated in the Conditions of the Contract.

1.08 CLOSEOUT DOCUMENTS – ELECTRONIC SUBMISSION FORMAT:

A. Contractor shall submit 5 DVD's, each DVD with the following information and format:

Folder Name: 01 List of Subcontractors
- Filename: *List of Subcontractors.pdf*

Folder Name: 02 Contractor's Payment and Release of Liens
- Filename: *AIA – G706A Contractor's Affidavit of Release of Liens.pdf*
- Filename: *AIA-G707 – Consent of Surety to Final Payment Form.pdf*

Folder Name: 03 Subcontractor's payments & release of liens waiver.
- Filename: *Release of Lien – Company Name.pdf*
  Examples:
  Release of Lien - EMI
  Release of Lien - D&J Site Utilities

  Conditional Release of Liens are acceptable when retainage is still pending. Conditional release should explicitly say release of liens upon receiving retainage.

Folder Name: 04 One Year Warranties – General and Subcontractors
- Filename: *One Year Warranty – Company Name.pdf*
  Examples:
  One Year Warranty – Spawglass.pdf
  One Year Warranty – D&J Site Utilities.pdf

Folder Name: 05 Meeting Notes
- Filename: Date – *Meeting Agenda.pdf*
- Filename: Date – *Meeting Notes.pdf*
  Examples:
  2016.03.03 – Meeting Agenda.pdf
  2016.03.03 – Meeting Notes.pdf

Folder Name: 06 Submittals
- Filename:
  Specification Number – Specification Name – Shop Drawings.pdf
  Specification Number – Specification Name – Data Sheets.pdf
  Examples:
  08740 – Access Control Systems – Shop Drawings.pdf
  11131 – Motorized Projection Screens – Data Sheets.pdf

Folder Name: 07 Construction Photographs
Note: All photos need to be submitted in .JPG format.
  Sub-Folder: Year - Month
- Filename of photograph: Year – Month – Date - #.jpg
  Examples:
  2016 – 03 – 01 – Photo 1.jpg
  2016 – 03 – 01 – Photo 2.jpg

Folder Name: 08 City – County Inspections
- Filename: *Inspection - Type.pdf*
  Examples:
  Inspection - Underground Plumbing.pdf

Folder Name: 09 Substantial Completion & Punchlists

- Filename: *Substantial Completion.pdf*
  If more than one Substantial Completions are used in the project, such as different buildings, file naming should be as follows:

- Filename: *Substantial Completion – Building Name.pdf*
  Building Name is the actual name of the building
  Examples:
  Substantial Completion – Administration.pdf
  Substantial Completion – Gymnasium.pdf

- Filename: *Punchlist - Entity.pdf*
  Entity is the actual name of the entity performing the punchlist
  Examples:
  Punchlist – Architect.pdf
  Punchlist – Owner.pdf
  Punchlist – MEP.pdf

Folder Name: 10 Certificate of Occupancy

- Filename: *Certificate of Occupancy.pdf*
  If more than one Certificate of Occupancies are used in the project, such as different buildings, file naming should be as follows:

- Filename: *Certificate of Occupancy – Building Name.pdf*
  Building Name is the actual name of the building
  Examples:
  Certificate of Occupancy – Administration.pdf
  Certificate of Occupancy – Gymnasium.pdf

Folder Name: 11 Contractor's Asbestos Free Affidavit Letter

- Filename: *Contractor's Asbestos Free Affidavit.pdf*

Folder Name: 12 Keying Schedule

- Filename: *Keying Schedule.pdf*
  Provide date of key transfer meeting.

Folder Name: 13 Training

- Filename: *Specification Number – Specification Name – Sign-In.pdf*
  Examples:
  08740 – Access Control Systems – Sign-in.pdf
  11131 – Motorized Projection Screens – Sign-in.pdf
  15950 – Building Automatic Controls – Sign-in.pdf

Folder Name: 14 HVAC Test and Balance Report

- Filename: *Project Name – HVAC Test and Balance Report.pdf*

Folder Name: 15 Product Warranties

- Filename: *Specification Number – Specification Name – Warranty.pdf*
  Examples:
  07535 – Fully Adhered Multi-Ply Roofing System - Warranty.pdf
  15732 – Rooftop Units – Warranty.pdf

Folder Name: 16 Operating and Maintenance Data.

- Filename: *Specification Number – Specification Name – Maintenance or Manuel.pdf*
  Examples:
  10100 – Markerboards and Tackboards – Maintenance.pdf
  15732 – Rooftop Units – Operating Manual.pdf

Folder Name: 17 Material Testing
Note: Please use sub-folders to separate different tests, such as compaction, concrete, grout, welding, asphalt, etc.

Sub-Folder: Compaction

- Filename as per testing laboratory

Sub-Folder: Concrete Breaks

- Filename as per testing laboratory

Sub-Folder: Grout

- Filename as per testing laboratory

Folder Name: 18 Material Safety and Data Sheets

- Filename: *Specification Number – Specification Name – MSDS.pdf*
  Examples:
  09260 – Gypsum Drywall – MSDS.pdf
  09300 - Tiling – MSDS.pdf

Sample Folder Hierarchy

END OF SECTION

SECTION 01710
CLEANING

PART 1: GENERAL:

1.01 DESCRIPTION:

A. Execute cleaning, during progress of the Work, and at completion of the Work, as required by General Conditions.

1.02 DISPOSAL REQUIREMENTS:

A. Conduct cleaning and disposal operations to comply with codes, ordinances, regulations, and anti-pollution laws.

PART 2: PRODUCTS:

2.01 MATERIALS:

A. Use only those cleaning materials which will not create hazards to health or property and which will not damage surfaces.
B. Use only those cleaning materials and methods recommended by manufacturer of the surface material to be cleaned.
C. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3: EXECUTION:

3.01 DURING CONSTRUCTION:

A. Contractor at all times shall keep the premises free from accumulation of waste materials or rubbish caused by his operations or his subcontractor's operations. Oversee cleaning and ensure that building and grounds are maintained free from accumulations of waste materials and rubbish.
B. At reasonable intervals during progress of work, clean up site, building and access, and dispose of waste materials, rubbish and debris. Provide containers and locate on site for collection of waste materials, rubbish and debris. Do not allow waste materials, rubbish and debris to accumulate and become an unsightly or hazardous condition.
C. Transport waste materials in a controlled manner with as few handlings as possible; do not drop or throw materials from heights. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not fall on wet, newly painted surfaces. Sprinkle dusty debris with water.
D. Burning or burying of rubbish and waste materials on the project site is not permitted. Disposal of volatile fluid wastes (such as mineral spirits, oil, or paint thinner) in storm or sanitary sewer systems is not permitted. Remove waste materials, rubbish and debris from the site and legally dispose of at public or private dumping areas off the Owner's property.
E. Contractor shall coordinate efforts to properly protect new and existing material from damage by ongoing construction work.

3.02 FINAL CLEANING:

A. At completion of construction and just prior to acceptance or occupancy conduct a final inspection of exposed surfaces. Perform final cleaning and maintain cleaning until building, or portion thereof, is accepted by Owner.
B. Remove dirt stains, labels, fingerprints and other foreign materials from surfaces. Repair marred surfaces to match adjacent finishes.
C. Remove all waste materials and rubbish from and about the Project as well as all tools, construction equipment, machinery and surplus materials.

END OF SECTION

SECTION 01720
PROJECT RECORD DOCUMENTS

PART 1: GENERAL:

1.01 GENERAL:

A. Maintain at the site for the Owner one record copy of:

1. Drawings
2. Specifications
3. Addenda
4. Change Orders and other Modifications to the Contract.
5. Architect/Engineer Field Orders or written instructions.
6. Approved Shop Drawings, Product Data and Samples.
7. Field Test records.
8. Construction photographs.
9. Meeting Reports.

B. The Contractor shall use one set of Construction Drawings provided to the Contractor at the time construction is commenced. These Drawings shall be marked-up by each Contractor, throughout the construction period, indicating all changes, revisions and additions to the Work, including field relocations of work concealed from view.

1.02 MAINTENANCE OF DOCUMENTS AND SAMPLES:

A. Store documents and samples in Contractor's field office apart from documents used for construction.
   1. Provide files and racks for storage of documents.
   2. Provide locked cabinets or secure storage space for storage of samples.

B. File documents and samples in accordance with Data Filing Format of the Uniform Construction Index.

C. Maintain documents in a clean, dry, legible condition and in good order. Do not use record documents for construction purposes.

D. Make documents and samples available at all times for view by Architect.

1.03 RECORDING:

A. Label each document "PROJECT RECORD" in neat large printed letters.

B. Record information concurrently with construction progress. Do not conceal any work until required information is recorded.

C. Drawings: Legibly mark to record actual construction:
   1. Depths of various elements of foundation in relation to finish first floor datum.
   2. Horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
   3. Location of internal utilities and appurtenances concealed in the construction, referenced to visible and accessible features of the structure.
   4. Field changes of dimension and detail.
   5. Changes made by Field Order, Architectural Supplemental Instructions, Request for Information, Addenda, Construction Change Directive or by Change Order.
   6. Details not on original Contract Drawings.

D. Specifications and Addenda: Legibly mark each Section to record:
   1. Manufacturer, trade name, catalog number, and supplier of each Product and item of equipment actually installed.
   2. Changes made by Field Order, Architectural Supplemental Instructions, Request for Information, Addenda, Construction Change Directive or by Change Order.

1.04 SUBMITTAL:

A. At the completion of work, Contractor shall certify, by endorsement thereof, that each of the revised drawings is complete and accurate. Prior to Contractor's application for final payment, and within forty-five {45} days of final acceptance of all the work by the Owner, unless otherwise modified by the Contract Agreement, and as a condition of acceptance by the Owner, Contractor shall deliver the certified Record Documents to the Architect for transmittal to the Owner.

END OF SECTION

SECTION 01730

OPERATING AND MAINTENANCE DATA

PART 1: GENERAL:

1.01 INFORMATION DATA:

A. Compile Manufacturer's Directions and Manuals, Product Data and related information appropriate for Owner's maintenance and operation of product furnished under the Contract.

1. Furnish operating and maintenance data as specified in other pertinent sections of Specifications.

B. Instruct Owner's personnel in the maintenance of products and in the operation of equipment and systems.

1.02 FORM OF SUBMITTALS:

A. Prepare data in the form of an instructional manual for use by Owner's personnel.

B. Provide indexed tabs fly-leaf for each separate product, or each piece of operating equipment. Provide typed description of product and major component parts of equipment.

C. Identify each volume with typed or printed title "OPERATING AND MAINTENANCE INSTRUCTIONS".

D. Bind in and identify in DVD PDF files, organized in a PDF portfolio with index.

E. When multiple binders are used, correlate the data into related consistent groupings.

1.03 CONTENT OF MANUAL:

A. Neatly typewritten table of contents for each volume, arranged in a systematic order.

1. Contractor, name of responsible principal, address and telephone number.
2. A list of each product required to be included, indexed to the content of the volume.
3. List with each product, the name, address and telephone number of:
    a. Subcontractor or installer.
    b. Maintenance contractor, as appropriate.
    c. Identify the area of responsibility of each.
    d. Local source of supply for parts and replacement.
4. Identify each product by product name and other identifying symbols as set forth in Contract Documents.

B. Product Data: Include only those sheets which are pertinent to the specific product. Annotate each sheet to:

1. Clearly identify the specific product or part installed.
2. Clearly identify the data applicable to the installation.
3. Delete references to inapplicable information.

C. Drawings: Supplement product data with drawings as necessary to clearly illustrate relations of component parts of equipment and systems, and control and flow diagrams.

1. Coordinate drawings with information in Project Record Documents to assure correct illustration of completed installation.
2. Do not use Project Record Documents as maintenance drawings.

D. Written text, as required to supplement product data for the particular installation:

1. Organize in a consistent format under separate headings for different procedures.
2. Provide a logical sequence of instructions for each procedure.

E. Copy of each warranty, bond and service contract issued. Provide information sheet for Owner's personnel, give:

1. Proper procedures in the event of failure.
2. Instance which might affect the validity of warranties or bonds.

1.04 MANUAL FOR MATERIALS AND FINISHES:

A. Submit in electronic file complete manual in final form and document in respective division.

B. Content, for architectural products, applied materials and finishes:

1. Manufacturer's data, giving full information on products.
2. Instructions for care and maintenance.

C. Content, for moisture-protection and weather-exposed products:

1. Manufacturer's data, giving full information on products.

D. Additional requirements for Maintenance Data: the respective sections of Specifications.

1.05 MANUAL FOR EQUIPMENT AND SYSTEMS:

A. Submit in electronic file complete manual in final form and document in respective division.

B. Content, for each unit of equipment and system, as appropriate:

1. Description of unit and component parts.
2. Operating procedures.
3. Maintenance procedures.
4. Servicing and lubrication schedule.
5. Manufacturer's printed operating and maintenance instructions.
6. Description of sequence of operation by control manufacturer.
7. Original manufacturer's parts list, illustrations, assembly drawings and diagrams required for maintenance.
8. As-installed control diagrams by controls manufacturer.
9. Each contractor's coordination drawings.
10. Charts of valve tag numbers, with the location and function of each valve.
11. List of original manufacturer's spare parts, manufacturer's current prices, and recommended quantities to be maintained in storage.
12. Other data as required under pertinent sections of specifications.

C. Content, for each electric and electronic system, as appropriate:

1. Description of system and component parts.
2. Circuit directories of panelboards.
3. As-installed color coded wiring diagrams.
4. Operating procedures.
5. Maintenance procedures.

6. Manufacturer's printed operating and maintenance instructions.
7. List of original manufacturer's spare parts, manufacturer's current prices, and recommended quantities to be maintained in storage.
8. Other data as required under pertinent sections of specifications.

D. Prepare and include additional data when the need for such data becomes apparent during instruction of Owner's personnel.

E. Additional requirements for Operating and Maintenance Data: the respective sections of specifications.

1.06 INSTRUCTIONS OF OWNER'S PERSONNEL:

A. Prior to final review or acceptance, fully instruct Owner's designated operating and maintenance personnel in the operation, adjustment and maintenance of all products, equipment and systems.

B. Operating and 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.

END OF SECTION

SECTION 01740

WARRANTIES AND BONDS

PART 1: GENERAL:

1.01 SUBMITTAL REQUIREMENTS:

A. Assemble warranties, bonds and services and maintenance contracts, executed by each of the respective manufacturers, suppliers, and subcontractors.

B. Review submittals to verify compliance with Contract Documents. Submit to Architect for review and transmittal to Owner.

1.02 TIME OF SUBMITTALS:

A. For equipment or component parts of equipment put into service during progress of construction submit within ten {10} days after review and acceptance.

B. Otherwise make submittals within ten {10} days after Date of Substantial Completion, prior to final request for payment.

C. For items of work, where acceptance is delayed materially beyond the Date of Substantial Completion, provide updated submittal within ten {10} days after acceptance, listing the date of acceptance as the start of the warranty period.

END OF SECTION

SECTION 01800
GENERAL NOTES

PART 1: GENERAL:

1.01 GENERAL NOTES:

A. Contractor shall protect all streets and sidewalks and shall make all necessary repairs at his own expense.

B. Shall at all times protect the excavations, trenches, and/or the building from damage from rain water, ground water, backing up drains or sewers and all other water. He shall provide all pumps and equipment and enclosures to provide this protection.

C. Contractor shall provide all shoring, bracing and sheathing as required for safety and proper execution of the work and remove same when work is completed. Contractor shall be responsible for all scaffolding, shoring, bracing, sheathing, temporary construction and temporary walkways, etc., and shall hold harmless the Owner and Architect from any injury or litigation as a result of causes related to any scaffolding, shoring, bracing, sheathing, temporary construction, temporary walkways, and similar construction technics.

D. Contractor shall comply with the Trench Safety Law Requirements.

2.01 WAIVER OF LIEN:

A. In submitting a Proposal (Bid) Contractor, if awarded the Contract, explicitly warrants that the Owner shall be held free of any claim or lien of any nature resulting from Contractor's pursuance or prosecution of the work. This shall cover any third party lien in any manner whatsoever concerning Contractor's performance or payment on this project.

3.01 PREVAILING WAGES:

A. Article 5159a, Vernon's Annotated Texas Civil Statutes as below noted apply to this project.

"Not less than the general prevailing rate of per diem wages for work of a similar character in the locality in which the work is performed, and not less than the general per diem wages for legal holiday and overtime work, shall be paid to all laborers, workmen and mechanics employed by or on behalf of the State of Texas, or by or on behalf of any county, district or other political subdivision of the State, engaged in the construction of public works, exclusive of maintenance work".

B. See attached.

4.01 CONTRACTOR'S ASBESTOS FREE AFFIDAVIT:

A. In order to protect staff, employees and public in general from any unnecessary exposure to asbestos fibers, the Asbestos Hazard Emergency Response Act prohibits the use of asbestos containing materials in all forms in the construction and operation of this facility.

B. Failure to complete this waiver constitutes non-compliance with the job specifications. This document shall be attached to the Contract between Owner and Contractor.

4.02 AFFIDAVIT:

A. I certify that I am familiar with the materials used in the construction of, and incorporated into, the construction described below. I further certify that to the best of my knowledge and belief no asbestos containing materials, either friable or otherwise were used in the process of constructing or incorporated into the construction.

B. The undersigned, being duly sworn upon his/her oath deposes and says that he/she is the person making the foregoing statements and that they are made in good faith and are true in every respect.

Contractor's signature:

STATE OF

COUNTY OF

I, _____, a Notary Public in and for said County, in the State aforesaid, DO THEREBY CERTIFY THAT _____ personally known to me to be the same person whose name is subscribed to the foregoing instrument, appeared before me this day in person, and acknowledged that he/she signed, sealed, and delivered said instrument as his/her free and voluntary act, for the uses and purposes herein set forth.

GIVEN UNDER MY HAND AND NOTARIAL SEAL THIS _____ DATE OF _____ , 20 .

NOTARY PUBLIC: _____

MY COMMISSION EXPIRES:_____

(NOTARY SEAL)

END OF SECTION

Superseded General Decision Number: TX20170305

State: Texas

Construction Type: Building

County: Hidalgo County in Texas.

BUILDING CONSTRUCTION PROJECTS (does not include single family homes or apartments up to and including 4 stories).

Note: Under Executive Order (EO) 13658, an hourly minimum wage of $10.35 for calendar year 2018 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least $10.35 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2018. The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/05/2018
1	09/14/2018

BOIL0074-003 01/01/2017

	Rates	Fringes
BOILERMAKER	$ 28.00	22.35

ENGI0178-005 06/01/2014

	Rates	Fringes
POWER EQUIPMENT OPERATOR		
(1) Tower Crane	$ 29.00	10.60
(2) Cranes with Pile Driving or Caisson Attachment and Hydraulic Crane 60 tons and above	$ 28.75	10.60
(3) Hydraulic cranes 59 Tons and under	$ 27.50	10.60

* IRON0084-011 06/01/2018

	Rates	Fringes
IRONWORKER, ORNAMENTAL	$ 23.77	7.12

PLUM0412-004 04/01/2013

	Rates	Fringes
PLUMBER	$ 31.14	12.43

SUTX2014-031 07/21/2014

	Rates	Fringes
BRICKLAYER	$ 16.17	0.00
CARPENTER	$ 14.21	2.22
CEMENT MASON/CONCRETE FINISHER	$ 12.46	0.00
ELECTRICIAN	$ 18.44	4.53
INSULATOR - MECHANICAL (Duct, Pipe & Mechanical System Insulation)	$ 11.54	2.17
IRONWORKER, REINFORCING	$ 12.01	0.00
IRONWORKER, STRUCTURAL	$ 15.04	4.34
LABORER: Common or General	$ 8.00	0.00
LABORER: Mason Tender - Brick	$ 10.00	0.00
LABORER: Mason Tender - Cement/Concrete	$ 10.89	0.96
LABORER: Pipelayer	$ 11.00	3.47
LABORER: Roof Tearoff	$ 10.06	0.00
OPERATOR: Backhoe/Excavator/Trackhoe	$ 14.04	1.01
OPERATOR: Bobcat/Skid Steer/Skid Loader	$ 13.93	0.00
OPERATOR: Bulldozer	$ 18.29	1.31
OPERATOR: Drill	$ 16.22	0.34
OPERATOR: Forklift	$ 14.83	0.00
OPERATOR: Grader/Blade	$ 10.00	0.00
OPERATOR: Loader	$ 12.87	0.70
OPERATOR: Mechanic	$ 17.00	0.00
OPERATOR: Paver (Asphalt, Aggregate, and Concrete)	$ 16.03	0.00
OPERATOR: Roller	$ 12.70	0.00
PAINTER (Brush, Roller, and Spray)	$ 11.27	0.00
PIPEFITTER	$ 15.22	3.16
ROOFER	$ 11.42	0.00
SHEET METAL WORKER (HVAC Duct Installation Only)	$ 18.40	2.12
SHEET METAL WORKER, Excludes		

HVAC Duct Installation.....$ 21.13 6.53

TILE FINISHER.....$ 11.22 0.00

TILE SETTER.....$ 12.15 0.00

TRUCK DRIVER: Dump Truck.....$ 12.39 1.18

TRUCK DRIVER: Flatbed Truck.....$ 19.65 8.57

TRUCK DRIVER: Semi-Trailer Truck.....$ 12.50 0.00

TRUCK DRIVER: Water Truck.....$ 12.00 4.11

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than "SU" or "UAVG" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this

classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the "SU" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests

for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION

SECTION 02050

DEMOLITION

PART 1: GENERAL

1.01 SUMMARY:

A. Section Includes:

1. Demolition shall include, unless otherwise noted on Drawing, removal of existing objects of improvements, whether indicated on Drawings or not, that would, in the opinion of the Owner, prevent or interfere with progress or completion of proposed work.
2. Permits, fees, and licenses shall be secured and paid for by Contractor, including disposal charges as required to ensure progress of work will proceed.
3. Work shall comply with requirements of governing authorities in demolition of ***existing pavement, curbs and gutters, drainage structures, and utilities*** as may required.
4. Demolition requires removal and disposal off site of following:
   - ***A} Building structures indicated of Drawings or as required by specifications.***
   - ***B} Building foundations and supporting walls to uniform depth of 12" below lowest foundation elevation.***
   - ***C} Building materials as indicated on drawings.***

1.02 RELATED REQUIREMENTS:

A. Demolition drawings.

1.03 JOB CONDITIONS:

A. Conditions existing at time of inspection will be maintained by Owner in so far as practicable. Variations within structure may occur by Owner's removal and salvage operations prior to start of demolition work. Owner shall indicate at pre-proposal conference those material decided to be salvaged for future use by Owner.

B. Items of salvageable value to Contractor may be removed from structure as work progresses. Salvaged items must be transported from site as they are removed. Storage or sale of removed items on site will not be permitted.

C. Explosives shall not be brought to site or used without written consent of authorities having jurisdiction. Such written consent will not relieve Contractor of total responsibility or injury to persons or for damage to property due to blasting operations. The performance of any required blasting shall comply with governing regulations.

1.04 PROTECTION:

A. SUMMARY:

1. Ensure safe passage of persons around all areas of demolition.
2. Conduct operations to prevent damage to adjacent buildings, structures, other facilities, or injury to persons.
3. Promptly repair any damages caused to adjacent facilities by demolition operations at no cost to Owner.
4. Maintain existing utilities indicated to remain, keep in service, and protect against damage during demolition operations.
5. Prevent interruption of existing utilities serving occupied or used facilities, except when authorized in writing by authorities having jurisdiction.
6. Provide temporary services during interruptions to existing utilities as acceptable to governing authorities.
7. Make arrangements, before initiating demolition, for relocating, disconnection, rerouting, abandoning, or similar action as may be required relative to utilities and other underground piping, to permit work to proceed without delay. Arrangements shall be made in accordance with regulations of authorities of utilities concerned, including but not restricting any other services not mentioned, such as overhead and underground power and telephone power lines and equipment, gas piping, storm sewers, sanitary

sewers, or water piping. Contractor shall not use water when it may create hazardous or objectionable conditions, such as ice, flooding, or/or pollution.

8. Use water sprinkling and other suitable methods to limit dust and dirt rising and scattering in air to lowest practical level.
9. Comply with governing regulations pertaining to environmental protection.
10. Clean adjacent structures and improvements of dust, dirt, and debris caused by demolition operations. Return adjacent areas to condition existing prior to start of work.

PART 2: PRODUCTS:

A. This part not used.

PART 3: EXECUTION:

3.01 BUILDING DEMOLITION:

A. Demolish buildings completely and remove from site using methods as required to complete work within limitations of governing regulations.

B. Proceed with demolition in systematic manner, from top of structure to ground and complete demolition work above each floor or tier before disturbing supporting members on lower levels.

C. Locate demolition equipment and remove materials so as to prevent excessive loading to supporting walls, floors, or framing.

D. Remove structural framing members and lower to ground by hoists, derricks, or other suitable methods.

E. Demolish concrete and masonry in small sections. Break up and remove concrete slabs-on-grade unless otherwise shown to remain.

F. Demolish and remove below grade construction and concrete slabs on grade to a minimum depth of twelve inches below lowest foundation elevations.

3.02 FILLING BASEMENTS AND VOIDS:

A. Completely fill below grade areas and voids resulting from demolition or removal of structures (tanks, wells, cisterns, etc.) using approved select fill materials free from debris, trash, roots, and other organic matter.

B. Ensure that areas to be filled are free of standing water, trash, and debris prior to fill placement.

C. Place fill materials in horizontal layers not exceeding eight inches (8") in loose depth and compact each layer at optimum moisture content of fill material to density equal to original adjacent ground, unless subsequent excavation for new work is required.

D. Grade surface to match adjacent grades and to provide flow to surface drainage structures after fill placement and compaction.

3.03 DISPOSAL OF DEMOLISHED MATERIALS:

A. Remove from site, debris, rubbish, and other materials resulting from demolition operations.

B. No burning of any materials, debris, or trash on-site or off-site will be allowed, except when allowed by the appropriate governing authority. If allowed as stated above, burning shall be performed in manner prescribed by governing authority.

C. Transport materials removed from demolished structures and dispose off-site to areas which are approved for disposal by governing authorities and appropriate property owners.

END OF SECTION

SECTION 02055

SOILS FOR EARTHWORK

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Subsoil materials.
2. Topsoil materials.

B. Related Sections:
1. Section 02060 - Aggregates for Earthwork.
2. Section 02061 - Aggregates for Exterior Improvements.
3. Section 02311 - Rough Grading.
4. Section 02320 - Backfill.
5. Section 02324 - Trenching.

1.2 REFERENCES

A. American Association of State Highway and Transportation Officials:
1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.

B. ASTM International:
1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)).
2. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (6,000 ft-lbf/ft3 (2,700 kN-m/m3)).
3. ASTM D2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).

PART 2 PRODUCTS

2.1 SOURCE QUALITY CONTROL

A. Section 01400 - Quality Requirements: Testing and Inspection Services Testing and analysis of soil material.

B. Testing and Analysis of Subsoil Material:Perform in accordance with ASTM D698.

C. Testing and Analysis of Topsoil Material: Perform in accordance with ASTM D698.

D. When tests indicate materials do not meet specified requirements, change material and retest.

E. Furnish materials of each type from same source throughout the Work.

PART 3 EXECUTION

3.1 EXCAVATION

A. Excavate subsoil and topsoil from areas designated. Strip topsoil to full depth of topsoil in designated areas.

B. Stockpile excavated material meeting requirements for subsoil materials and topsoil materials.

C. Remove excess excavated materials subsoil and topsoil not intended for reuse, from site.

D. Remove excavated materials not meeting requirements for subsoil materials and topsoil materials from site.

3.2 STOCKPILING

A. Stockpile materials on site at locations designated by Architect/Engineer.

B. Stockpile in sufficient quantities to meet Project schedule and requirements.

C. Separate differing materials with dividers or stockpile apart to prevent mixing.

D. Prevent intermixing of soil types or contamination.

E. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.

3.3 STOCKPILE CLEANUP

A. Remove stockpile, leave area in clean and neat condition. Grade site surface to prevent free standing surface water.

END OF SECTION

SECTION 02230

SITE CLEARING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Removing surface debris.
   2. Removing designated trees, shrubs, and other plant life.
   3. Removing abandoned utilities.
   4. Excavating topsoil.

B. Related Sections:
   1. Section 02311 - Rough Grading.
   2. Section 02316 - Rock Removal.

PART 2 EXECUTION

2.1 EXAMINATION

A. Section 01300 - Administrative Requirements: Verification of existing conditions before starting work.

B. Verify existing plant life designated to remain is tagged or identified.

C. Identify waste area for placing removed materials.

2.2 PREPARATION

A. Call Local Utility Line Information not less than three working days before performing Work.
   1. Request underground utilities to be located and marked within and surrounding construction areas.

2.3 PROTECTION

A. Locate, identify, and protect utilities indicated to remain, from damage.

B. Protect trees, plant growth, and features designated to remain, as final landscaping

C. Protect bench marks, survey control points, and existing structures from damage or displacement.

2.4 CLEARING

A. Clear areas required for access to site and execution of Work.

B. Remove trees and shrubs within marked areas. Remove stumps.

C. Clear undergrowth and deadwood, without disturbing subsoil.

D. Apply herbicide to remaining stumps to inhibit growth.

2.5 REMOVAL

A. Remove debris, rock, and extracted plant life from site.

B. Remove abandoned utilities. Indicated removal termination point for underground utilities on Record Documents.

C. Continuously clean-up and remove waste materials from site. Do not allow materials to accumulate on site.

D. Do not burn or bury materials on site. Leave site in clean condition.

2.6 TOPSOIL EXCAVATION

A. Excavate topsoil from areas to be further excavated, relandscaped, or regraded, without mixing with foreign materials for use in finish grading.

B. Do not excavate wet topsoil.

C. Stockpile in area designated on site to depth not exceeding 8 feet and protect from erosion.

D. Remove excess topsoil not intended for reuse, from site.

END OF SECTION

SECTION 02311

ROUGH GRADING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Excavating topsoil.
2. Excavating subsoil.
3. Cutting, grading, filling, compacting site for site structures, building pads.

B. Related Sections:
1. Section 02055 - Soils for Earthwork: Soils for fill.
2. Section 02060 - Aggregates for Earthwork: Aggregates for fill.
3. Section 02230 - Site Clearing: Excavating topsoil.
4. Section 02315 - Excavation and Fill: Building excavation.
5. Section 02316 - Rock Removal.
6. Section 02320 - Backfill: General building area backfilling.
7. Section 02324 - Trenching: Trenching and backfilling for utilities.

1.2 REFERENCES

A. American Association of State Highway and Transportation Officials:
1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.

B. ASTM International:
1. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
2. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)).
3. ASTM D1556 - Standard Test Method for Density of Soil in Place by the Sand-Cone Method.
4. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (6,000 ft-lbf/ft3 (2,700 kN-m/m3)).
5. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
6. ASTM D2419 - Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
7. ASTM D2434 - Standard Test Method for Permeability of Granular Soils (Constant Head).
8. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

9. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

PART 2 EXECUTION

2.1 PREPARATION

A. Call Local Utility Line Information service not less than three working days before performing Work.
   1. Request underground utilities to be located and marked within and surrounding construction areas.

B. Identify required lines, levels, contours, and datum.

C. Protect utilities indicated to remain from damage.

D. Protect bench marks, survey control point, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

2.2 FILLING

A. Fill areas to contours and elevations with unfrozen materials.

B. Place fill material in continuous layers and compact as required.

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

D. Slope grade away from building minimum 2 percent slope for minimum distance of 10 ft, unless noted otherwise.

E. Make grade changes gradual. Blend slope into level areas.

2.3 FIELD QUALITY CONTROL

A. Perform in place compaction tests in accordance with the following:
   1. As required by geotechnical engineer.

END OF SECTION

SECTION 02315

EXCAVATION AND FILL

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Soil densification.
2. Excavating for building foundations.
3. Excavating for slabs-on-grade.
4. Excavating for site structures.

B. Related Sections:
1. Section 02055 - Soils for Earthwork: Stockpiling excavated materials.
2. Section 02060 - Aggregates for Earthwork: Stockpiling excavated materials.
3. Section 02311 - Rough Grading: Topsoil and subsoil removal from site surface.
4. Section 02316 - Rock Removal: Removal of rock during excavating.
5. Section 02320 - Backfill.
6. Section 02324 - Trenching: Excavating for utility trenches.

1.2 REFERENCES

A. ASTM International:
1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)).
2. ASTM D1556 - Standard Test Method for Density of Soil in Place by the Sand-Cone Method.
3. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
4. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

B. Local utility standards when working within 24 inches of utility lines.

PART 2 EXECUTION

2.1 EXCAVATION

A. Underpin adjacent structures which may be damaged by excavation work.

B. Excavate subsoil to accommodate building foundations, slabs-on-grade.

C. Excavate to working elevation for piling work.

D. Compact disturbed load bearing soil in direct contact with foundations to original bearing capacity; perform compaction in accordance with Section 02320 and Section 02324.

E. Grade top perimeter of excavation to prevent surface water from draining into excavation.

F. Trim excavation. Remove loose matter.

G. Notify Architect/Engineer of unexpected subsurface conditions.

H. Correct areas over excavated with structural fill.

I. Remove excess and unsuitable material from site.

J. Repair or replace items indicated to remain damaged by excavation.

2.2 PROTECTION

A. Prevent displacement or loose soil from falling into excavation; maintain soil stability.

B. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

C. Protect structures, utilities and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth operations.

END OF SECTION

SECTION 02316

TERMITE CONTROL

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Soil treatment for termite control.

B. Related Sections:
   1. Section 02055 - Soils for Earthwork: Backfill materials.
   2. Section 02315 - Excavation and Fill: Subgrade preparation.
   3. Section 03300 - Cast-In-Place Concrete: Slabs on grade and foundations placed over treated soil.

1.2 REFERENCES

A. Environmental Protection Agency:
   1. EPA FIFRA - Federal Insecticide, Fungicide and Rodenticide Act.

B. National Pest Management Association:
   1. NPMA WDO - Wood Destroying Organism Library.

1.3 SUBMITTALS

A. Product Data: Submit toxicants to be used, composition by percentage, dilution schedule, intended application rate. Include product label information.

B. Test Reports: Indicate regulatory agency approval reports.

C. Manufacturer's Application Instructions: Indicate caution requirements and in accordance with current product label of chosen pesticide.

D. Certify applications followed NPMA WDO for termite control or other regional location guidance.

1.4 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record moisture content of soil before application, date and rate of application, areas of application, diary of toxicity meter readings and corresponding soil coverage.

B. Operation and Maintenance Data: Indicate re-treatment schedule.

1.5 QUALIFICATIONS

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

B. Applicator: Company specializing in performing the Work of this sectionand licensed in State of Texas.

1.6 SEQUENCING

A. Section 01100 - Summary: Work sequence.

B. Apply toxicant immediately prior to installation of vapor barrier under slabs-on-grade in accordance with product label supplemented by the NPCA’s ARP for termiticiding or local requirements.

1.7 WARRANTY

A. Warranty: Include coverage for damage and repairs to building and building contents caused by termites. Repair damage. Re-treat where required.

PART 2 PRODUCTS

2.1 MATERIALS

A. Toxicant Chemical: EPA FIFRA approved; synthetically color dyed to permit visual identification of treated soil.

B. Diluent: Recommended by toxicant manufacturer.

2.2 MIXES

A. Mix toxicant to manufacturer's instructions.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01300 - Administrative Requirements:Verification of existing conditions before starting work.

B. Verify soil surfaces are unfrozen, sufficiently dry to absorb toxicant, and ready to receive treatment.

C. Verify final grading and excavation are complete.

3.2 APPLICATION

A. Apply toxicant at locations indicated in Schedule at end of section.

B. Apply extra treatment to structure penetration surfaces including pipe or ducts, and soil penetrations including grounding rods or posts.

C. Re-treat disturbed treated soil with same toxicant as original treatment.

D. When inspection or testing identifies presence of termites, re-treat soil and re-test.

3.3 PROTECTION OF FINISHED WORK

A. Section 01700 - Execution Requirements: Protecting finished Work.

B. Do not permit soil grading over treated work.

END OF SECTION

SECTION 02831
CHAIN LINK FENCES AND GATES

PART I GENERAL

1.01 SECTION INCLUDES

Provide chain link fences and gates units controlled by single source including erection accessories, fittings, and fastenings as indicated on Drawings. Refer to architectural building plans for fencing attached to building.

1.02 RELATED SECTIONS

A. Construction Drawings.

B. Manufacturer's technical data and installation requirements.

C. Division 3 Concrete.

1.03 REFERENCES

A. ANSI/ASTM A123 - Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products.

B. ANSI/ASTM F567 - Installation of Chain-Link Fence.

C. ASTM A116 - Zinc-Coated (Galvanized) Steel Woven Wire Fence Fabric.

D. ASTM A120 - Pipe, Steel, Black and Hot-Dipped zinc Coated (Galvanized) welded and seamless, for Ordinary Uses.

E. ASTM A121 - Zinc-Coated (Galvanized) Steel Barbed Wire.

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

G. ASTM A392 - Zinc-Coated Steel Chain-Link Fence Fabric.

H. ASTM A428 - Weight of Coating on Aluminum-Coated Iron or Steel Articles.

I. ASTM A491 - Aluminum-Coated Steel Chain Link Fence Fabric.

J. ASTM A569 - Steel, Carbon (0.15 Maximum Percent), Hot- Rolled Sheet and Strip Commercial Quality.

K. ASTM A585 - Aluminum Coated Steel Barbed Wire.

L. ASTM C94 - Ready-mixed Concrete.

M. ASTM F573 - Residential Zinc-Coated Steel Chain Link Fence Fabric.

N. ASTM F668 - Polyvinyl Chloride (PVC) Coated Steel Chain Link Fence Fabric.

O. Chain Link Pence Manufacturers Institute (CLFMI) - Product Manual.

P. FS RR-F-191 - Fencing, Wire and Post Metal (and Gates, Chain Link Fence Fabric, and Accessories).

1.04 PROJECT RECORD DOCUMENTS

A. Accurately record actual locations of property perimeter posts relative to property lines and easements.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, provide products of one of the following:

1. Allied Tube and Conduit Corp.
2. Anchor Fence, Inc.
3. United States Steel

2.02 MATERIALS

A. Fabric:

1. No. 9 ga. (0.148”) finished size galvanized steel wires, 2” mesh, with both top and bottom selvages twisted and barbed.

2. Furnish one-piece fabric widths for fencing.

B. Barbed Wire (where noted on drawings)

1 Barbed wire descriptions in "Steel Barbed Wire" Galvanized-Steel Barbed Wire" paragraphs below are examples; revise to suit Project. If retaining this article, coordinate with components for barbed wire installation, including barbed wire arms in "Fittings" Article.

2. Steel Barbed Wire: ASTM A 121, three-strand barbed wire, 0.099-inch- (2.51-mm-) diameter line wire with 0.080-inch- (2.03-mm-) diameter, four-point round barbs spaced not more than 5 inches (127 mm) o.c.

a. Aluminum Coating: Type A.
b. Zinc Coating: Type Z, Class 3.

B. End, Corner, and Pull Posts: Galvanized steel, minimum sizes and weights as follows:

1. Up to 6’-0” Fabric Height: 2.375 OD steel pipe, 3.65 lbs./lin. ft. or 2.25"x l.875” H-sections, 2.64 lbs./lin. ft.

2. Over 6'-0” Fabric Height: 2.875" OD pipe, 5.79 lbs./lin. ft., or 3.5”x3.5” roll-formed sections, 4.85 lbs./lin. ft.

C. Line Posts: Galvanized steel, minimum sizes and weights as f follows:

1. Up to 6'-0” Fabric Height: 1.90” OD steel pipe, 2.70 lbs./lin. ft. or 1.875'x l.625" C-sections, 2.28 lbs./lin. ft.

2. 6'-0" to 8’-0" Fabric Height: 2.375" OD steel pipe, 3.65 lbs./lin. ft. or 2.25"x l.875” H-sections, 2.64 lbs./lin. ft.

3. Over 8'-0" Fabric Height: 2.875" OD steel pipe, 5.79 lbs./lin. ft. or 2.25"x l.875", H-sections, 3.26 lbs./lin. ft.

D. Gate Posts: Galvanized steel, posts for supporting single gate leaf, or one leaf of double gate installation, for nominal gate widths as follows:

1. Up to 6' -0": 3.5" x 3.5" roll-formed section, 4.85 lbs./lin. ft., or 2.875 OD pipe, 5.79 lbs./lin. ft.

2. Over 6' –0" to 13' –0": 4.000", OD pipe, 9.11 lbs./lin. ft.

E. Top Rail: Rails: 1.66", OD pipe, 2.27 lbs./ft. or 1.625"x l.25", roll-formed sections, 1.35 lbs./ft.; galvanized steel, manufacturer's longest lengths.

F. Couplings: Expansion type, approximately 6" long, for each joint.

G. Attaching Devices: Provide means for attaching top rail securely to each gate corner, pull and end post.

H. Sleeves: Galvanized steel pipe not less then 6" long and with inside diameter not less than ½" greater than outside diameter of pipe. Provide steel plate closure welded to bottom of sleeve of width and length not less than 1" greater than outside diameter of sleeve.

I. Tension Wire: 7 gage galvanized steel, coated coil spring wire, located at bottom of fabric.

J. Wire Ties: 11 ga. galvanized steel

K. Post Brace Assembly: Manufacturer's standard adjustable brace at end of gate posts and at both sides of corner and pull posts, with horizontal brace located at mid-height of fabric. Use same material as top rail for brace, and truss to line posts with 0.375" diameter rod and adjustable tightener.

L. Post Tops: Galvanized steel, weathertight closure cap for each tubular post. Furnish caps with openings to permit passage of top rail.

M. Stretcher Bars: Galvanized steel, one piece lengths equal to full height of fabric, with minimum cross-section of 3/16" x ¾". Provide one stretch bar for each gate and end post, and two for each corner and pull post.

N. Stretch Bar Bands: Manufacturer's standard.

O. Gate Cross-bracing: 3/80 diameter galvanized steel adjustable length truss rods.

P. Portland Cement: ASTM C 150.

Q. Aggregates: ASTM C 33.

R. Water: Clean.

S. Non-shrink, non-Metallic Grout: Premixed, factory- packaged, noncorrosive nonstaining, nongaseous, exterior grout complying with CE CRD-C621.

T. Swinging Gate Hardware:

1. Hinges: Size and material to suit gate size, non- lift-off type, offset to permit 180 degree gate opening. Provide 1-1/2" pair of hinges for each leaf over 6"-0" nominal height.

2. Latch: Forked type or plunger-bar type to permit operation from either side of gate, with padlock eye as integral part of latch.

U. Double Gates Hardware: Provide gate stops for double gates, consisting of mushroom type of flush plate with anchors set in concrete, to engage center drop rod or plunger bar. Include locking device and padlock eye as integral part of latch, using one padlock for locking both gate leaves.

V. Sliding Gate Hardware: Provide manufacturer's standard heavy-duty track, ball-bearing hanger sheaves, overhead framing and supports, guides, stays, bracing, and accessories as required.

PART 3 EXECUTION

3.01 GATE FABRICATION

A. Fabricate swing gate perimeter frames of 1.90” OD pipe, galvanized steel. Provide horizontal and vertical members to ensure proper gate operation and for attachment of fabric, hardware, and accessories. Space frame members maximum of 8’-0”, apart.

B. Assemble gate frames by welding or special fittings and rivets, for rigid connections. Install same fabric as for fence with stretcher bars at vertical edges. Install diagonal cross-bracing on gates as required to ensure rigid frame without sag or twist. Bars may be used at top and bottom edges. Attach stretchers to gate frame at 15" o.c. maximum.

C. Attach hardware to provide security against removal or breakage.

3.02 FINISH

A. Fabric Finish: Galvanized, ASTM A 392, Class I, with not less than 1.2 oz. zinc/sq. ft. of surface.

B. Framing: Galvanized steel, AS7M A 120 or A 123, with not less than 1.8 oz. zinc/sq. ft. of surface.

C. Hardware and Accessories: Galvanized, ASTM A 153 with zinc weights in accordance with industry standards.

3.03 CONCRETE MIXING

Mix materials to obtain concrete with minimum 28-day compressive strength of 2,500 psi; in maximum size aggregate, maximum 3" slump, and 2-4% entrained air.

3.04 INSTALLATION

A. Comply with recommended procedures and instructions of fencing manufacturer. Provide secure, aligned installation with line posts spaced at 10’-0” o.c. maximum.

B. Grade Set Posts: Drill or hand excavate using post hole digger in firm undisturbed or compacted soil.

C. Excavate hole for each post to minimum diameter recommended by fence manufacturer but not less than four times the largest cross-section of post. Excavate hole depths not less than 12" diameter by 36" minimum below finish grade surface.

D. Center and align posts in holes with bottom of posts 3" above bottom of excavation.

E. Place concrete around posts and vibrate or tamp for consolidation. Check each post for vertical and top alignment, and hold in position during placement and finishing operations. Extend concrete footing 2" above grade and trowel to crown to shed water.

F. Sleeve Set Posts: Anchor posts by means of pipe sleeves preset and anchored into concrete. After posts, have been inserted into sleeves, fill annular space between post and sleeve solid with nonshrink, non-metallic grout, mixed and placed to comply with grout manufacturer's directions.

G. Top Rails: Run rail continuously, bending to form radius for curved runs. Provide expansion couplings as recommended by manufacturer.

H. Center Rails: Provide center rails where indicated. Install in one piece between posts and flush with post on fabric side, using special offset fittings where necessary.

I. Brace Assemblies: Install braces so posts are plumb when diagonal rod is under proper tension.

J. Tension wire: Install tension wires through post cap loops before stretching fabric and tie to each post cap with not less than 6 ga. galvanized wire. Fasten fabric to tension wire using 11 ga. galvanized steel hog rings spaced 24" o.c.

K. Fabric: Leave approximately 2" between finish grade and bottom selvage. Pull fabric taut and tie to posts, rails, and tension wires. Install fabric on security side of fence, and anchor to framework so that fabric remains in tension after pulling force is released.

L. Stretcher Bars: Secure at end, corner, pull, and gate posts by threading through or clamping to fabric at 4" o.c., and secure to posts with metal bands spaced at 15" o.c.

M. Tie Wires:

1. Use U-shaped wire, conforming with diameter of pipe to which attached, clasping pipe and fabric firmly when ends twisted at least two full turns. Bend ends of wire to minimize hazard to persons or clothing.

2. Tie fabric to line posts with wire ties spaced 12" o.c. Tie fabric to rails and braces with wire ties spaced 24" o.c. Tie fabric to tension wires with hog rings spaced 24" o.c.

3. Manufacturer's standard procedure will be accepted if of equal strength and durability.

N. Fasteners: Install nuts for tension bands and hardware bolts on side of fence opposite fabric side. Peen ends of bolts or score threads to prevent removal of nuts.

P. Gates: Install gates plumb, level, and secure for full opening without interference. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubrication.

END OF SECTION

SECTION 03100

CONCRETE FORMS AND ACCESSORIES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Formwork for cast-in place concrete.
2. Shoring, bracing, and anchorage.
3. Architectural form liners.
4. Form accessories.
5. Form stripping.

B. Related Sections:
1. Section 03200 - Concrete Reinforcement.
2. Section 03300 - Cast-in-Place Concrete.

1.2 REFERENCES

A. American Concrete Institute:
1. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials.
2. ACI 301 - Specifications for Structural Concrete.
3. ACI 318 - Building Code Requirements for Structural Concrete.
4. ACI 347 - Guide to Formwork for Concrete.

B. American Forest and Paper Association:
1. AF&PA - National Design Specifications for Wood Construction.

C. The Engineered Wood Association:
1. APA/EWA PS 1 - Voluntary Product Standard for Construction and Industrial Plywood.

D. ASTM International:
1. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
2. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.

E. West Coast Lumber Inspection Bureau:
1. WCLIB - Standard Grading Rules for West Coast Lumber.

1.3 DESIGN REQUIREMENTS

A. Design, engineer and construct formwork, shoring and bracing in accordance with ACI 318 to conform to design and applicable code requirements to achieve concrete shape, line and dimension as indicated on Drawings.

1.4 PERFORMANCE REQUIREMENTS

A. Vapor Retarder Permeance: Maximum 1 perm perms when tested in accordance with ASTM E96, Procedure A.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 347 ACI 301 ACI 318.

B. For wood products furnished for work of this Section, comply with AF&PA.

C. Perform Work in accordance with State Municipality of Highways Public Work's standard.

1.6 COORDINATION

A. Section 01300 - Administrative Requirements: Coordination and project conditions.

B. Coordinate this Section with other sections of work, requiring attachment of components to formwork.

PART 2 PRODUCTS

2.1 WOOD FORM MATERIALS

A. Form Materials: At discretion of Contractor.

2.2 FORMWORK ACCESSORIES

A. Vapor Retarder: Where indicated on Drawings, 10 mil thick polyethylene sheet manufacture by:
   1. Stego Wrap Class A: by Stego Industries LLC (887) 464-7834
   2. Griffolyn by Reef Industries (800) 231-6074
   3. VaporBlock 10 by Raven Industries (800) 635-3456
   4. Perminator Vapor – May by W.R. Meadows (800) 342-5976
   5. Or Equivalent

B. Bituminous Joint Filler: ASTM D1751.

C. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Size, strength and character to maintain formwork in place while placing concrete.

D. Water Stops: Rubber Polyvinyl chloride, minimum 1,750 psi tensile strength, minimum 50 degrees F to plus 175 degrees F working temperature range, inch wide, maximum possible lengths, ribbed profile, preformed corner sections, heat welded jointing.

****** OR ******

E. Waterstop: Flexible strip of bentonite waterproofing compound in coil form for joints in concrete construction.
   1. Colloid Environmental Technologies Company Model.
   2. TC MiraDRi Model.
   3. Paramount Technical Products Model.
   4. Substitutions: Section 01600 - Product Requirements Not Permitted.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01300 - Administrative Requirements: Coordination and project conditions.

B. Verify lines, levels, and centers before proceeding with formwork. Verify dimensions agree with Drawings.

C. When formwork is placed after reinforcement resulting in insufficient concrete cover over reinforcement before proceeding, request instructions from Architect/Engineer.

3.2 INSTALLATION

A. Earth Forms:
   1. Earth forms are not permitted.

B. Formwork - General:
   1. Provide top form for sloped surfaces steeper than 1.5 horizontal to 1 vertical to hold shape of concrete during placement, unless it can be demonstrated that top forms can be omitted.
   2. Construct forms to correct shape and dimensions, mortar-tight, braced, and of sufficient strength to maintain shape and position under imposed loads from construction operations.
   3. Camber forms where necessary to produce level finished soffits unless otherwise shown on Drawings.

4. Carefully verify horizontal and vertical positions of forms. Correct misaligned or misplaced forms before placing concrete.
5. Complete wedging and bracing before placing concrete.

C. Forms for Smooth Finish Concrete:
1. Use steel, plywood or lined board forms.
2. Use clean and smooth plywood and form liners, uniform in size, and free from surface and edge damage capable of affecting resulting concrete finish.
3. Install form lining with close-fitting square joints between separate sheets without springing into place.
4. Use full size sheets of form lines and plywood wherever possible.
5. Tape joints to prevent protrusions in concrete.
6. Use care in forming and stripping wood forms to protect corners and edges.
7. Level and continue horizontal joints.
8. Keep wood forms wet until stripped.

D. Erect formwork, shoring, and bracing to achieve design requirements, in accordance with requirements of ACI 301 ACI 318.

E. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.

F. Obtain Architect/Engineer’s approval before framing openings in structural members not indicated on Drawings.

G. Install fillet and chamfer strips on external corners of beams joists columns and.

H. Install void forms in accordance with manufacturer's recommendations.
1. SureVoid Products, Inc., Englewood, CO (800) 458-5444.

I. Do not reuse wood formwork more than times for concrete surfaces to be exposed to view. Do not patch formwork.

3.3 APPLICATION - FORM RELEASE AGENT

A. Apply form release agent on formwork in accordance with manufacturer's recommendations.

B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.

C. Do not apply form release agent where concrete surfaces are indicated to receive special finishes or applied coverings that are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

D. Reuse and Coating of Forms: Thoroughly clean forms and reapply form coating before each reuse. For exposed work, do not reuse forms with damaged faces or edges. Apply

form coating to forms in accordance with manufacturer's specifications. Do not coat forms for concrete indicated to receive "scored finish". Apply form coatings before placing reinforcing steel.

3.4 INSTALLATION - INSERTS, EMBEDDED PARTS, AND OPENINGS

A. Install formed openings for items to be embedded in or passing through concrete work.

B. Locate and set in place items required to be cast directly into concrete.

C. Coordinate with Work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other Work.

D. Install accessories straight, level, and plumb. Ensure items are not disturbed during concrete placement.

E. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.

F. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.

G. Form Ties:
1. Use sufficient strength and sufficient quantity to prevent spreading of forms.
2. Place ties at least 1 inch away from finished surface of concrete.
3. Leave inner rods in concrete when forms are stripped.
4. Space form ties equidistant, symmetrical and aligned vertically and horizontally unless otherwise shown on Drawings.

H. Arrangement: Arrange formwork to allow proper erection sequence and to permit form removal without damage to concrete.

I. Construction Joints:
1. Install surfaced pouring strip where construction joints intersect exposed surfaces to provide straight line at joints.
2. Just prior to subsequent concrete placement, remove strip and tighten forms to conceal shrinkage.
3. Show no overlapping of construction joints. Construct joints to present same appearance as butted plywood joints.
4. Arrange joints in continuous line straight, true and sharp.

J. Openings for Items Passing Through Concrete:
1. Frame openings in concrete where indicated on Drawings. Establish exact locations, sizes, and other conditions required for openings and attachment of work specified under other sections.
2. Coordinate work to avoid cutting and patching of concrete after placement.

3. Perform cutting and repairing of concrete required as result of failure to provide required openings.

K. Screeds:
1. Set screeds and establish levels for tops of concrete slabs and levels for finish on slabs.
2. Slope slabs to drain where required or as shown on Drawings.
3. Before depositing concrete, remove debris from space to be occupied by concrete and thoroughly wet forms. Remove freestanding water.

L. Screed Supports:
1. For concrete over waterproof membranes and vapor retarder membranes, use cradle, pad or base type screed supports which will not puncture membrane.
2. Staking through membrane is not be permitted.

M. Cleanouts and Access Panels:
1. Provide removable cleanout sections or access panels at bottoms of forms to permit inspection and effective cleaning of loose dirt, debris and waste material.
2. Clean forms and surfaces against which concrete is to be placed. Remove chips, saw dust and other debris. Thoroughly blow out forms with compressed air just before concrete is placed.

3.5 FORM CLEANING

A. Clean forms as erection proceeds, to remove foreign matter within forms.

B. Clean formed cavities of debris prior to placing concrete.

C. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.

3.6 FORM REMOVAL

A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads and removal has been approved by Architect/Engineer.

B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.

C. Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.

D. Leave forms in place for minimum number of days as specified in ACI 347.

3.7 ERECTION TOLERANCES

A. Construct formwork to maintain tolerances required by ACI 301 ACI 318.

****** OR ******

B. Camber slabs and beams 1/4 inch per 10 feet in accordance with ACI 301 ACI 318.

3.8 FIELD QUALITY CONTROL

A. Section 01400 - Quality Requirements 01700 - Execution Requirements: Field inspecting, testing, adjusting, and balancing.

B. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and that supports, fastenings, wedges, ties, and items are secure.

C. Notify Architect/Engineer after placement of reinforcing steel in forms, but prior to placing concrete.

D. Schedule concrete placement to permit formwork inspection before placing concrete.

END OF SECTION

SECTION 03200

CONCRETE REINFORCEMENT

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Reinforcing bars.
2. Welded wire fabric.
3. Reinforcement accessories.

B. Related Sections:
1. Section 03100 - Concrete Forms and Accessories.
2. Section 03300 - Cast-in-Place Concrete.
3. Section 03350 - Concrete Finishing: Reinforcement for concrete floor toppings.

1.2 REFERENCES

A. American Concrete Institute:
1. ACI 301 - Specifications for Structural Concrete.
2. ACI 318 - Building Code Requirements for Structural Concrete.
3. ACI 530.1 - Specifications for Masonry Structures.
4. ACI SP-66 - ACI Detailing Manual.

B. ASTM International:
1. ASTM A82 - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
2. ASTM A184/A184M - Standard Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement.
3. ASTM A496 - Standard Specification for Steel Wire, Deformed, for Concrete Reinforcement.
4. ASTM A497 - Standard Specification for Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement.
5. ASTM A615/A615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
6. ASTM A704/A704M - Standard Specification for Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement.
7. ASTM A706/A706M - Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
8. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement.
9. ASTM A775/A775M - Standard Specification for Epoxy-Coated Reinforcing Steel Bars.

10. ASTM A884/A884M - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Fabric for Reinforcement.
11. ASTM A934/A934M - Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars.
12. ASTM A996/A996M - Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement.
13. ASTM D3963/D3963M - Standard Specification for Fabrication and Jobsite Handling of Epoxy-Coated Reinforcing Steel Bars.

C. American Welding Society:
1. AWS D1.4 - Structural Welding Code - Reinforcing Steel.

D. Concrete Reinforcing Steel Institute:
1. CRSI - Manual of Standard Practice.
2. CRSI - Placing Reinforcing Bars.

1.3 SUBMITTALS

A. Section 01330 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate bar sizes, spacings, locations, and quantities of reinforcing steel and welded wire fabric, bending and cutting schedules, and supporting and spacing devices and.

C. Certificates: Submit AWS qualification certificate for welders employed on the Work.

D. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.
1. Submit certified copies of mill test report of reinforcement materials analysis.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with CRSI - Manual of Standard Practice ACI 301 ACI 318.

B. Prepare shop drawings in accordance with ACI SP-66.

C. Perform Work in accordance with State Municipality of Highways Public Work's standard.

1.5 QUALIFICATIONS

A. Welders: AWS qualified within previous 12 months.

1.6 COORDINATION

A. Section 01300 - Administrative Requirements: Coordination and project conditions.

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

PART 2 PRODUCTS

2.1 REINFORCEMENT

A. Deformed and Plain Reinforcement: ASTM A615/A615M; 60 ksi yield strength, steel bars, unfinished galvanized finish epoxy coated finish.

2.2 ACCESSORY MATERIALS

A. Tie Wire: Minimum 16 gage annealed type, epoxy coated.

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

C. Special Chairs, Bolsters, Bar Supports, Spacers Adjacent to Weather Exposed Concrete Surfaces: Plastic-coated steel Plastic tipped steel Stainless steel type; size and shape to meet Project conditions.

D. Reinforcing Splicing Devices: Exothermic welding type; full tension and compression; sized to fit joined reinforcing.

****** OR ******

E. Reinforcing Splicing Devices: Mechanical set screw swaged threaded type; full tension and compression; sized to fit joined reinforcing.

F. Epoxy Coating Patching Material: Type as recommended by coating manufacturer.

2.3 FABRICATION

A. Fabricate concrete reinforcement in accordance with CRSI Manual of Practice ACI 318 applicable code.

B. Form standard hooks for 180 degree bends, 90 degree bend, stirrup and tie hooks, and seismic hooks as indicated on Drawings.

C. Form reinforcement bends with minimum diameters in accordance with ACI 318 applicable code.

D. Fabricate column reinforcement with offset bends at reinforcement splices.

E. Form spiral column reinforcement from minimum 3/8 inch diameter continuous plain deformed bar or wire.

F. Form ties and stirrups from the following:
   1. For bars No. 10 and Smaller: No. 3 deformed bars deformed wire.
   2. For bars No. 11 and Larger: No. 4 deformed bars deformed wire.

G. Weld reinforcement in accordance with AWS D1.4.

H. Galvanized Epoxy-Coated Reinforcement: Clean surfaces, weld and re-protect welded joint in accordance with CRSI.

I. Locate reinforcement splices not indicated on Drawings, at point of minimum stress. Review location of splices with Architect/Engineer.

2.4 SHOP FINISHING

A. Galvanized Finish for Steel Bars: ASTM A767/A767M, Class I II, hot dip galvanized after fabrication.

B. Epoxy Coated Finish for Steel Bars: ASTM A775/A775M ASTM A934/A934M.

C. Epoxy Coated Finish for Steel Wire: ASTM A884/A884M; Class A using ASTM A775/A775M ASTM A934/A934M.

PART 3 EXECUTION

3.1 PLACEMENT

A. Place, support and secure reinforcement against displacement. Do not deviate from required position beyond specified tolerance.
   1. Do not weld crossing reinforcement bars for assembly except as permitted by Architect/Engineer.

B. Do not displace or damage vapor retarder.

C. Accommodate placement of formed openings.

D. Space reinforcement bars with minimum clear spacing in accordance with ACI 318 of one bar diameter, but not less than 1 inch.
   1. Where bars are indicated in multiple layers, place upper bars directly above lower bars.

E. Maintain concrete cover around reinforcement in accordance with ACI 318 applicable code as follows:

Footings and Concrete Formed Against Earth		3 inches
Concrete exposed to earth or weather	No. 6 bars and larger	2 inches
	No. 5 bars and smaller	1-1/2 inches
Supported Slabs, Walls, and Joists	No. 14 bars and larger	1-1/2 inches
	No. 11 bars and smaller	3/4 inches
Beams and Columns		1-1/2 inches
Shell and Folded Plate Members	No. 6 bars and larger	3/4 inches
	No. 5 bars and smaller	1/2 inches

3.2 ERECTION TOLERANCES

A. Section 01400 - Quality Requirements: Tolerances.

B. Install reinforcement within the following tolerances for flexural members, walls, and compression members:

Reinforcement Depth	Depth Tolerance	Concrete Cover Tolerance
Greater than 8 inches	plus or minus 3/8 inch	minus 3/8 inch
Less than 8 inches	plus or minus 1/2 inch	minus 1/2 inch

C. Install reinforcement within the tolerances specified in ACI 530.1 for foundation walls.

3.3 FIELD QUALITY CONTROL

A. Section 01400 - Quality Requirements 01700 - Execution Requirements: Field inspecting, testing, adjusting, and balancing.

B. Field inspection and testing will be performed by Owner’s testing laboratory in accordance with ACI 318 applicable code.

C. Perform field inspection and testing in accordance with ACI 318 applicable code.

D. Provide free access to Work and cooperate with appointed firm.

E. Reinforcement Inspection:

1. Placement Acceptance: Specified and ACI 318 material requirements and specified placement tolerances.
2. Welding: Inspect welds in accordance with AWS D1.1.
3. Periodic Placement Inspection: Inspect for correct materials, fabrication, sizes, locations, spacing, concrete cover, and splicing.
4. Weldability Inspection: Inspect for reinforcement weldability when formed from steel other than ASTM A706/A706M.
5. Continuous Weld Inspection: Inspect reinforcement as required by ACI 318 applicable code.
6. Periodic Weld Inspection: Other welded connections.

END OF SECTION

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 SUMMARY

A. Section includes cast-in-place concrete for the following:
   1. Building frame members.
   2. Shear walls.
   3. Foundation walls.
   4. Supported slabs.
   5. Slabs on grade.
   6. Control, expansion and contraction joint devices.

B. Related Sections:
   1. Section 03100 - Concrete Forms and Accessories: Formwork and accessories. Placement of joint device joint device anchors in formwork.
   2. Section 03200 - Concrete Reinforcement.
   3. Section 03350 - Concrete Finishing.
   4. Section 03390 - Concrete Curing.

1.2 REFERENCES

A. American Concrete Institute:
   1. ACI 301 - Specifications for Structural Concrete.
   2. ACI 305 - Hot Weather Concreting.
   3. ACI 306.1 - Standard Specification for Cold Weather Concreting.
   4. ACI 308.1 - Standard Specification for Curing Concrete.
   5. ACI 318 - Building Code Requirements for Structural Concrete.

B. ASTM International:
   1. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
   2. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
   3. ASTM C33 - Standard Specification for Concrete Aggregates.
   4. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
   5. ASTM C42/C42M - Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
   6. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete.
   7. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic Cement Concrete.

8. ASTM C150 - Standard Specification for Portland Cement.
9. ASTM C172 - Standard Practice for Sampling Freshly Mixed Concrete.
10. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
11. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
12. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
13. ASTM C330 - Standard Specification for Lightweight Aggregates for Structural Concrete.
14. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete.
15. ASTM C595 - Standard Specification for Blended Hydraulic Cements.
16. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
17. ASTM C685/C685M - Standard Specification for Concrete Made By Volumetric Batching and Continuous Mixing.
18. ASTM C845 - Standard Specification for Expansive Hydraulic Cement.
19. ASTM C989 - Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars.
20. ASTM C1017/C1017M - Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
21. ASTM C1064/C1064M - Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete.
22. ASTM C1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
23. ASTM C1116 - Standard Specification for Fiber-Reinforced Concrete and Shotcrete.
24. ASTM C1157 - Standard Performance Specification for Hydraulic Cement.
25. ASTM C1218 - Standard Test Method for Water-Soluble Chloride in Mortar and Concrete.
26. ASTM C1240 - Standard Specification for Silica Fume Used in Cementitious Mixtures.
27. ASTM D994 - Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).
28. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
29. ASTM D1752 - Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
30. ASTM D6690 - Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.
31. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.
32. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.

33. ASTM E1643 - Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill under Concrete Slabs.
34. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.

1.3 PERFORMANCE REQUIREMENTS

A. Vapor Retarder Permeance: Maximum 1 perm when tested in accordance with ASTM E96, Procedure A.

1.4 SUBMITTALS

A. Section 01330 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit data on joint devices, attachment accessories, admixtures.

C. Design Data:
1. Submit concrete mix design for each concrete strength. Submit separate mix designs when admixtures are required for the following:
   a. Hot and cold weather concrete work.
   b. Air entrained concrete work.
2. Identify mix ingredients and proportions, including admixtures.

1.5 QUALITY ASSURANCE

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

B. Conform to ACI 305 when concreting during hot weather.

C. Conform to ACI 306.1 when concreting during cold weather.

D. Acquire cement and aggregate from one source for Work.

1.6 COORDINATION

A. Section 01300 - Administrative Requirements: Coordination and project conditions.

B. Coordinate placement of joint devices with erection of concrete formwork and placement of form accessories.

PART 2 PRODUCTS

2.1 CONCRETE MATERIALS

A. Cement: ASTM C150, Type I - Normal Type IA - Air Entraining Type II - Moderate Type IIA - Air Entraining Type III - High Early Strength Type IIIA - Air Entraining Type IV - Low Heat of Hydration Type V - Sulfate Resistant Portland type; manufactured by; ASTM C595, list appropriate blend and cement type.

B. Normal Weight Aggregates: ASTM C33.
   1. Coarse Aggregate Maximum Size: inches In accordance with ACI 318. Water: ACI 318; potable, without deleterious amounts of chloride ions with maximum percent of water soluble chloride ions by weight of cement.

2.2 ADMIXTURES

A. Furnish materials in accordance with State Municipality of Highways Public Work's standards.

B. Air Entrainment: ASTM C260.

C. Chemical: ASTM C494/C494M Type A - Water Reducing Type B - Retarding Type C - Accelerating Type D - Water Reducing and Retarding Type E - Water Reducing and Accelerating Type F - Water Reducing, High Range Type G - Water Reducing, High Range and Retarding.

D. Fly Ash Calcined Pozzolan: ASTM C618 Class.

E. Silica Fume: ASTM C1240.

F. Slag: ASTM C989; Grade 80 100 120; ground granulated blast furnace slag.

G. Plasticizing: ASTM C1017/C1017M Type I, plasticizing Type II, plasticizing and retarding.

2.3 ACCESSORIES

A. Bonding Agent: Polymer resin emulsion Polyvinyl Acetate Latex emulsion Two component modified epoxy resin Non-solvent two component polysulfide epoxy Mineral filled polysulfide polymer epoxy Mineral filled polysulfide polymer epoxy resin Polyamid cured epoxy.

B. Vapor Retarder: ASTM E1745 Class A B C; 10 mil thick polyethylene film fabric reinforced plastic film; type recommended for below grade application. Furnish joint tape recommended by manufacturer.

C. Non-Shrink Grout: ASTM C1107, Grade A B C; premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 2,400 psi in 48 hours and 7,000 psi in 28 days.

2.4 JOINT DEVICES AND FILLER MATERIALS

A. Joint Filler Type A: ASTM D1751 ASTM D994; Asphalt impregnated fiberboard or felt, 1/4 inch thick; tongue and groove profile.

****** OR ******

B. Joint Filler Type B: ASTM D1752; Closed cell polyvinyl chloride molded vinyl foam, resiliency recovery of 95 percent if not compressed more than 50 percent of original thickness.

****** OR ******

C. Joint Filler Type C: ASTM D1752; Premolded sponge rubber fully compressible with recovery rate of minimum 95 percent.

D. Construction Joint Devices: Integral galvanized steel extruded plastic; inch thick, formed to tongue and groove profile, with removable top strip exposing sealant trough, knockout holes spaced at 6 inches, ribbed steel spikes with tongue to fit top screed edge; manufactured by.

E. Expansion and Contraction Joint Devices: ASTM B221 alloy, extruded aluminum; resilient elastomeric vinyl neoprene filler strip with Shore A hardness of 35 to permit plus or minus 25 percent joint movement with full recovery; extruded aluminum vinyl cover plate, of longest manufactured length at each location, flush recessed mounted; color as selected; manufactured by.

F. Sealant: ASTM D6690, Type I.

2.5 CONCRETE MIX

A. Select proportions for normal weight concrete in accordance with ACI 301 Method 1

B. Admixtures: Include admixture types and quantities indicated in concrete mix designs only when approved by Architect/Engineer.
   1. Use accelerating admixtures in cold weather. Use of admixtures will not relax cold weather placement requirements.
   2. Do not use calcium chloride nor admixtures containing calcium chloride.
   3. Use set retarding admixtures during hot weather.
   4. Add air entrainment admixture to concrete mix for work exposed to freezing and thawing or deicing chemicals.

5. For concrete exposed to deicing chemicals, limit fly ash, pozzolans, silica fume, and slag content as required by applicable code.

C. Average Compressive Strength Reduction: Not permitted.

D. Ready Mixed Concrete: Mix and deliver concrete in accordance with ASTM C94/C94M ASTM C685/C685M.

E. Site Mixed Concrete: Mix concrete in accordance with ACI 318.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01300 - Administrative Requirements: Coordination and project conditions.

B. Verify requirements for concrete cover over reinforcement.

C. Verify anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with placing concrete.

3.2 PREPARATION

A. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent. Remove laitance, coatings, and unsound materials.

B. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.

C. Remove debris and ice from formwork, reinforcement, and concrete substrates.

D. Remove water from areas receiving concrete before concrete is placed.

3.3 PLACING CONCRETE

A. Place concrete in accordance with ACI 301 ACI 318.

B. Notify testing laboratory and Architect/Engineer minimum 24 hours prior to commencement of operations.

C. Ensure reinforcement, inserts, embedded parts, formed expansion and contraction joints, and are not disturbed during concrete placement.

D. Install vapor retarder under interior slabs on grade in accordance with ASTM E1643. Lap joints minimum 6 inches and seal watertight by adhesive applied between overlapping edges and ends taping edges and ends.

E. Repair vapor retarder damaged during placement of concrete reinforcing. Repair with vapor retarder material; lap over damaged areas minimum 6 inches and seal watertight.

F. Install construction joint devices in coordination with floor slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.

G. Install joint device anchors. Maintain correct position to allow joint cover to be flush with floor and wall finish.

H. Install joint covers in one piece longest practical length, when adjacent construction activity is complete.

I. Apply sealants in joint devices in accordance with Section 07900.

J. Deposit concrete at final position. Prevent segregation of mix.

K. Place concrete in continuous operation for each panel or section determined by predetermined joints.

L. Consolidate concrete.

M. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.

N. Place concrete continuously between predetermined expansion, control, and construction joints.

O. Do not interrupt successive placement; do not permit cold joints to occur.

P. Place floor slabs in checkerboard or saw cut pattern indicated.

Q. Saw cut joints within 12 hours after placing. Use 3/16 inch thick blade, cut into 1/4 depth of slab thickness.

R. Screed floors and slabs on grade level, maintaining surface flatness of F_f of 20 maximum 1/4 inch in 10 ft.

3.4 CONCRETE FINISHING

A. Provide formed concrete surfaces to be left exposed concrete walls columns beams joists with smooth rubbed sand float sack rubbed finish as Scheduled in this section.

B. Finish concrete floor surfaces in accordance with ACI 301 ACI 318.

C. Wood float surfaces receiving quarry tile ceramic tile terrazzo with full bed setting system.

D. Steel trowel surfaces receiving carpeting resilient flooring seamless flooring thin set quarry tile thin set ceramic tile.

E. Steel trowel surfaces which are indicated to be exposed.

F. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains at 1/8 1/4 inch per foot nominal as indicated on drawings.

3.5 CURING AND PROTECTION

A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
   1. Protect concrete footings from freezing for minimum 5 days.

B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

C. Cure concrete in accordance with ACI 308.1

D. Cure floor surfaces in accordance with ACI 301 ACI 318.

E. Ponding: Maintain 100 percent coverage of water over floor slab areas continuously for 7 days.

F. Spraying: Spray water over floor slab areas and maintain wet for 7 days.

3.6 FIELD QUALITY CONTROL

A. Section 01400 - Quality Requirements 01700 - Execution Requirements: Field inspecting, testing, adjusting, and balancing.

B. Perform field inspection and testing in accordance with ACI 318 applicable code.

C. Provide free access to Work and cooperate with appointed firm.

D. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of Work.

E. Concrete Inspections:
   1. Continuous Placement Inspection: Inspect for proper installation procedures.

2. Periodic Curing Inspection: Inspect for specified curing temperature and procedures.

F. Strength Test Samples:
1. Sampling Procedures: ASTM C172.
2. Cylinder Molding and Curing Procedures: ASTM C31/C31M, cylinder specimens, standard cured field cured.
3. Sample concrete and make one set of three cylinders for every 150 cu yds or less of each class of concrete placed each day and for every 5,000 sf of surface area for slabs and walls.
4. When volume of concrete for any class of concrete would provide less than 3 sets of cylinders, take samples from three randomly selected batches, or from every batch when less than 3 batches are used.
5. Make one additional cylinder during cold weather concreting, and field cure.

G. Field Testing:
1. Slump Test Method: ASTM C143/C143M.
2. Air Content Test Method: ASTM C173/C173M ASTM C231.
3. Temperature Test Method: ASTM C1064/C1064M.
4. Measure slump and temperature for each compressive strength concrete sample.
5. Measure air content in air entrained concrete for each compressive strength concrete sample.

H. Cylinder Compressive Strength Testing:
1. Test Method: ASTM C39.
2. Test Acceptance: In accordance with ACI 318 applicable code.
3. Test one cylinder at 7 days.
4. Test two cylinders at 28 days.
5. Dispose remaining cylinders when testing is not required.

I. Core Compressive Strength Testing:
1. Sampling and Testing Procedures: ASTM C42/C42M.
2. Test Acceptance: In accordance with ACI 318 applicable code.
3. Drill three cores for each failed strength test from concrete represented by failed strength test.

J. Water Soluble Chloride Ion Concentration Test Method: ASTM C1218; tested at 28 days.
1. Maximum Concentration: As permitted by applicable code.

K. Maintain records of concrete placement. Record date, location, quantity, air temperature and test samples taken.

3.7 PATCHING

A. Allow Architect/Engineer to inspect concrete surfaces immediately upon removal of forms.

B. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify Architect/Engineer upon discovery.

C. Patch imperfections as directed by Architect/Engineer in accordance with ACI 301 ACI 318.

3.8 DEFECTIVE CONCRETE

A. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.

B. Repair or replacement of defective concrete will be determined by Architect/Engineer.

C. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect/Engineer for each individual area.

END OF SECTION

SECTION 03350

CONCRETE FINISHING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Finishing concrete floors [and floor toppings].
   2. Floor surface treatment.

B. Related Sections:
   1. Section 03300 - Cast-in-Place Concrete: [Prepared concrete floors ready to receive finish;] [control and formed expansion and contraction joints and joint devices].
   2. Section 03360 - Concrete Finishes: Exposed aggregate finish.
   3. Section 03390 - Concrete Curing.
   4. Section 05810 - Expansion Joint Cover Assemblies.
   5. Section 07900 - Joint Sealers.

1.2 REFERENCES

A. American Concrete Institute:
   1. ACI 301 - Specifications for Structural Concrete.
   2. ACI 302.1 - Guide for Concrete Floor and Slab Construction.

B. ASTM International:
   1. ASTM E1155 - Standard Test Method for Determining Floor Flatness and of Levelness Using the F-number System.

1.3 SUBMITTALS

A. Section 01330 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit data on concrete hardener, sealer, curing compounds curing papers and slip resistant treatment, compatibilities, and limitations.

1.4 CLOSEOUT SUBMITTALS

A. Section 01700 - Execution Requirements: Closeout procedures.

B. Operation and Maintenance Data: Submit data on maintenance renewal of applied coatings.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 301 and ACI 302.1.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Section 01600 - Product Requirements: Product storage and handling requirements.

B. Deliver materials in manufacturer's packaging including application instructions.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Section 01600 - Product Requirements: Environmental conditions affecting products on site.

1.8 COMPOUNDS - HARDENERS AND SEALERS

A. Chemical Hardener: Magnesium fluorosilicate and zinc fluorosilicate blend

PART 2 EXECUTION

2.1 EXAMINATION

A. Section 01300 - Administrative Requirements: Coordination and project conditions.

B. Verify floor surfaces are acceptable to receive the Work of this section.

2.2 FLOOR FINISHING

A. Finish concrete floor surfaces in accordance with ACI 301 and ACI 302.1.

B. Wood float surfaces receiving quarry tile, ceramic tile, and cementitious terrazzo with full bed setting system.

C. Steel trowel surfaces receiving carpeting, resilient flooring, seamless flooring, thin set terrazzo, thin set quarry tile, and thin set ceramic tile.

D. Steel trowel surfaces which are scheduled to be exposed.

2.3 TOLERANCES

A. Section 01400 - Quality Requirements: Tolerances.

B. Measure for F(F) and F(L) tolerances for floors in accordance with ASTM E1155, within 48 hours after slab installation.

C. Finish concrete to achieve the following tolerances:
   1. Under Glazed Tile on Setting Bed: F(F) 35 and F(L) 20.
   2. Under Resilient Finishes: F(F) 75 and F(L) 50.
   3. Exposed to View and Foot Traffic: F(F) 75 and F(L) 40.
   4. Correct slab surface when actual F(F) or F(L) number for floor installation measures less than required.

D. Correct defects in defined traffic floor by grinding or removal and replacement of defective Work. Areas requiring corrective Work will be identified. Re-measure corrected areas by same process.

END OF SECTION

SECTION 03390

CONCRETE CURING

PART 1 GENERAL

1.1 SUMMARY

A. Section includes initial and final curing of horizontal and vertical concrete surfaces.

B. Related Sections:
1. Section 03300 - Cast-In-Place Concrete.
2. Section 03350 - Concrete Finishing.

1.2 REFERENCES

A. American Concrete Institute:
1. ACI 301 - Specifications for Structural Concrete.
2. ACI 302.1 - Guide for Concrete Floor and Slab Construction.
3. ACI 308.1 - Standard Specification for Curing Concrete.
4. ACI 318 - Building Code Requirements for Structural Concrete.

B. ASTM International:
1. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete.
2. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
3. ASTM C1315 - Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.
4. ASTM D2103 - Standard Specification for Polyethylene Film and Sheeting.

1.3 SUBMITTALS

A. Section 01330 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit data on curing compounds.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 301 ACI 302.1 ACI 318.

PART 2 PRODUCTS

2.1 MATERIALS

A. Membrane Curing Compound Type 1

B. Water: Potable, not detrimental to concrete.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01300 - Administrative Requirements: Coordination and project conditions.

B. Verify substrate surfaces are ready to be cured.

3.2 INSTALLATION - HORIZONTAL SURFACES

A. Cure concrete in accordance with ACI 308.1.

B. Ponding: Maintain 100 percent coverage of water over floor slab areas, continuously for 4 days.

****** [OR] ******

C. Spraying: Spray water over floor slab areas and maintain wet for 7 days.

****** [OR] ******

D. Absorptive Mat: Spread cotton fabric over floor slab areas. Spray with water until mats are saturated, and maintain in saturated condition for 7 days.

****** [OR] ******

E. Absorptive Mat: Saturate burlap-polyethylene and place burlap-side down over floor slab areas, lapping ends and sides; maintain in place for 7 days.

END OF SECTION

SECTION 03600

GROUT

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Portland cement grout.
   2. Rapid curing epoxy grout.
   3. Non-shrink cementitious grout.

B. Related Sections:
   1. Section 03300 - Cast-in-Place Concrete.

1.2 REFERENCES

A. American Concrete Institute:
   1. ACI 301 - Specifications for Structural Concrete.
   2. ACI 318 - Building Code Requirements for Structural Concrete.

B. American Society of Testing and Materials:
   1. ASTM C33 - Standard Specification for Concrete Aggregates.
   2. ASTM C40 - Test Method for Organic Impurities in Fine Aggregates for Concrete.
   3. ASTM C150 - Standard Specification for Portland Cement.
   4. ASTM C191 - Test Method for Time of Setting of Hydraulic Cement by Vicat Needle.
   5. ASTM C307 - Test Method for Tensile Strength of Chemical-Resistant Mortar, Grouts, and Monolithic Surfacings.
   6. ASTM C531 - Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes.
   7. ASTM C579 - Test Method for Compressive Strength of Chemical-Resistant Mortars, Grouts, monolithic Surfacings and Polymer Concretes.
   8. ASTM C827 - Test Method for Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures.

C. U. S. Army Corps of Engineers Concrete Research Division (CRD):
   1. CRD C621 - Non-Shrink Grout.

PART 2 PRODUCTS

2.1 PORTLAND CEMENT GROUT MATERIALS

A. Portland Cement: ASTM C150, Type I and II.

B. Water:
1. Potable; containing no impurities, suspended particles, algae or dissolved natural salts in quantities capable of causing:
a. Corrosion of steel.
b. Volume change increasing shrinkage cracking.
c. Efflorescence.
d. Excess air entraining.

C. Fine Aggregate:
1. Washed natural sand.
2. Gradation in accordance with ASTM C33 and represented by smooth granulometric curve within required limits.
3. Free from injurious amounts of organic impurities as determined by ASTM C40.

D. Mix:
1. Portland cement, sand and water. Do not use ferrous aggregate or staining ingredients in grout mixes.

2.2 RAPID CURING EPOXY GROUT

A. Rapid Curing Epoxy Grout: High strength, three component epoxy grout formulated with thermosetting resins and inert fillers. Rapid-curing, high adhesion, and resistant to ordinary chemicals, acids and alkalies.

Compressive Strength	ASTM C579	12,000 psi at 7 days
Tensile Strength	ASTM C307	2,000 psi minimum
Coefficient of Expansion	ASTM C531	30x10-6 in per degree F
Shrinkage	ASTM C827	None

2.3 NON-SHRINK CEMENTITIOUS GROUT

A. Properties: Certified to maintain initial placement volume or expand after set and meet the following minimum properties when tested in accordance with CRD-C621, for Type D non-shrink grout:

Property	Test	Time	Result
Setting Time	ASTM C191	Initial	2 hours (Approx)
		Final	3 hours (Approx)

Expansion			0.10% - 0.4% Maximum
Compressive Strength	CRD-C621	1 day	4,000 psi
		7 days	7,000 psi
		28 days	10,000 psi to 10,800 psi

2.4 FORMWORK

A. Refer to Section 03100 for formwork requirements.

2.5 CURING

A. Prevent rapid loss of water from grout during first 48 hours by use of approved membrane curing compound or with use of wet burlap method.

PART 3 EXECUTION

3.1 PREPARATION

A. Remove defective concrete, laitance, dirt, oil, grease and other foreign material from concrete surfaces by brushing, hammering, chipping or other similar means until sound, clean concrete surface is achieved.

B. Rough concrete lightly, but not enough to interfere with placement of grout.

C. Remove foreign materials from metal surfaces in contact with grout.

D. Align, level and maintain final positioning of components to be grouted.

E. Saturate concrete surfaces with clean water; remove excess water, leave none standing.

3.2 MIXING

A. Portland Cement Grout:
1. Use proportions of 2 parts sand and 1 part cement, measured by volume.
2. Prepare grout with water to obtain consistency to permit placing and packing.
3. Mix water and grout in two steps; pre-mix using approximately 2/3 of water;after partial mixing, add remaining water to bring mix to desired placement consistency and continue mixing 2 to 3 minutes.
4. Mix only quantities of grout capable of being placed within 30 minutes after mixing.
5. Do not add additional water after grout has been mixed.
6. Capable of developing minimum compressive strength of 2400 psi in 48 hours and 7000 psi in 28 days.

****** [OR] ******

3.3 PLACING GROUT

A. Place grout material quickly and continuously.

B. Do not use pneumatic-pressure or dry-packing methods.

C. Apply grout from one side only to avoid entrapping air.

D. Do not vibrate placed grout mixture, or permit placement when area is being vibrated by nearby equipment.

E. Thoroughly compact final installation and eliminate air pockets.

F. Do not remove leveling shims for at least 48 hours after grout has been placed.

3.4 CURING

A. Immediately after placement, protect grout from premature drying, excessively hot or cold temperatures, and mechanical injury.

B. After grout has attained its initial set, keep damp for minimum of 3 days.

3.5 FIELD QUALITY CONTROL

A. Submit proposed mix design of each class of grout to inspection and testing firm for review prior to commencement of Work.

B. Tests of grout components may be performed to ensure conformance with specified requirements.

END OF SECTION

SECTION 04065

MASONRY MORTAR AND GROUT

PART 1 GENERAL

1.1 SUMMARY

A. Section includes mortar and grout for masonry.

B. Related Sections:
1. Section 04810 - Unit Masonry Assemblies: Installation of mortar and grout.
2. Section 04820 - Reinforced Unit Masonry Assemblies: Installation of mortar and grout.

1.2 REFERENCES

A. American Concrete Institute:
1. ACI 530 - Building Code Requirements for Masonry Structures.
2. ACI 530.1 - Specifications for Masonry Structures.

B. ASTM International:
1. ASTM C5 - Standard Specification for Quicklime for Structural Purposes.
2. ASTM C91 - Standard Specification for Masonry Cement.
3. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete.
4. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic Cement Concrete.
5. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar.
6. ASTM C150 - Standard Specification for Portland Cement.
7. ASTM C199 - Standard Test Method for Pier Test for Refractory Mortars.
8. ASTM C206 - Standard Specification for Finishing Hydrated Lime.
9. ASTM C270 - Standard Specification for Mortar for Unit Masonry.
10. ASTM C387 - Standard Specification for Packaged, Dry, Combined Materials for Mortar and Concrete.
11. ASTM C404 - Standard Specification for Aggregates for Masonry Grout.
12. ASTM C476 - Standard Specification for Grout for Masonry.
13. ASTM C595 - Standard Specification for Blended Hydraulic Cements.
14. ASTM C780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.
15. ASTM C1019 - Standard Test Method for Sampling and Testing Grout.
16. ASTM C1142 - Standard Specification for Extended Life Mortar for Unit Masonry.
17. ASTM C1314 - Standard Test Method for Constructing and Testing Masonry Prisms Used to Determine Compliance with Specified Compressive Strength of Masonry.

18. ASTM C1329 - Standard Specification for Mortar Cement.
19. ASTM C1357 - Standard Test Method for Evaluating Masonry Bond Strength.

1.3 SUBMITTALS

A. Section 01330 - Submittal Procedures: Submittal requirements.

B. Design Data: Submit design mix when Property specification of ASTM C270 is to be used, required environmental conditions, and admixture limitations.

1.4 QUALITY ASSURANCE

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

1.5 ENVIRONMENTAL REQUIREMENTS

A. Section 01600 - Product Requirements.

B. Cold Weather Requirements: In accordance with ACI 530.1 when ambient temperature or temperature of masonry units is less than 40 degrees F.

C. Hot Weather Requirements: In accordance with ACI 530.1 when ambient temperature is greater than 100 degrees F or ambient temperature is greater than 90 degrees F with wind velocity greater than 8 mph.

PART 2 PRODUCTS

2.1 COMPONENTS

A. Portland Cement: ASTM C150, Type I

B. Calcium chloride is not permitted.

2.2 MIXES

A. Mortar Mixes:
1. Extended Life Mortar: ASTM C1142, Type RS

B. Mortar Mixing:
1. Thoroughly mix mortar ingredients in accordance with ASTM C270 in quantities needed for immediate use.
2. Achieve uniformly damp sand immediately before mixing process.
3. Re-temper only within two hours of mixing.

C. Grout Mixes:
   1. Grout for Non-Structural Masonry: 3,000 psi strength at 28 days; 8-11 inches slump; mixed in accordance with ASTM C476 grout.
   2. Grout for Structural Masonry: 3,000 psi strength at 28 days; 8-11 inches slump; mixed in accordance with ASTM C476 grout.
   3. Application:
      a. Coarse Grout: For grouting spaces with minimum 4 inches dimension in every direction.
      b. Fine Grout: For grouting other spaces.

D. Grout Mixing:
   1. Mix grout in accordance with ASTM C94/C94M, modified to use ingredients complying with ASTM C476.
   2. Add admixtures; mix uniformly.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01300 - Administrative Requirements: Coordination and project conditions.

B. Request inspection of spaces to be grouted.

3.2 INSTALLATION

A. Install mortar and grout in accordance with ACI 530.1 Specifications for Masonry Structures.

3.3 FIELD QUALITY CONTROL

A. Establishing Mortar Mix: In accordance with ASTM C270.

B. Testing Frequency: One set of specified tests for every 5,000 sf of completed wall area.

C. Testing of Mortar Mix: In accordance with ASTM C780 for aggregate ratio and water content, air content, consistency, and compressive strength.

D. Testing of Grout Mix: In accordance with ASTM C1019 for compressive strength, and in accordance with ASTM C143/C143M for slump.

E. Test compressive strength of mortar and masonry to ASTM C1314; test in accordance with masonry unit sections specified.

END OF SECTION

SECTION 04820

REINFORCED UNIT MASONRY ASSEMBLIES

PART 1 GENERAL

1.1 SUMMARY

A. Section includes concrete masonry units, reinforcement, anchorage, and accessories.

B. Related Sections:
1. Section 04065 - Masonry Mortar and Grout: Mortar and grout.

1.2 REFERENCES

A. American Concrete Institute:
1. ACI 530 - Building Code Requirements for Masonry Structures.
2. ACI 530.1 - Specifications for Masonry Structures.

B. ASTM International:
1. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
2. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
3. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
4. ASTM A580/A580M - Standard Specification for Stainless Steel Wire.
5. ASTM A615/A615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
6. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
7. ASTM A951 - Standard Specification for Masonry Joint Reinforcement.
8. ASTM B370 - Standard Specification for Copper Sheet and Strip for Building Construction.
9. ASTM B695 - Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel.
10. ASTM C27 - Standard Classification of Fireclay and High-Alumina Refractory Brick.
11. ASTM C34 - Standard Specification for Structural Clay Load-Bearing Wall Tile.
12. ASTM C55 - Standard Specification for Concrete Brick.
13. ASTM C56 - Standard Specification for Structural Clay Non-Load-Bearing Tile.
14. ASTM C62 - Standard Specification for Building Brick (Solid Masonry Units Made From Clay or Shale).

15. ASTM C67 - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile.
16. ASTM C73 - Standard Specification for Calcium Silicate Face Brick (Sand-Lime Brick).
17. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units.
18. ASTM C126 - Standard Specification for Ceramic Glazed Structural Clay Facing Tile, Facing Brick, and Solid Masonry Units.
19. ASTM C129 - Standard Specification for Nonloadbearing Concrete Masonry Units.
20. ASTM C140 - Standard Test Methods of Sampling and Testing Concrete Masonry Units.
21. ASTM C212 - Standard Specification for Structural Clay Facing Tile.
22. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale).
23. ASTM C315 - Standard Specification for Clay Flue Linings.
24. ASTM C530 - Standard Specification for Structural Clay Non-Loadbearing Screen Tile.
25. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
26. ASTM C652 - Standard Specification for Hollow Brick (Hollow Masonry Units Made From Clay or Shale).
27. ASTM C744 - Standard Specification for Prefaced Concrete and Calcium Silicate Masonry Units.
28. ASTM C1261 - Standard Specification for Firebox Brick for Residential Fireplaces.
29. ASTM C1283 - Standard Practice for Installing Clay Flue Lining.
30. ASTM D226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
31. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials.
32. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.

C. National Fire Protection Association:
   1. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials.

D. Underwriters Laboratories Inc.:
   1. UL 723 - Tests for Surface Burning Characteristics of Building Materials.

1.3 PERFORMANCE REQUIREMENTS

A. Concrete Masonry Compressive Strength (f'm): 2,000 psi;
   1. Concrete Masonry Units: 1900 psi minimum net area compressive strength.

1.4 SUBMITTALS

A. Section 01330 - Submittal Procedures: Submittal requirements.

B. Shop Drawings: Indicate bars sizes, spacings, locations, reinforcement quantities, bending and cutting schedules, supporting and spacing devices for reinforcement.

C. Product Data:
1. Submit data for masonry units and fabricated wire reinforcement.

1.5 QUALITY ASSURANCE

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

1.6 QUALIFICATIONS

A. Installer: Company specializing in performing Work of this section with minimum three years experience.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Section 01600 - Product Requirements.

B. Cold Weather Requirements: In accordance with ACI 530.1 when ambient temperature or temperature of masonry units is less than 40 degrees F.

C. Hot Weather Requirements: In accordance with ACI 530.1 when ambient temperature is greater than 100 degrees F or ambient temperature is greater than 90 degrees F with wind velocity greater than 8 mph.

PART 2 PRODUCTS

2.1 COMPONENTS

A. Hollow Load Bearing Concrete Masonry Units (CMU): ASTM C90; normal weight.

2.2 ACCESSORIES

A. Single Wythe Joint Reinforcement: ASTM A951; ladder type; 0.148 inch diameter side rods with 0.148 inch diameter cross ties.

B. Reinforcing Steel: ASTM A615/A615M, 60 ksi yield grade, deformed billet bars.

C. Anchor Rods: ASTM A307; Grade C; J-shaped or L-shaped; complete with washers and heavy hex nuts; sized for minimum 15 inch embedment.

1. Hot-Dipped Galvanizing: ASTM A153/A153M.
2. Mechanical Galvanizing: ASTM B695; Class 55.

D. Mortar and Grout: As specified in Section 04065.

E. Joint Filler: Closed cell rubber; oversized 50 percent to joint width; self expanding.

2.3 SOURCE QUALITY CONTROL

A. Section 01400 - Quality Requirements: Testing, inspection and analysis requirements.

B. Test brick efflorescence in accordance with ASTM C67. Brick rated greater than "slightly effloresced" is not acceptable.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01300 - Administrative Requirements: Coordination and project conditions.

B. Verify field conditions are acceptable and are ready to receive work.

C. Verify items provided by other sections of work are properly sized and located.

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

3.2 PREPARATION

A. Direct and coordinate placement of metal anchors supplied to other Sections.

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

C. Wet clay and shale brick before laying when initial rate of absorption is greater than 30 grams when tested in accordance with ASTM C67.

3.3 INSTALLATION

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

B. Maintain masonry courses to uniform dimension. Form bed and head joints of uniform thickness.

C. Coursing of Concrete Masonry Units:
1. Bond: Running.

2. Coursing: One unit and one mortar joint to equal 8 inches.
3. Mortar Joints: Concave.

D. Placing And Bonding:
1. Lay solid masonry units in full bed of mortar, with full head joints.
2. Lay hollow masonry units with face shell bedding on head and bed joints.
3. Buttering corners of joints or excessive furrowing of mortar joints are not permitted.
4. Remove excess mortar as Work progresses.
5. Interlock intersections and external corners.
6. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment is required, remove mortar and replace.
7. Perform job site cutting of masonry units with proper tools to assure straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
8. Isolate masonry from vertical structural framing members with movement joint .
9. Isolate top of masonry from horizontal structural framing members and slabs or decks.

E. Joint Reinforcement And Anchorage:
1. Install horizontal joint reinforcement 16 inches oc.
2. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
3. Place joint reinforcement continuous in first and second joint below top of walls.
4. Lap joint reinforcement ends minimum 6 inches.
5. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.
6. Embed anchors embedded in concrete attached to structural steel members. Embed anchorages in every sixth brick.

F. Lintels:
1. Install precast concrete lintels over openings.
2. Install reinforced unit masonry lintels over openings where steel or precast concrete lintels are not scheduled or indicated.
3. Openings Up To 42 inches Wide: Reinforce openings as indicated on Drawings.
4. Openings From 42 inches Up To 78 inches Wide: Reinforce openings as indicated on Drawings.
5. Openings Over 78 inches: Reinforce openings as indicated on Drawings.
6. Do not splice reinforcing bars.
7. Support and secure reinforcing bars from displacement.
8. Place and consolidate grout fill without displacing reinforcing.
9. Allow masonry lintels to attain specified strength before removing temporary supports.
10. Maintain minimum 8 inches bearing on each side of opening.

G. Grouted Components:
1. Reinforce bond beam with 1, No. 5 bar.

2. Reinforce pilaster with 1, No. 6 bar in each cell.
3. Lap splices bar diameters required by code.
4. Support and secure reinforcing bars from displacement.
5. Place and consolidate grout fill without displacing reinforcing.
6. At bearing locations, fill masonry cores with grout for minimum 12 inches either side of opening.

H. Reinforced Masonry:
1. Lay masonry units with cells vertically aligned and cavities between wythes clear of mortar and unobstructed.
2. Place reinforcing, reinforcement bars, and grout as indicated on Drawings.
3. Splice reinforcement in accordance with Section 03200.
4. Support and secure reinforcement from displacement.
5. Place and consolidate grout fill without displacing reinforcing.
6. Place grout in accordance with ACI 530.1 Specification for Masonry Structures.

I. Control And Expansion Joints:
1. Install control and expansion joints at the following maximum spacings, unless otherwise indicated on Drawings:
   a. Exterior Walls: 20 feet on center and within 10 feet on one side of each interior and exterior corner.
   b. Interior Walls: 30 feet on center.
   c. At changes in wall height.
2. Do not continue horizontal joint reinforcement through control and expansion joints.
3. Install preformed control joint device in continuous lengths. Seal butt and corner joints.
4. Size control joint in accordance with Section 07900 for sealant performance.
5. Form expansion joint by omitting mortar and cutting unit to form open space.

J. Cutting And Fitting:
1. Obtain Architect/Engineer’s approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.4 ERECTION TOLERANCES

A. Section 01400 - Quality Requirements: Tolerances.

B. Maximum Variation From Alignment of Pilasters: 1/4 inch.

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

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

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

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

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

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

I. Maximum Variation for Steel Reinforcement:
   1. Install reinforcement within the tolerances specified in ACI 530.1 for foundation walls.
   2. Plus or minus 1/2 inch when distance from centerline of steel to opposite face of masonry is 8 inches or less.
   3. Plus or minus 1 inch when distance is between 8 and 24 inches.
   4. Plus or minus 1-1/4 inch when distance is greater than 24 inches.
   5. Plus or minus 2 inches from location along face of wall.

3.5 FIELD QUALITY CONTROL

A. Concrete Masonry Units: Test each type in accordance with ASTM C140.

3.6 CLEANING

A. Section 01700 - Execution Requirements: Final cleaning.

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

C. Replace defective mortar. Match adjacent work.

D. Clean soiled surfaces with cleaning solution.

E. Use non-metallic tools in cleaning operations.

3.7 PROTECTION OF FINISHED WORK

A. Section 01700 - Execution Requirements: Requirements for protecting finished Work.

B. Protect exposed external corners subject to damage.

C. Protect base of walls from mud and mortar splatter.

D. Protect masonry and other items built into masonry walls from mortar droppings and staining caused by mortar.

E. Protect tops of masonry work with waterproof coverings secured in place without damaging masonry. Provide coverings where masonry is exposed to weather when work is not in progress.

END OF SECTION

SECTION 05120

STRUCTURAL STEEL

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Structural shapes.
2. Channels and angles.
3. Hollow structural sections.
4. Structural pipe.
5. Structural plates and bars.
6. Fasteners, connectors, and anchors.

B. Related Sections:
1. Section 03600 - Grout: Grout for setting base plates.
2. Section 05210 - Steel Joists.
3. Section 05312 - Steel Roof Deck

1.2 REFERENCES

A. American Institute of Steel Construction:
1. AISC Code of Standard Practice for Steel Buildings and Bridges.
2. AISC Load and Resistance Factor Design (LRFD) Specification for Structural Steel Buildings.
3. AISC Load and Resistance Factor Design Specification for Single-Angle Members.
4. AISC Seismic Provisions for Structural Steel Buildings.
5. AISC Specification for Allowable Stress Design of Single-Angle Members.
6. AISC Specification for the Design of Steel Hollow Structural Sections.
7. AISC Specification for Structural Steel Buildings Allowable Stress Design, and Plastic Design.

B. ASTM International:
1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
2. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
3. ASTM A108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished.
4. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
5. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

6. ASTM A193/A193M - Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service.
7. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
8. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
9. ASTM A354 - Standard Specification for Quenched and Tempered Alloy Steel Bolts, Studs, and Other Externally Threaded Fasteners.
10. ASTM A449 - Standard Specification for Quenched and Tempered Steel Bolts and Studs.
11. ASTM A490 - Standard Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength.
12. ASTM A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
13. ASTM A501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
14. ASTM A514/A514M - Standard Specification for High-Yield-Strength, Quenched and Tempered Alloy Steel Plate, Suitable for Welding.
15. ASTM A529/A529M - Standard Specification for High-Strength Carbon-Manganese Steel of Structural Quality.
16. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts.
17. ASTM A572/A572M - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
18. ASTM A588/A588M - Standard Specification for High-Strength Low-Alloy Structural Steel with 50 ksi (345 MPa) Minimum Yield Point to 4-in. (100-mm) Thick.
19. ASTM A618 - Standard Specification for Hot-Formed Welded and Seamless High-Strength Low-Alloy Structural Tubing.
20. ASTM A786/A786M - Standard Specification for Hot-Rolled Carbon, Low-Alloy, High-Strength Low-Alloy, and Alloy Steel Floor Plates.
21. ASTM A847 - Standard Specification for Cold-Formed Welded and Seamless High Strength, Low Alloy Structural Tubing with Improved Atmospheric Corrosion Resistance.
22. ASTM A852/A852M - Standard Specification for Quenched and Tempered Low-Alloy Structural Steel Plate with 70 ksi (485 MPa) Minimum Yield Strength to 4 in. (100 mm) Thick.
23. ASTM A913/A913M - Standard Specification for High-Strength Low-Alloy Steel Shapes of Structural Quality, Produced by Quenching and Self-Tempering Process (QST).
24. ASTM A992/A992M - Standard Specification for Structural Steel Shapes.
25. ASTM B695 - Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel.
26. ASTM E94 - Standard Guide for Radiographic Examination.
27. ASTM E164 - Standard Practice for Ultrasonic Contact Examination of Weldments.

28. ASTM E165 - Standard Test Method for Liquid Penetrant Examination.
29. ASTM E709 - Standard Guide for Magnetic Particle Examination.
30. ASTM F436 - Standard Specification for Hardened Steel Washers.
31. ASTM F959 - Standard Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners.
32. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.
33. ASTM F1852 - Standard Specification for Twist Off Type Tension Control Structural Bolt/Nut/Washer Assemblies, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.

C. American Welding Society:
1. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination.
2. AWS D1.1 - Structural Welding Code - Steel.

D. Research Council on Structural Connections:
1. RCSC - Specification for Structural Joints Using ASTM A325 or A490 Bolts.

E. SSPC: The Society for Protective Coatings:
1. SSPC - Steel Structures Painting Manual.
2. SSPC Paint 15 - Steel Joist Shop Paint.
3. SSPC Paint 20 - Zinc-Rich Primers (Type I - Inorganic and Type II - Organic).
4. SSPC SP 3 - Power Tool Cleaning.
5. SSPC SP 6 - Commercial Blast Cleaning.
6. SSPC SP 10 - Near-White Blast Cleaning.

1.3 SUBMITTALS

A. Section 01330 - Submittal Procedures: Requirements for submittals.

B. Shop Drawings:
1. Indicate profiles, sizes, spacing, locations of structural members, openings, attachments, and fasteners.
2. Connections.
3. Cambers
4. Indicate welded connections with AWS A2.4 welding symbols. Indicate net weld lengths.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with the following:
1. AISC Code of Standard Practice for Steel Buildings and Bridges.
2. AISC Load and Resistance Factor Design (LRFD) Specification for Structural Steel Buildings.
3. AISC Specification for the Design of Steel Hollow Structural Sections.

4. AISC Load and Resistance Factor Design Specification for Single-Angle Members.
5. RCSC Specification for Structural Joints Using ASTM A 325 or A 490 Bolts.
6. ASCE 19.

PART 2 PRODUCTS

2.1 STRUCTURAL STEEL

A. Structural W-Shapes: ASTM A572/A572M; Grade 50

B. Structural M-Shapes: ASTM A572/A572M; Grade 50

C. Structural T-Shapes: Cut from structural W-shapes.

D. Channels and Angles: ASTM A36/A36M.

E. Round Hollow Structural Sections: ASTM A500, Grade C

F. Square and Rectangular Hollow Structural Sections: ASTM A500, Grade C.

G. Structural Plates and Bars: ASTM A36/A36M.

2.2 FASTENERS, CONNECTORS, AND ANCHORS

A. Bolts: ASTM A307; Grade A or B.

B. High Strength Bolts: ASTM A325; Type 1 or ASTM A490; Type 1.

C. Nuts: ASTM A563 heavy hex type.

D. Washers: ASTM F436; Type 1, circular Furnish clipped washers where space limitations require.

E. Threaded Rods: ASTM A307; Grade A.

F. Forged Structural Steel Hardware:
1. Clevises and Turnbuckles: ASTM A108; Grade 1085.
2. Eye Nuts and Eye Bolts: ASTM A108; Grade 1030.
3. Sleeve Nuts: ASTM A108; Grade 1018.
4. Rod Ends, Yoke Ends and Pins, Cotter Pins, and Coupling Nuts: Carbon steel.

2.3 WELDING MATERIALS

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

2.4 FABRICATION

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

B. Develop required camber for members.

2.5 FINISH

A. Shop prime structural steel members. Do not prime surfaces that will be fireproofed.

2.6 SOURCE QUALITY CONTROL AND TESTS

A. Section 01400 - Quality Requirements: Testing, inspection and analysis requirements.

B. Shop test bolted and welded connections as specified for field quality control tests.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01300 - Administrative Requirements: Verification of existing conditions before starting work.

B. Verify bearing surfaces are at correct elevation.

C. Verify anchors rods are set in correct locations and arrangements with correct exposure for steel attachment.

3.2 PREPARATION

A. Furnish templates for installation of anchor rods and embedments in concrete and masonry work.

3.3 ERECTION

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

B. Field weld components and shear connectors indicated on Drawings.

C. Field connect members with threaded fasteners; tighten to snug tight for bearing type connections.

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

E. After erection, touch up welds and abrasions to match shop finishes.

3.4 GROUT INSTALLATION

A. Shim bearing plates and equipment supports to proper elevation, snug tighten anchor bolts.

B. Fill void under bearing surface with grout. Install and pack grout to remove air pockets.

C. Moist cure grout.

D. Remove forms after grout is set. Trim grout edges to from smooth surface, splayed 45 degrees.

E. Tighten anchor bolts after grout has cured for a minimum of 3 days.

3.5 ERECTION TOLERANCES

A. Section 01400 - Quality Requirements: Tolerances.

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

C. Maximum Offset From Alignment: 1/4 inch.

3.6 FIELD QUALITY CONTROL

A. Bolted Connections: Inspect in accordance with AISC specifications.
   1. Visually inspect all bolted connections.
   2. For Direct Tension Indicators, comply with requirements of ASTM F959. Verify that gaps are less than gaps specified in Table 2.

B. Welding: Inspect welds in accordance with AWS D1.1.
   1. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.
   2. Visually inspect all welds.
   3. Ultrasonic Inspection: ASTM E164; perform on all full penetration welds.
   4. Liquid Penetrant Inspection: ASTM E165.

C. Correct defective bolted connections and welds.

END OF SECTION

SECTION 07413
METAL ROOF & WALL PANELS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Exposed fastener metal roof panels, with related metal trim and accessories.

1.2 RELATED REQUIREMENTS

A. Division 07 Section ["Thermal Insulation"] ["Roof Insulation"] for thermal insulation installed under metal panels.

B. Division 07 Section "Air Barriers" for air barriers within roof assembly and adjacent to roof assembly.

C. Division 07 Section "Metal Roof & Wall Panels" for factory-formed metal roof & wall panels.

D. Division 07 Section "Joint Sealants" for field-applied Joint Sealants.

E. Division 13 Metal Building Systems.

1.3 REFERENCES

A. American Architectural Manufacturer's Association (AAMA): www.aamanet.org:

1. AAMA 621 - Voluntary Specifications for High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) & Zinc-Aluminum Coated Steel Substrates.
2. AAMA 809.2 - Voluntary Specification Non-Drying Sealants.

B. American Society of Civil Engineers (ASCE): www.asce.org/codes-standards:

1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.

C. ASTM International (ASTM): www.astm.org:

1. ASTM A 653 - Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
2. ASTM A 755 - Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products.
3. ASTM A 792/A 792M - Standard Specification for Steel Sheet, 55 % Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
4. ASTM C 645 - Specification for Nonstructural Steel Framing Members.
5. ASTM C 754 - Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
6. ASTM C 920 - Specification for Elastomeric Joint Sealants.
7. ASTM D 1003 - Standard Test Method for Haze and Luminous Transmittance of Transparent Plastics.
8. ASTM D 2244 - Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.
9. ASTM D 4214 - Test Methods for Evaluating Degree of Chalking of Exterior Paint Films.
10. ASTM E 1646 - Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference.
11. ASTM E 1680 - Standard Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems.

12. ASTM E 1980 - Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces.

D. **FM Global (FM)**: www.fmglobal.com:

1. ANSI/FM 4471 - Approval Standard for Class 1 Panel Roofs.

E. International Accreditation Service (IAS):

1. IAS AC 472 - Accreditation Criteria for Inspection Programs for Manufacturers of Metal Building Systems, Part B.

F. **Underwriters Laboratories, Inc.** (UL): www.ul.com:

1. UL 580 - Tests for Uplift Resistance of Roof Assemblies

G. US Environmental Protection Agency: www.energystar.gov/index.cfm:

1. Energy Star Reflective Roof Products.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Prior to erection of framing, conduct preinstallation meeting at site attended by Owner, Architect, manufacturer's technical representative, inspection agency and related trade contractors.

1. Coordinate building framing in relation to metal panel system.
2. Coordinate openings and penetrations of metal panel system.
3. Coordinate work of Division 07 Sections "Roof Specialties" and "Roof Accessories" and openings and penetrations and manufacturer's accessories with installation of metal panels.

1.5 QUALITY ASSURANCE

A. Manufacturer/Source: Provide metal roof panel assembly and accessories from a single manufacturer providing fixed-base roll forming, and accredited under IAS AC 472 Part B.

B. Manufacturer Qualifications: Approved manufacturer listed in this Section with minimum five years experience in manufacture of similar products in successful use in similar applications.

1. Approval of Comparable Products: Submit the following in accordance with project substitution requirements, within time allowed for substitution review:

   a. Product data, including certified independent test data indicating compliance with requirements.
   b. Samples of each component.
   c. Sample submittal from similar project.
   d. Project references: Minimum of five installations not less than five years old, with Owner and Architect contact information.
   e. Sample warranty.
   f. IAS AC 472 certificate.

2. Substitutions following award of contract are not allowed except as stipulated in Division 01 General Requirements.
3. Approved manufacturers must meet separate requirements of Submittals Article.

C. Installer Qualifications: Experienced Installer with minimum of five years experience with successfully completed projects of a similar nature and scope.

1. Installer's Field Supervisor: Experienced mechanic, able to communicate with Owner, Architect, and installers, supervising work on site whenever work is underway.

D. **Buy American Compliance**: Materials provided under work of this Section shall comply with the following requirements:

1. Buy American Act of 1933 BAA-41 U.S.C §§ 10a – 10d.
2. Buy American provisions of Section 1605 of the American Recovery and Reinvestment Act of 2009 (ARRA).

1.6 ACTION SUBMITTALS

A. Product Data: Manufacturer’s data sheets for specified products.

B. Shop Drawings: Show layouts of metal panels. Include details of each condition of installation, panel profiles, and attachment to building. Provide details at a minimum scale 1-1/2-inch per foot of edge conditions, joints, fastener and sealant placement, flashings, openings, penetrations, roof accessories, lightning arresting equipment, and special details. Make distinctions between factory and field assembled work.

1. Indicate points of supporting structure that must coordinate with metal panel system installation.
2. Include data indicating compliance with performance requirements.
3. Include structural data indicating compliance with requirements of authorities having jurisdiction.

C. Samples for Initial Selection: For each exposed product specified including sealants. Provide representative color charts of manufacturer's full range of colors.

D. Samples for Verification: Provide 12-inch- (305 mm-) long section of each metal panel profile. Provide color chip verifying color selection.

1.7 INFORMATIONAL SUBMITTALS

A. Product Test Reports: Indicating compliance of products with requirements, witnessed by a professional engineer.

B. Qualification Information: For Installer firm and Installer’s field supervisor.

C. IAS Accreditation Certificate: Indicating that manufacturer is accredited under provisions of IAS AC 472.

D. **Buy American Certification**: Manufacturers' letters of compliance acceptable to authorities having jurisdiction, indicating that products comply with requirements.

E. Manufacturer's Warranty: Sample copy of manufacturer's standard warranty.

1.8 CLOSEOUT SUBMITTALS

A. Maintenance data.

B. Manufacturer's Warranty: Executed copy of manufacturer's standard warranty.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Protect products of metal panel system during shipping, handling, and storage to prevent staining, denting, deterioration of components or other damage. Protect panels and trim bundles during shipping.

1. Deliver, unload, store, and erect metal panel system and accessory items without misshaping panels or exposing panels to surface damage from weather or construction operations.
2. Store in accordance with Manufacturer's written instructions. Provide wood collars for stacking and handling in the field.

1.10 COORDINATION

A. Coordinate sizes, profiles, and locations of roof curbs and other roof-mounted equipment and roof penetrations, based upon sizes of actual selected equipment.

1.11 WARRANTY

A. Special Manufacturer’s Warranty: On manufacturer’s standard form, in which manufacturer agrees to repair or replace metal panel assemblies that fail within one year from date of Substantial Completion.

B. Special Panel Finish Warranty: On Manufacturer’s standard form, in which Manufacturer agrees to repair or replace metal panels that evidence deterioration of factory-applied finish within [25] years from date of Substantial Completion, including:

1. **Fluoropolymer Two-Coat System**:

a. Color fading in excess of [5] [10] Hunter units per ASTM D 2244.
b. Chalking in excess of No. [8] [6] rating per ASTM D 4214.
c. Failure of adhesion, peeling, checking, or cracking.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Basis of Design Manufacturer: **MBCI Metal Roof and Wall Systems, Division of NCI Group, Inc.**; Houston TX. Tel: (877)713-6224; Email: info@mbci.com; Web: www.mbci.com.

1. Provide basis of design product, or comparable product approved by Architect prior to bid.

2.2 PERFORMANCE REQUIREMENTS

A. General: Provide metal roof panel system meeting performance requirements as determined by application of specified tests by a qualified testing facility on manufacturer's standard assemblies.

B. Thermal Movements: Allow for thermal movements from variations in both ambient and internal temperatures. Accommodate movement of support structure caused by thermal expansion and contraction. Allow for deflection and design for thermal stresses caused by temperature differences from one side of the panel to the other.

C. Structural Performance: Provide metal panel assemblies capable of withstanding the effects of indicated loads and stresses within limits and under conditions indicated:

1. Wind Loads: Determine loads based on uniform pressure, importance factor, exposure category, and basic wind speed indicated on drawings.

2. Deflection Limits: Withstand inward and outward wind-load design pressures in accordance with applicable building code with maximum deflection of [1/120] [1/180] [1/240] of the span with no evidence of failure.

D. **Wind Uplift Resistance**: Comply with UL 580 for wind-uplift class [UL-90].

E. **FM Approvals Listing**: Comply with FM Approvals 4471 as part of a panel roofing system, and that are listed in FM Approvals' "RoofNav" for Class 1 construction. Identify materials with FM Approvals markings.

1. Fire/Windstorm Classification: [Class 1A-90] .
2. Hail Resistance Rating: 1-SH.

F. **Air Infiltration**: ASTM E 1680: Maximum [0.006 cfm/sq. ft. (0.030 L/s per sq. m) at 6.24 lbf/sq. ft. (300 Pa)] static-air-pressure difference.

G. **Water Penetration**: ASTM E 1646: No uncontrolled water penetration at a static pressure of 20 lbf/sq. ft. (958 Pa).

2.3 METAL PANEL MATERIALS

A. **Aluminum-Zinc Alloy-Coated Steel Sheet**: ASTM A 792/A 792M, structural quality, Grade 50, Coating Class AZ50 (Grade 340, Coating Class AZM150), prepainted by the coil-coating process per ASTM A 755/A 755M.

B. **Aluminum-Zinc Alloy-Coated Steel Sheet**: ASTM A 792/A 792M, structural quality, Grade 50, Coating Class AZ55 (Grade 340, Coating Class AZM165) unpainted Galvalume Plus coating.

2.4 METAL ROOF & WALL PANELS

A. **Large Tapered-Rib-Profile, Exposed Fastener Metal Roof Panels**: Structural metal roof panel consisting of formed metal sheet with trapezoidal major ribs with intermediate stiffening ribs symmetrically placed between major ribs, installed by lapping edges of adjacent panels.

1. Basis of Design: MBCI, PBR Roof Panel, www.mbci.com/pbr.html.
2. Coverage Width: 36 inches (914 mm).
3. Major Rib Spacing: 12 inches (305 mm) on center.
4. Rib Height: 1-1/4 inch (31.8 mm).
5. Nominal Coated Thickness: [0.028 inch/24 gage 0.71 mm)]
6. Panel Surface: [Smooth]
7. Exterior Finish: Unpainted exposed Galvalume Plus Coating.

B. **Large Tapered-Rib-Profile, Exposed Fastener Metal Wall Panels**: Structural metal roof panel consisting of formed metal sheet with trapezoidal major ribs with intermediate stiffening ribs symmetrically placed between major ribs, installed by lapping edges of adjacent panels.

1. Basis of Design: MBCI, PBR Wall Panel, www.mbci.com/pbr.html.
2. Coverage Width: 36 inches (914 mm).
3. Major Rib Spacing: 12 inches (305 mm) on center.
4. Rib Height: 1-1/4 inch (31.8 mm).
5. Nominal Coated Thickness: [0.028 inch/24 gage 0.71 mm)]
6. Panel Surface: [Smooth]
7. Exterior Finish: Unpainted exposed Galvalume Plus Coating.

2.5 METAL ROOF PANEL ACCESSORIES

A. General: Provide complete metal roof panel assembly incorporating ridge, eave, rake, valley, and parapet trims, copings, fascias, gutters and downspouts, and miscellaneous flashings, in [manufacturer's standard profiles] [profiles as indicated]. Provide required fasteners, closure strips, support plates, and sealants as indicated in manufacturer's written instructions. Colors shall be with MBCI Signature 300 colors as selected by architect.

B. Flashing and Trim: Match material, thickness, and finish of metal panel face sheet.

C. Panel Fasteners: Self-tapping screws and other acceptable fasteners recommended by roof panel manufacturer.

1. Exposed Fasteners: Long life fasteners with EPDM or neoprene gaskets, with heads matching color of metal panels by means of factory-applied coating.

D. Joint Sealers: Manufacturer's standard or recommended liquid and preformed sealers and tapes, and as follows:

1. Tape Sealers: Manufacturer's standard non-curing butyl tape, AAMA 809.2.
2. Exposed Joint Sealants: Urethane, single component, ASTM C 920.

E. **Steel Sheet Miscellaneous Framing Components**: ASTM C 645, with ASTM A 653/A 653M, G60 (Z180) hot-dip galvanized zinc coating.

F. **Roof Accessories**: Approved by metal roof panel manufacturer. Refer to Section 07 72 00 "Roof Accessories" for requirements for curbs, equipment supports, roof hatches, heat and smoke vents, ventilators, and preformed flashing sleeves.

2.6 FABRICATION

A. General: Provide factory fabricated and finished metal panels and accessories meeting performance requirements, indicated profiles, and structural requirements.

B. Panel Lengths: Form panels in continuous lengths for full length of detailed runs, except where otherwise indicated on approved shop drawings.

C. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's written instructions, approved shop drawings, and project drawings. Form from materials matching metal panel substrate and finish.

2.7 FINISHES

A. Finishes, General: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions. Metal roof accessories noted on part 2.5 shall be colored with MBCI Signature 300 colors as selected by architect.

B. Fluoropolymer Two-Coat System: 0.2 – 0.3 mil primer with 0.7 - 0.8 mil 70 percent PVDF fluoropolymer color coat, AAMA 621[, meeting solar reflectance index requirements].

1. Basis of Design: MBCI, Signature 300.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine metal panel system substrate and supports with Installer present. Inspect for erection tolerances and other conditions that would adversely affect installation of metal panel installation.

1. Inspect metal panel support substrate to determine if support components are installed as indicated on approved shop drawings. Confirm presence of acceptable supports at recommended spacing to match installation requirements of metal panels.
2. Panel Support Tolerances: Confirm that panel supports are within tolerances acceptable to metal panel system manufacturer but not greater than the following:

a. 1/4 inch (6 mm) in 20 foot (6.1 m) in any direction.
b. 3/8 inch (9 mm) over any single roof plane.

B. Correct out-of-tolerance work and other deficient conditions prior to proceeding with metal roof panel system installation.

3.2 PREPARATION

A. **Miscellaneous Supports**: Install sub-framing, girts, furring, and other miscellaneous panel support members according to ASTM C 754 and manufacturer's written instructions.

B. Flashings: Install flashings to be installed as part of this trade.

3.3 METAL PANEL INSTALLATION

A. Exposed Fastener Metal Roof Panels: Install weathertight metal panel system in accordance with manufacturer's written instructions, approved shop drawings, and project drawings. Install metal roof panels in orientation, sizes, and locations indicated, free of waves, warps, buckles, fastening stresses, and distortions. Anchor panels and other components securely in place. Provide for thermal and structural movement.

B. Panel Sealants: Install manufacturer's recommended tape sealant at panel sidelaps and endlaps.

C. Panel Fastening: Attach panels to supports using screws, fasteners, and sealants recommended by manufacturer and indicated on approved shop drawings.

1. Fasten metal panels to supports at each location indicated on approved shop drawings, with spacing and fasteners recommended by manufacturer.
2. Provide weatherproof jacks for pipe and conduit penetrating metal panels of types recommended by manufacturer.
3. Dissimilar Materials: Where elements of metal panel system will come into contact with dissimilar materials, treat faces and edges in contact with dissimilar materials as recommended by manufacturer.

3.4 ACCESSORY INSTALLATION

A. General: Install metal panel trim, flashing, and accessories using recommended fasteners and joint sealers, with positive anchorage to building, and with weather tight mounting. Coordinate installation with flashings and other components.

1. Install components required for a complete metal panel assembly, including trim, copings, flashings, sealants, closure strips, and similar items.

2. Comply with details of assemblies utilized to establish compliance with performance requirements and manufacturer's written installation instructions.
3. Set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently weather resistant.

B. Joint Sealers: Install joint sealers where indicated and where required for weathertight performance of metal panel assemblies, in accordance with manufacturer's written instructions.

1. Prepare joints and apply sealants per requirements of Division 07 Section "Joint Sealants."

C. Remove temporary protective films immediately in accordance with metal roof panel manufacturer's instructions. Clean finished surfaces as recommended by metal roof panel manufacturer.

D. Replace damaged panels and accessories that cannot be repaired to the satisfaction of the Architect.

END OF SECTION

SECTION 07920
JOINT SEALERS FOR METAL WALL PANELS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Polyurethane Sealants B.

Tape Mastic Sealants C.

Non-skinning Sealants D.

Silicone Sealants

E. Acrylic Sealants

1.2 REFERENCES

A. American Architectural Manufacturer's Association (AAMA)

1. AAMA 800-10 - Voluntary Specifications and Test Methods for Sealants

B. ASTM International (ASTM)

1. ASTM A 653 - Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
2. ASTM A 792 - Standard Specification for Steel Sheet, 55 % Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
3. ASTM C 639 - Standard Test Method for Rheological (Flow) Properties of Elastomeric Sealants
4. ASTM C 661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer
5. ASTM C 681 - Standard Test Method for Volatility of Oil- and Resin-Based, Knife-Grade, Channel Glazing Compounds
6. ASTM C 711 - Standard Test Method for Low-Temperature Flexibility and Tenacity of One-Part, Elastomeric, Solvent-Release Type Sealants
7. ASTM C 794 - Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants
8. ASTM C 908 - Standard Test Method for Yield Strength of Preformed Tape Sealants
9. ASTM C 920 - Standard Specification for Elastomeric Joint Sealants
10. ASTM D 56 - Standard Test Method for Flash Point by Tag Closed Cup Tester
11. ASTM D 217 - Standard Test Methods for Cone Penetration of Lubricating Grease
12. ASTM D 412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension
13. ASTM D 792 - Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement
14. ASTM D 925 - Standard Test Methods for Rubber Property—Staining of Surfaces (Contact, Migration, and Diffusion)
15. ASTM D 2452 - Standard Test Method for Extrudability of Oil- and Resin-Base Caulking Compounds
16. ASTM D 2453 - Standard Test Method for Shrinkage and Tenacity of Oil- and Resin- Base Caulking Compounds
17. ASTM D 1475 - Standard Test Method For Density of Liquid Coatings, Inks, and Related Products
18. ASTM D 2202 - Standard Test Method for Slump of Sealants
19. ASTM D 2203 - Standard Test Method for Staining from Sealants

20. ASTM G 154 - Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials

C. Interim Federal Specifications (FS)

1. FS TT-S-00230C - Sealing Compound: Elastomeric Type, Single Component
2. FS TT-C-1796A – Caulking Compounds, Metal Seam and Wood Seam
3. FS TT-S-001543A – Sealing Compounds: Silicone Rubber Base (For Caulking, Sealing, and Glazing in Buildings and Other Structures

D. South Coast Air Quality Management District (SCAQMD)

1. Rule 1168 – Adhesive and Sealant Applications

E. Underwriter's Laboratories

1. UL 580 - Tests for Uplift Resistance of Roof Assemblies

1.3 SUBMITTALS

A. Material Safety Data Sheets (MSDS): Provide in accordance with 29 CFR 1910.1200, Hazard Communication

B. Product Test Reports: Reports of tests required by this section performed by a qualified testing agency, indicating that the sealants comply with the requirements.

C. Buy American Compliance: Provide documentation that the products provided in this section comply with the following requirements:

1. Buy American provisions of Section 1605 of the American Recovery and Reinvestment Act of 2009 (ARRA).

D. VOC Content: Provide documentation of the Volatile Organic Content (VOC) in accordance with SCAQMD Rule 1168

E. USDA Approval: Provide documentation that the product is approved for use in meat and poultry processing areas by the USDA for the following types of sealants:

1. Polyurethane
2. Tape Mastic
3. Non-skinning Sealant

1.4 WARRANTY

A. Special Manufacturer's Warranty: Manufacturer's standard form in which elastomeric sealant manufacturer agrees to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within 5 years of installation.

PART 2 - PRODUCTS

2.1 GENERAL MATERIAL REQUIREMENTS

A. Substrate Requirements: When testing is requited on a substrate, the material used shall be either ASTM A653 G-90 or ASTM A792 AZ50 and tests shall be conducted with each of the following coatings:

1. Bare (No coating)

2. Acrylic (Galvalume Plus)
3. Polyester
4. Siliconized Polyester
5. Polyvinylidene Fluoride Resin (PVDF)

2.2 POLYURETHANE SEALANT

A. General: Provide Sealants that meet the following specifications:

1. ASTM C 920, Type S, Grade NS, Class 25, Use: NT, A, M, G and O paintable sealant
2. AAMA 808.3
3. FS TT-S-00230C, Type II, Class A

B. Color: The sealant shall be in the following colors:

1. White
2. Gray
3. Bronze
4. Almond

C. Physical Properties: The sealant shall have the following additional physical properties:

1. Peel Adhesion: All panels shall have at least a 90% cohesive failure of at least 15 lb/in when tested in accordance with ASTM C 794.
2. Tensile Strength: Sealant shall have a tensile maximum of 300 psi and an elongation of 500-600% when tested in accordance with ASTM D 412.
3. Sag: There shall be no sag when tested in accordance with ASTM C 639.
4. Hardness: Shore "A" hardness on all three samples shall not exceed 40 when tested in accordance with ASTM C 661
5. Service Temperature Range: -40 degrees Fahrenheit to 200 degrees Fahrenheit.
6. Water Resistance: There shall be no presence of voids, cracks, separation or breakdown of the compound when tested in accordance with AAMA 800-10, Section 2.11.1.
7. Flash Point: No less than 145 degrees Fahrenheit when tested in accordance with ASTM D 56.
8. Shelf Life: The compound shall have a shelf life of 9 months or more when stored at or below 80 degrees.
9. Skin Time: The compound shall have a skin time of 2-4 hours
10. Cure Time: The compound shall have a cure time of 24-48 hours
11. VOC Content: The Volatile Organic Compound (VOC) content shall be less than 250 g/L when calculated SCAQMD Rule 1168.

2.3 TAPE MASTIC SEALANT

A. General: Provide Sealants that meet the following specifications:

1. AAMA 804.3
2. AAMA 807.3
3. FS TT-C-1796A,Type II, Class B
4. Approved by Underwriters Laboratories for use in roof deck constructions classified under UL-518 Class 90

B. Color: Gray

C. Physical Properties: The sealant shall have the following additional physical properties:

1. Specific Gravity: 1.4 or higher when tested in accordance with ASTM D 792

2. Tensile Adhesive Strength: 20 psi or higher when tested in accordance with ASTM C 908
3. Elongation: 1000% or higher when tested in accordance with ASTM C 908
4. Cone Penetration: The sealant shall meet the following conditions when tested in accordance with ASTM D 217 with a 300g cone in 5 seconds:
   a. 8.5 – 100 mm at 77 degrees Fahrenheit b. 125-135 mm at 120 degrees Fahrenheit c. 45-55 mm at Zero degrees Fahrenheit
5. VOC Content: The Volatile Organic Compound (VOC) content shall be less than 250 g/L when calculated SCAQMD Rule 1168.

2.4 NON-SKINNING SEALANT

A. General: Provide sealants that meet the following specifications:

1. AAMA 809,2
2. FS TT-C-1796A, Type 1, Class A B.

Color: White

C. Physical Properties: The sealant shall have the following additional physical properties:

1. Extrudability: The sealant shall deposit in 30 to 50 seconds through a 0.104" orifice at 50 psi pressure in accordance with ASTM D 2452
2. Total Solids: At least 85% by weight when determined in accordance with ASTM C 681
3. Volume Shrinkage: Less than 15% when determined in accordance with ASTM D 2453
4. Weight per U.S. Gallon: 10.75 lbs. +/- 0.25 lbs. when determined in accordance with ASTM D 1475
5. Vehicle Bleed out: There shall be no visible exudation of vehicle from sealant after 21 days at 158 degrees Fahrenheit on the test panel
6. Flexibility: There shall be no loss of adhesion at -60 degrees Fahrenheit when tested in accordance with ASTM C 711
7. Sag: 0.20 in max, full button when tested in accordance with ASTM D 2202
8. Staining: Sealant will not stain a painted test panel when tested in accordance with ASTM D 925, Method A
9. UV Resistance: There shall be no cracking, bleeding, or loss of elasticity after 1,000 hours of QUV exposure in accordance with ASTM G 154.
10. Wet Flammability: No less than 110 degree Fahrenheit flash point when determined in accordance with ASTM D 56
11. Coverage: Each gallon of sealant shall provide the following minimum coverage:
    a. 1,500 lineal feet with 1/8 in bead b. 690 lineal feet with 3/16 in bead c. 390 lineal feet with 1/4 in bead.
12. Shelf Life: 18 months minimum in unopened container when stored at or below 90 degrees Fahrenheit.
13. Drying time: Non-skinning, remains permanently soft and tacky
14. Engageability: Sealant will easily engage and transfer to male joint at 10 degrees Fahrenheit
15. Service Temperature Range: -60 degrees Fahrenheit to 200 degrees Fahrenheit
16. Application Temperature Range: 10 degrees Fahrenheit to 120 degrees Fahrenheit
17. Non-Reactive: Will not darken, etch, or leave salt deposits on the test panel after two years
18. VOC Content: The Volatile Organic Compound (VOC) content shall be less than 250 g/L when calculated SCAQMD Rule 1168.

2.5 SILICONE SEALANT

A. General: Provide sealants that meet the following specifications:

1. ASTM C 920, Type S, Grade NS, Class 25
2. AAMA 802.3, Type I and II
3. AAMA 805.2 Group C
4. AAMA 808.3
5. FS TT-S-001543A, Class A
6. FS TT-S-00230C, Class A B.

Color: Clear

C. Physical Properties: The sealant shall have the following additional physical properties:

1. Mechanical Properties: The sealant shall have the following mechanical properties as determined by ASTM D 412:
   a. Tensile Strength: 150 psi minimum (Method A) b.
   Modulus at 100% Elongation: 35 psi minimum c.
   Elongation: 400% minimum
   d. Recovery: 100%
2. Hardness: Maximum Shore A hardness of 15 when determined in accordance with ASTM C 661
3. Tack-free Time: 1/4 in dia. bead at 77 degrees Fahrenheit, 50% relative humidity, 10-15 minutes
4. Cure Time: 1/4 in dia. bead at 77 degrees Fahrenheit, 50% relative humidity, 10-12 hours
5. Service Temperature: -60 degrees Fahrenheit to 300 degrees Fahrenheit
6. Shelf Life: 9 months when stored in unopened original containers at 80 degrees Fahrenheit or less
7. VOC Content: The Volatile Organic Compound (VOC) content shall be less than 250 g/L when calculated SCAQMD Rule 1168.

2.6 ACRYLIC SEALANT

A. Color:

1. Clear
2. White
3. Gray

B. Physical Properties:

1. Percent Solids:
   a. Colors: 75% minimum determined in accordance with ASTM D 1475 b.
   Clear: 70% minimum determined in accordance with ASTM D 1475
2. Peel Adhesion: All panels shall have at least a 90% cohesive failure of at least 5 lb./in when tested in accordance with ASTM C 794
3. Weight per U.S. Gallon: 8.7 lbs. +/- 0.25 lbs. when determined in accordance with ASTM D 1475
4. Viscosity: The sealant shall meet the following conditions when tested in accordance with ASTM D 2452 with a 20g cone with a 0.104 in orifice at 60 psi at 77 degrees Fahrenheit in the indicated time:
   a. Colors: 40-60 seconds b.
   Clear: 35-45 seconds
5. Elongation: 200% minimum when tested in accordance with ASTM D 412

6. Hardness: Maximum Shore A hardness of 55 when determined in accordance with ASTM C 661
7. Flash Point: No less than the following when tested in accordance with ASTM D 56 a. Colors: 52 degrees Fahrenheit
   b. Clear: 40 degrees Fahrenheit
8. Slump: 0.10" maximum when tested in accordance with ASTM D 2202
9. Vehicle Migration: No vehicle migration from the sealant edge when tested in accordance with ASTM D 2203 as modified by Section 2.8.1 of AAMA 800-10
10. Paintability: Compatible with Alkyds, enamels and lacquers post-solvent release
11. Service Temperature Range: Zero degrees Fahrenheit to 180 degrees Fahrenheit
12. Shelf Life:18 months when stored in original, unopened containers at or below 80 degrees Fahrenheit

PART 3 – EXECUTION

3.1 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove laitance and form-release agents from concrete.
2. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces.

3.2 INSTALLATION OF JOINT SEALANTS

D. General: Comply with ASTM C 1193 and joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

E. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

F. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

G. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
   1. Place sealants so they directly contact and fully wet joint substrates.
   2. Completely fill recesses in each joint configuration.
   3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

H. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.

END OF SECTION

SECTION 07951

CAULKING

PART 1: GENERAL:

1.01 DESCRIPTION:

A. WORK INCLUDED: Throughout the project, caulk and seal all joints where shown on the Drawings and elsewhere as required to provide a positive barrier against passage of air and passage of moisture.

1.02 QUALITY ASSURANCE:

A. Qualifications of Installers:

1. Proper caulking and proper installation of sealants require that installer be thoroughly trained and experienced in the necessary skills and thoroughly familiar with the specified requirements.
2. For caulking and installation of sealants throughout the work, use only personnel who have been specifically trained in such procedures and who are completely familiar with the joint details shown on the Drawings and the installation requirements called for in this Section.

1.03 SUBMITTALS:

A. General: Comply with provisions of Section 01300.

B. Manufacturer's Data: Submit:

1. A complete materials list showing all items proposed to be furnished and installed under this Section.
2. Sufficient data to demonstrate that all such materials meet or exceed the specified requirements.

C. Samples: Accompanying the submittal required in Paragraph "B" submit samples of each sealant, each backing material, each primer, and each bond breaker proposed to be used.

1.04 PRODUCT HANDLING:

A. Delivery and Storage: Deliver all materials of this Section to the jobsite in the original unopened containers with all labels intact and legible at time of use. Store only under conditions recommended by the manufacturers. Do not retain on the jobsite any material which has exceeded the shelf life recommended by its manufacturer.

B. Protection: Use all means necessary to protect the materials of this Section before, during, and after installation and to protect the work and materials of all other trades.

C. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

PART 2: PRODUCTS:

2.01 CAULKING:

A. General: Except as otherwise approved by the Architect, in writing, use only the type of caulking described in this Article.

B. Caulking Materials:

1. Around Fixed Glass "Storefront" Aluminum Frames use silicone based caulking in color matching the aluminum. This caulking furnished and installed by "storefront" aluminum installer.
2. Around Windows: (if any) Use DAP Acrylic Latex Caulk with Silicone, in color to match window color or approved equal.
3. Around Exterior Door Frames: Use DAP Acrylic Latex Caulk with silicone in "Clear" color or approved equal.
4. Miscellaneous Exterior Connections Between Dissimilar Materials: Use DAP Acrylic Latex Caulk with silicone in "Clear" color unless another standard color of the manufacturer would be more suitable.
5. Exterior Masonry Control Joints: Use Dow Corning 790 sealant or approved equal. Prime where required by manufacturer. Provide foam backer rod approved for use by sealant manufacturer.
6. Interior Caulking: Use DAP Acrylic Latex Caulk with silicone or approved equal. Color as selected from manufacturer's standard colors.
7. Caulking Joints Not Otherwise Specified: Use DAP Acrylic Latex Caulk with silicone or approved equal.
8. FIRE RATED WALLS AND NON-FIRE RATED WALLS: Top-of-walls, shall be sealed on both sides of wall with fire rated sealants: CP606, CP 672 firestop spray, Firestop joint Spray CFS-SP WB with respective UL No. as recommended by Hilti Company.
9. Fire rated wall penetrations shall be: FS-one intumescent fire stop sealant with respective UL No. recommended by Hilti Company.
10. Smoke and acoustical walls sealant shall be: CP506 Sealant, CP 572 Spray by Hilti.
11. Exterior/Interior of Masonry Walls Dow Corning 790 silicone sealant.

C. Prime:

1. In accordance with sealant manufacturer recommendations.

PART 3: EXECUTION:

3.01 INSPECTION:

A. Examine the areas and conditions under which work of this section will be performed. Correct conditions detrimental to the proper and timely completion of the Work. Do not proceed until satisfactory conditions have been corrected.

3.02 PREPARATION:

A. All Surfaces:

1. All surfaces in contact with caulking shall be dry, sound, and well brushed and wiped free from dust, and oil or grease.
2. Use solvent, where necessary, to remove oil and grease, wiping the surfaces with clean rags.
3. Remove all mortar from the joint cavity.
4. Where backstop is required, insert the approved backup material in the joint cavity to the depth required.

3.03 INSTALLATION OF SEALANTS:

A. General: Prior to start of installation in each joint, verify the joint type, and verify that the required proportion of width of joint to depth of joint has been secured.

B. Equipment: Apply sealant under pressure with hand or power-actuated gun or other appropriate means. Guns shall have nozzle of proper size and shall provide sufficient pressure to completely fill joints as designed.

C. Masking: Thoroughly and completely mask all joints where the appearance of sealant on adjacent surfaces would be objectionable.

D. Installation of Sealant: Install the sealant in strict accordance with the manufacturer's recommendations thoroughly filling all joints to the recommended depth.

E. Tooling: Tool all joints to the profile recommended by the caulking manufacturer or as shown by details in the Drawings.

F. Cleaning Up:

1. Remove masking tape immediately after joints have been tooled.
2. Clean adjacent surfaces free from sealant as the installation progresses. Use solvent or cleaning agent as recommended by the sealant manufacturer.

END OF SECTION

SECTION 09900
PAINTING

PART 1: GENERAL

1.01 SCOPE

A. Perform all work required to complete the Finish Painting indicated by the Contract Documents and furnish all supplementary items necessary for its proper installation.

B. The requirements of Division O - "Bidding and Contract Requirements" and Division 1 - "General Requirements" of this Project Manual shall apply to all work required for this section.

C. Paint to completion of all exposed surfaces throughout the Project, both interior and exterior with the exception of the following:

1. Surfaces which are delivered to the job site with a factory finish, unless indicated to be painted.
2. Nonferrous metals.
3. Integral color Concrete, Stucco or Cementitious Coatings.
4. Exposed concrete floors.
5. Face brick.

1.02 SUBMITTALS

A. Detailed Painting Schedule

1. Furnish a "Detailed Painting Schedule" for approval by the Architect. Indicate type of surface, type of paint material, and number of coats required, as set forth in the "Painting Requirements" hereinafter specified.
2. Submit brand designation and grade of the indicated type produced by the approved manufacturer for each application listed or required.
3. Submit product analyses and performance characteristics for all paint materials as requested by the Architect.
4. Submit approval of the "Detailed Painting Schedule" before delivering material to the job site.
5. No claim by the Painting Contractor as to the unsuitability or unavailability of any material specified or his unwillingness to use same or his inability to produce first-class work with same will be entertained, unless such claims are made in writing and submitted with his bid.
6. The Architect will check the "Detailed Painting Schedule" and if any painting material listed therein does not represent, in the opinion of the Architect, such highest quality of the manufacturer, the Architect may direct its replacement with an acceptable painting material at no additional cost to the Owner.
7. Owners maintenance manual: Upon conclusion of the project, the Contractor or paint manufacturer/supplier shall furnish a coating maintenance manual, such as Sherwin Williams “Custodian Project Color and Product Information” report or equal. Manual shall include an Area Summary with finish schedule, Area Detail designating where each product/color/finish was used, product date pages, Material Safety Data Sheets, care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.

B. Samples

1. Submit duplicate samples of each type paint finish proposed for use.
2. Samples shall be 3"x6" on suitable materials and shall be as true a representation of finished work as is practicable.
3. Label each sample and show various stages of finish on each sample.

1.03 PRODUCT HANDLING

A. Delivery

1. Deliver material to job site in original, unopened containers and packages bearing manufacturers name, type of paint, stock number and color.
2. Deliver all paints ready-mixed unless otherwise directed by the Architect.

B. Storage

1. Keep storage area neat, clean and adequately protected from paint spillage. Repair damage caused to surfaces within storage areas.
2. Dispose of all cloths and cotton waste which might constitute a fire hazard at the end of each work day.

1.04 ENVIRONMENTAL CONDITIONS

A. Do not apply paint or varnish under conditions that could adversely affect drying of final finish. Apply all materials under adequate illumination and ventilation.

B. Do not apply paint or varnish when temperature is less than 50 deg. F. or more than 90 deg. F., or when excess humidity is present.

1.05 PROTECTION

A. Protect or remove hardware, escutcheons, fixtures, plates, covers, and other items subject to damage or discoloration from painting.

B. Carefully and adequately protect, as required, all surfaces not requiring painting in areas where painting is being carried on. Use tarpaulins or other suitable covers, with supports, if needed, to protect adjacent or underlying surfaces

C. Maintain all wrappings or other factory-applied protection furnished with finishing hardware or other items provided by other trades and installed in areas where painting is required. If wrappings are displaced or removed, protect surfaces for the duration of painting work.

PART 2: PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Material manufactured by The Sherwin Williams Company is the acceptable standard of quality. Coating systems from other listed manufacturers shall match the systems specified provided it complies with the Contract Documents.

1. PAINT:
Sherwin-Williams Company
Pratt and Lambert, Inc.
PPG Paints
Benjamin Moore

2.02 MATERIALS

A. PREPARED PAINTS AND COATINGS: All by the same manufacturer, unless otherwise specified.

B. TINTING COLORS: By manufacturer of Prepared Paint.

C. SPACKLING COMPOUND: Finely ground, grit-free when dry will set with no shrinkage to a smooth, hard, white surface and will sand properly and receive any finish.

D. PATCHING PLASTER: White, nonshrinking, containing no lime and uniform in set and quality.

E. TAPE AND BED MATERIALS:

1. JOINT TAPE: USF Perf-A-Tape
2. EMBEDDING AND FINISHING COMPOUND: USG Ready-Mixed Joint Compound All Purpose.

F. PRIMERS:

1. FERROUS METAL PRIMER: Sherwin Williams Pro-Cryl Universal Water Based Primer B66-310.
   PPG Paints: Pitt-tech Plus Int/Ext DTM Primer/Finish 90-912
2. ALKYD ENAMEL PRIMER: Sherwin Williams Pro-Cryl Universal Water Based Primer B66-310.
   PPG Paints: 4160 Devguard DTM Primer
3. ALKYD WOOD PRIMER: Sherwin Williams Premium Wall and Wood Primer B28W8111.
   PPG Paints: Seal Grip Universal Int/Ext Alkyd Primer 6-14
4. LATEX WALL PAINT PRIMER: Sherwin Williams Prep Rite High Build Primer B28W8601 with texture to produce fine finish plaster appearance on Drywall.
   PPG Paints: Pure Performance Latex Primer, 9-900, 0g/LVOC
5. SPOT PRIMER: Sherwin Williams Pro-Cryl Universal Water Based Primer B66-310.
   PPG Paints: Pitt-tech Plus Int/Ext DTM Primer/Finish 90-912
6. GALVANIZED PRIMER: Sherwin Williams Pro-Cryl Universal Water Based Primer B66-310.
   PPG Paints: Pitt-tech Plus Int/Ext DTM Primer/Finish 90-912
7. WATERPROOF EXTERIOR PRIMER/FINISH: Sherwin Williams Loxon XP.
   PPG Paints: Perma-Crete Int/Ext Alkali Resistant Primer 4-603

G. FILLERS/SEALERS:

1. WOOD FILLER: Sherwin Williams Wood Filler.
2. KNOT SEALER: Formula WP0578 of the Western Pine Association.

H. HIGH PERFORMANCE PAINTS:

1. SEMIGLOSS ENAMEL: Sherwin Williams Pro Industrial Pre-Catalyzed Epoxy Semi-Gloss K46W151
   PPG Paints: Pitt Glaze Pre-Catalized Epoxy Semi-Gloss 16-510

I. LATEX PAINTS:

1. LATEX FLAT WALL PAINT: Sherwin Williams Pro Mar 200, Antimicrobial, Zero VOC, Latex Finish, Flat, Egg-Shell and Semi-Gloss.
   PPG Paints: Pure Performance
2. LATEX MASONRY PAINT, ACRYLIC: Sherwin Williams Loxon XP.
   PPG Paints: Perma-Crete High Build 100% Acrylic

3. VINYL LATEX EMULSION: Sher-Tex medium texture.

PPG Paints: Perma-Crete Textured Coatings

J. LACQUER: Fed. Spec. TTP-P-143.

K. WOOD STAIN: Sherwin Williams Semi-Transparent Polyurethane Exterior Stain A15T5.
PPG Paints: Flood Semi-Transparent Polyurethane Stain

L. WOOD STAIN: Sherwin Williams Woodscapes Solid Color Acrylic House Stain A15 Series.
PPG Paints: Flood Acrylic Solid Color Stains

M. OIL: Watco Danish Oil

M. WAX: Watco Satin Carnauba Liquid Wax

O. (1) INTERIOR EPOXY: One (1) coat Sherwin Williams Heavy Duty block-filler; then Sherwin Williams Pro Industrial Water Based Epoxy B73 Series.
PPG Paints: Speedhide 6-15 Hi Fill Block Filler, finish coat: Pitt-Glaze 16-551 series

P. EXTERIOR Elastomeric: Sherwin Williams two (2) coats Loxon XP Waterproofing System
PPG Paints: 2 Coats Decra Flex 300 Smooth Flat 2260

Q. FIRE RETARDANT PAINT: Sherwin Williams: Flame Control No. 20-20 interior fire retardant flat latex, shall be used on all exposed painted wood except doors and millwork.

2.03 MIXING:

A. Tint prime coats and undercoats approximately to the shade of the final coat, but each with a slight variation in color to distinguish them from the preceding coat.

B. Apply paint of consistency recommended by manufacturer. Additional thinning permitted only with specified approval.

C. Use factory mixed colors, shades, and tints with finish paints matching the approved color samples. Job mixing permitted only with specific approval.

2.04 FINISH AND COLORS:

A. Paint colors shall be as selected by the Architect. Before any work is begun, the Architect will furnish the Painting Contractor with a color schedule and/or chips showing where the ***various*** colors shall be used.

B. ***60% of wall paint shall cover field wall and accent walls and surfaces terminating at corners floor and ceilings, 40% of wall paint shall be accent stripping, wall patterns, logo or graphics as selected by architect.***

PART 3: EXECUTION

3.01 CONDITION OF SURFACES

A. Examine surfaces to receive painting before beginning work and correct defects that could affect quality of finished work. Prepare surfaces, as necessary, to receive painting as specified. Retouch shop coats and prime coats as necessary.

B. Starting painting work shall be construed as evidence of acceptance of conditions under which work will be

done.

C. Clean surfaces to be painted and spaces in which painting will be done, broom-clean and dust-free. Remove soil, prints, stains, and adhered materials that would affect finish painting.

D. If acids have been used for cleaning, all traces of acid shall be thoroughly neutralized and rinsed and dried before any paint is applied.

E. Meet requirements of other portions of specifications for preparation of specific items.

F. Apply primer or first coat immediately after surface preparation to prevent contamination of the surface.

3.02 PREPARATION

A. Shop Painted Ferrous Metal

1. Clean surfaces free of concrete, mortar, plaster, rust, shavings, dirt, dust and other objectionable materials. Remove grease and oil with gasoline, benzine or other similar volatile cleaner. Use cleaner when space is properly ventilated and not in the presence of any open flame.
2. Touch up abraded or marred shop coats with spot primer specified.

B. Unpainted Ferrous Metal

1. Clean surfaces free of loose scale, rust, shavings, filings, dirt, dust and other objectionable material with wire brushes or other proper and acceptable means.
2. Remove grease and oil with gasoline, benzine or other similar volatile cleaner. Sandblast or wire brush to base metal all rusted areas on exposed exterior members. Use cleaner when space is properly ventilated and not in the presence of any open flame.

C. Zinc-Coated Metal (Galvanized)

1. Clean surfaces free of loose particles and other objectionable material. Remove grease and oil with mineral spirits or other similar cleaner.
2. Coat welded, chipped or abraded surfaces with "Galvalloy" galvanizing stick compound or ZRC Zinc Coating after wire brush cleaning.
3. Treat surfaces with an approved chemical compound such as a phosphoric acid-wash. Remove chemical compound completely with clean, fresh water and thoroughly dry surfaces prior to priming.

D. Gypsum Board

l. Mix and apply tape and bedding system in accordance with the manufacturer's recommendations.
2. Apply joint compound (embedding coat) to internal angles and butt joints approximately 3" wide and sufficiently thick to hide board surfaces. Cover screw heads and depressions with compound.
3. Apply tape to angles and joints, centered and seated into compound leaving sufficient compound under tape to provide proper bond. Apply a skim coat of compound over tape and clean excess compound from wallboard surface.
4. When first coat has thoroughly dried, apply second coat (fill coat) over embedding coat, filling board taper flush with board surface. For joints without taper, feather out 4" on either side of tape.
5. When second coat has thoroughly dried, apply third coat (finishing coat) tapered beyond edges of second coat and feathered to a smooth uniform finish which does not protrude beyond the plane of the board surface.

6. Apply at least two coats of compound to flanges of corner beads and metal edging. Extend compound

approximately 8 to 10 inches either side of exposed metal. Apply three coats of compound in succession for all dimples at fastener heads

7. Sand all coats after each application has dried and leave wallboard and treated areas uniformly smooth, ready to receive decoration.

E. Plaster: **shall be painted as described in this specification. Color as selected by architect.**

F. Wood

1. Clean knots, pitch streaks or visible sap spots free of residue and treat with Knot Sealer. Apply second coat of sealer no less than two hours after the application of the first coat.
2. Fill nail holes and other indentations with wood filler after first coat, matching color of stain or paint. Finish flush with adjacent surfaces.
3. Sand wood surfaces smooth with No. 00 sand paper and remove dust prior to painting.

G. Factory Finished Items

1. Factory finished items requiring painting shall be etched or otherwise prepared in an approved manner to receive final finish coat.

H. Insulation

1. Clean surfaces of pipe, duct and equipment insulation, such as canvas jackets and troweled-on insulation and of rigid wall or ceiling insulation where items are required to be painted.
2. Remove all loose, foreign and objectionable material prior to the application of any paint materials.

I. Copper Piping

1. Wash surfaces with a 5 percent acetic acid solution and allow to dry. Do not damage adjacent surfaces due to acid spillage.

J. Aluminum: Prefinished (or anodized) aluminum shall not be painted.

1. Remove oil or grease film by washing surfaces with mineral spirits or turpentine. Allow new, bare aluminum to weather for a month or roughen with steel wool before painting.

3.03 APPLICATION

A. Do not open containers until required for use. Thoroughly mix paint before application and frequently stir during application so as to maintain pigment satisfactorily in suspension.

B. Do not thin paint in excess of the printed directions of the manufacturer. Do not allow caking or setting of pigment into a hard mass.

C. Apply paint uniformly without visible laps, sags, curtains, holidays or objectionable brushmarks. Exercise care so that paint does not splatter on surfaces not required to be painted. Remove promptly paint applied or splattered on surfaces not required to be painted.

D. Insure that all primer and intermediate coats of paint are unscarred and completely integral at the time of application of each succeeding coat. Allow sufficient time between coats to ensure proper drying.

E. Sand between all coats on wood and-metal surfaces prior to the application of succeeding coats.

F. Remove doors for painting tops and bottoms. Finish top and bottom edges of doors the same as faces, after fitting.

G. Match final coat of paint in color, tint and hue with the color displays approved by the Architect.

H. Paint edges of doors occurring between rooms or spaces having different finishes the same as the room or space from which the same are visible when the door is in a partly opened position.

I. Paint factory finished access panels, registers, grilles, diffusers, electrical panel boxes, connector covers and similar items the same color as adjoining walls or ceilings. Use color as directed where adjacent surfaces do not require painting.

J. Finish all closets the same as the adjoining rooms, unless otherwise specified. Finish all other surfaces the same as nearest or adjoining surfaces unless otherwise shown.

K. Paint exposed insulated and non-insulated piping, conduits, duct work and hangers a color and texture to match walls or ceilings adjacent to it. Where adjacent surfaces are unpainted, use color as directed.

L. Back-prime all interior wood trim before installation, with alkyd primer or Okene Preservative.

M. Protect all accent colors on walls with a coating of pale varnish as approved by the Architect.

N. Application of Oil Finish:

1. Apply Watco oil for saturated coat with brush or rag. Let set 30 minutes. Repeat procedure and let set 5 to 10 minutes. Wipe off excess with clean dry rag.
2. Let set overnight. Repeat entire procedure.
3. Let set overnight. Sand with light sandpaper. Apply coat of liquid wax and buff with clean dry rag.
4. Match sample in Architect's office.

3.04 FIELD QUALITY CONTROL

A. When painting is to be started, the manufacturer whose materials have been approved for use shall furnish competent technical assistance on the job to ensure that his materials are being applied properly. Manufacturer's assistance shall be available at all times until completion of the work.

B. Each coat must be inspected and approved before application of the succeeding specified coat, otherwise no credit for the coat applied will be given and the Contractor automatically assumes the responsibility to recoat the work in question.

C. Application equipment shall be cleaned a minimum of daily and no work shall be done with equipment which leaves adulterants in the coat of paint being applied.

3.05 CLEANING

A. Remove from the premises upon completion of the work all staging, scaffolding and containers.

B. Remove misplaced paint spots, oil or stains upon adjacent surfaces and leave the entire work in a clean condition. Touch up and restore finish where damaged.

3.06 PAINTING SCHEDULE

A. EXTERIOR WORK

1. Iron and Steel

1st coat	Sherwin Williams Pro-Cryl Universal Metal Primer PPG Paints: Devguard 4160 DTM Primer
2nd coat	Sherwin Williams DTM Acrylic Semi-Gloss PPG Paints: Devflex 4216 Semi-Gloss (Maintenance)
3rd coat	Sherwin Williams DTM Acrylic Semi-Gloss PPG Paints: Devflex 4216 Semi-Gloss

2. Galvanized Iron and Steel

1st coat	Sherwin Williams Pro-Cryl Universal Metal Primer PPG Paints: Devguard 4160 DTM Primer
2nd coat	Sherwin Williams DTM Acrylic Semi-Gloss PPG Paints: Devflex 4216 Semi-Gloss (Maintenance)
3rd coat	Sherwin Williams DTM Acrylic Semi-Gloss PPG Paints: Devflex 4216 Semi-Gloss

3. Machinery and Equipment.

Spot Prime	Sherwin Williams Pro-Cryl Universal Metal Primer PPG Paints: Devguard 4160 DTM Primer
2nd Coat	Sherwin Williams Pro Industrial Multi-Surface Acrylic B66W1501 Gloss PPG Paints: Pitt Tech 90-1210

4. Exterior CMU

1 coat	Sherwin Williams Loxon Block Surfacer A24W200 PPG Paints: Perma-Crete Concrete Block & Masonry Surfacer 4-100XI
2 coats	Sherwin Williams Loxon XP Elastomeric Waterproofing System, A24-1400 Series PPG Paints: Decra Flex 300 Elastomeric 2260

5. Exterior Masonry — Sherwin Williams Pro Industrial Anti-Graffiti Coating Clear, B97C150
Blok-Guard & Graffiti Control by Prosoco Clear
PPG Paints: See rep for sacrificial and non sacrificial

6. Exterior Stucco

2 Coats	Sherwin Williams Self Cleaning Acrylic Flat LX13W51 PPG Paints: Manor Hall

B. INTERIOR WORK

1. Miscellaneous Iron and Steel

1st coat	Sherwin Williams Pro-Cryl Universal Metal Primer PPG Paints: Devguard 4160 DTM Primer
2nd coat	Sherwin Williams Pro Industrial Multi-Surface Acrylic Semi-Gloss B66W1551 PPG Paints: Devflex 4216 Semi Gloss
3rd coat	Sherwin Williams Pro Industrial Multi-Surface Acrylic Semi-Gloss B66W1551 PPG Paints: Devflex 4216 Semi Gloss

2. Primer Miscellaneous Iron and Steel spot prime
   - Sherwin Williams Pro-Cryl Universal Metal Primer
   - PPG Paints: Devguard 4160 DTM Primer
   - 1st coat: Sherwin Williams Pro Industrial Multi-Surface Acrylic Semi-Gloss B66W1551
   - PPG Paints: Deviflex 4216 Semi Gloss
   - 2nd coat: Sherwin Williams Pro Industrial Multi-Surface Acrylic
   - PPG Paints: Devflex 4216 Semi Gloss

3. Galvanized Iron and Steel
   - 1st coat: Sherwin Williams Pro-Cryl Universal Metal Primer
   - PPG Paints: Devguard 4160 DTM Primer
   - 2nd coat: Sherwin Williams Pro Industrial Multi-Surface Acrylic B66W1551
   - PPG Paints: Devflex 4216 Semi Gloss
   - 3rd coat: Sherwin Williams Pro Industrial Multi-Surface Acrylic B66W1551
   - PPG Paints: Devflex 4216 Semi Gloss

4. Bonderized Steel
   - 1st coat: Sherwin Williams Pro-Cryl Universal Metal Primer
   - PPG Paints: Devguard 4160 DTM Primer
   - 2nd coat: Sherwin Williams Pro Industrial Multi-Surface Acrylic B66W1551
   - PPG Paints: Devflex 4216 Semi Gloss
   - 3rd coat: Sherwin Williams Pro Industrial Multi-Surface Acrylic B66W1551
   - PPG Paints: Devflex 4216 Semi Gloss

5. Gypsum Drywall
   - 1st coat: Sherwin Williams Prep Rite Hi-Build Primer B28W8601
   - PPG Paints: Pure Performance lates primer 9-900
   - 2nd coat: Sherwin Williams Pro Mar 200 Zero VOC Latex Egg-Shell B20W12651
   - PPG Paints: Pure Performance egg shell 9-300
   - 3rd coat: Sherwin Williams Pro Mar 200 Zero VOC Latex Egg-shell B20W12651
   - PPG Paints: Pure Performance egg shell 9-300

6. Gypsum Drywall (High Traffic Areas, Hallways, Wet areas & Stairwells)
   - 1st coat: Sherwin Williams Prep Rite Hi-Build Primer B28W8601
   - PPG Paints: Pure Performance latex Primer 9-900
   - 2 nd coat: Sherwin Williams Pro Industrial Pre-Catalyzed Epoxy Egg-Shell, Semi-Gloss K46-W151
   - PPG Paints: Pitt-Tech Glaze Pre-Catalyzed Epoxy 16-310,93 g/L VOC Egg-Shell, Semi-Gloss
   - 3 rd coat: Sherwin Williams Pro Industrial Pre-Catalyzed Epoxy Egg-Shell, Semi-Gloss K46-W151
   - PPG Paints: Pitt-Tech Glaze Pre-Catalyzed Epoxy 16-310,93 g/L VOC Egg-Shell, Semi-Gloss

7. Portland Cement Plaster & Stucco (that is not integral color)
   - 1st coat: Sherwin Williams Prep Rite Masonry Primer
   - PPG Paints: Seal Grip Int/Ext Acrylic Primer 17-921
   - 2nd coat: Sherwin Williams Pro Mar 200 Zero VOC Latex Egg-Shell B20W2600
   - PPG Paints: Speedhide zero Interior Eggshell 4-4310XI
   - 3rd coat: Sherwin Williams Pro Mar 200 Zero VOC Latex Egg-Shell B20W2600
   - PPG Paints: Speedhide zero Interior Eggshell 4-4310XI

8. Wood Surfaces (Natural Finish)

1st coat	Oil
2nd coat	Oil
3rd coat	Oil
4th coat	Wax

9. Wood Surfaces (Stained)

1st coat	Stain
2nd coat	Filler (open grain wood, only)
3rd coat	Lacquer Sanding Sealer
4th coat	Dull Rubbed Lacquer
5th coat	Dull Rubbed Lacquer

10. Machinery and Equipment

Spot Prime	Sherwin Williams Pro-Cryl Primer
	PPG Paints: Devguard 4160 DTM Primer
2nd Coat	Sherwin Williams Pro Industrial Multi-Surface Acrylic Gloss
	PPG Paints: Dev Flex 4216 Semi Gloss

11. Exposed Canvas Covered Piping

1st coat	Sherwin Williams Drywall Latex Primer B28W8100
	PPG Paints: Speedhide Interior Latex Sealer 6-2
2nd coat	To match paint specified for
3rd coat	coats adjoining surfaces

12. Exposed Rigid Insulation

1st coat	Primer as recommended by the manufacturer of the finish coats
	XIM, UMA 400 Bonding Primer
2nd coat	Sherwin Williams Multi-Surface Acrylic Egg-Shell B666W1561
	PPG Paints: Dev Flex 4216 Semi Gloss

13. Exposed-High: Temperature Metal Piping

1st coat	Sherwin Williams Kem Hi Temp Heat Resistant Paint
	PPG Paints: High Heat Paint
2nd coat	Sherwin Williams Kem Hi Temp Heat Resistant Paint
	PPG Paints: High Heat Paint

14. CMU

1st coat	Sherwin Williams Heavy Duty Block Filler or Loxon Block Surfacer
	PPG Paints: Speedhide Int/Ext Masonry Hi Fill Block Filler
2nd coat	Sherwin Williams Pro Mar 200 Zero VOC, Latex Semi-Gloss, B31W2651
	PPG Paints: Aquapon Water Based Epoxy 98 Series, 325g/L VOC
3rd coat	Sherwin Williams Pro Mar 200 Zero VOC, Latex Semi-Gloss, B31W2651
	PPG Paints: Aquapon Water Based Epoxy 98 Series, 325g/L VOC

15. CMU (High Traffic Areas, Hallways, Wet areas & Stairwells)

1st coat	Sherwin Williams Loxon Block Surfacer
	PPG Paints: Speedhide Int/Ext Masonry Hi Fill Block Filler
2nd coat	Sherwin Williams Pro Industrial Water Based Catalyzed Epoxy B73-300 Series
	PPG Paints: Aquapon Water Based Epoxy 98 Series, 325g/L VOC
3rd coat	Sherwin Williams Pro Industrial Water Based Catalyzed Epoxy B73-300 Series
	PPG Paints: Aquapon Water Based Epoxy 98 Series, 325g/L VOC

16. Where indicated on drawings interior concrete floors shall be trowel smooth finish and shall be etched with10% muriatic acid, flush with water and allowed to dry thoroughly.

1st coat	Sherwin Williams solvent base H & C Concrete Stain & Sealer: Clear or Colored as selected by architect
2nd coat	Sherwin Williams solvent base H & C Concrete Stain & Sealer: Clear or Colored as selected by architect Sealer
3rd coat	Sherwin Williams solvent base H & C Concrete Stain & Sealer: Clear or Colored as selected by architect Sealer provide Anti-slip grit on the final coat.

17. Exposed Structural Steel

1 – 2 coats	Sherwin Williams Low VOC Waterborne Acrylic Dryfall B42 Series
	PPG Paints: Speedhide Super Tech Interior Dry-Fog Flat Latex 6-723XI

3.07 PIPE IDENTIFICATION

A. Conform to requirements of ASA A13, "Scheme for the Identification of Pipe Systems," as published by the American Society of Mechanical Engineers. Provide complete painting of piping in mechanical rooms only.

B. Color Coding:

1. Domestic Water, Cold or Hot – Green SW4085
2. Chilled, Heating or Condenser - Water - Green SW4085
3. Gas - Orange SW4083
4. Air - White SW4087
5. Condensate - Black SW4090
6. Electric Conduit - Yellow SW4084
7. Oil - Orange SW4083
8. Drain Lines - Black SW4090
9. Steam - Orange SW4083
10. Fire Protection Sprinkler – Red SW4081

3.08 SMOKE AND FIRE WALLS

A. Contractor shall identify all one-hour smoke walls and horizontal exit walls, by painting with stencil on both sides of wall, the rating which applies to the wall, Identifications shall be 11'-0" above finish floor, or above finish ceiling where wall does not extend above 11'-0", and shall be spaced at maximum distance of 29'-0" o.c. Height of letters shall be 4". Color of paint for letters will be Black.

END OF SECTION

SECTION 13121

PRE-ENGINEERED BUILDINGS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes pre-engineered, shop fabricated structural steel building frame.

1.2 REFERENCES

A. American Institute of Steel Construction:
1. AISC S335 - Specification for Structural Steel Buildings Allowable Stress Design, and Plastic Design.
2. AISC S342L - Load and Resistance Factor Design Specification for Structural Steel Buildings.
3. AISC S344L - Metric Load and Resistance Factor Design Specification for Structural Steel Buildings.

B. ASTM International:
1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
2. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
3. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
4. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
5. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
6. ASTM A490 - Standard Specification for Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength.
7. ASTM A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
8. ASTM A501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
9. ASTM A529/A529M - Standard Specification for High-Strength Carbon-Manganese Steel of Structural Quality.
10. ASTM A572/A572M - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
11. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
12. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.

13. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
14. ASTM C991 - Standard Specification for Flexible Glass Fiber Insulation for Pre-Engineered Metal Buildings.
15. ASTM C1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
16. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
17. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.

C. American Welding Society:
1. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination.
2. AWS D1.1 - Structural Welding Code - Steel.

D. Metal Building Manufacturers Association:
1. MBMA - Low Rise Building Systems Manual.

E. National Fire Protection Association:
1. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials.

F. SSPC: The Society for Protective Coatings:
1. SSPC - Steel Structures Painting Manual.
2. SSPC Paint 20 - Zinc-Rich Primers (Type I - Inorganic and Type II - Organic).

G. Underwriters Laboratories Inc.:
1. UL - Building Materials Directory.
2. UL 723 - Tests for Surface Burning Characteristics of Building Materials.

1.3 SYSTEM DESCRIPTION

A. Single span rigid frame.

1.4 DESIGN REQUIREMENTS

A. Provide drainage to exterior for water entering or condensation occurring within wall or roof system.

B. Size and fabricate wall and roof systems free of distortion or defects detrimental to appearance or performance.

1.5 PERFORMANCE REQUIREMENTS

A. Conform to applicable codes for submission of design calculations, reviewed shop and erection drawings, required for acquiring permits.

B. Cooperate with regulatory agency or authority and provide data as requested authority having jurisdiction.

1.6 SUBMITTALS

A. Section 01330 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate assembly dimensions, locations of structural members, connections, attachments, openings, cambers, loads, and reactions; wall and roof system dimensions, panel layout, general construction details, anchorages and method of anchorage, method or installation; framing anchor bolt settings, sizes, and locations from datum, and foundation loads; indicate welded connections with AWS A2.4 welding symbols; indicate net weld lengths; provide professional seal and signature.

C. Erection Drawings: Indicate members by label, assembly sequence, and temporary erection bracing.

PART 2 PRODUCTS

2.1 FABRICATION - FRAMING

A. Fabricate members in accordance with AISC Specification for plate, bar, tube, or rolled structural shapes.

B. Provide framing for door window louver skylight, ventilator openings.

PART 3 EXECUTION

3.1 ERECTION - FRAMING

A. Erect framing in accordance with AISC Specification.

B. Provide for erection and wind loads. Provide temporary bracing to maintain structure plumb and in alignment until completion of erection and installation of permanent bracing.

C. Set column base plates with non-shrink grout to achieve full plate bearing.

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.

3.2 ERECTION TOLERANCES

A. Framing Members: 1/4 inch from level;1/8 inch from plumb.

END OF SECTION

SECTION 15140
DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes domestic water piping from locations indicated to fixtures and equipment inside the building.

B. Related Sections include the following:

1. Division 15 Section "Plumbing Specialties" for water distribution piping specialties.

C. PVC: Polyvinyl chloride plastic.

1.3 PERFORMANCE REQUIREMENTS

A. Provide components and installation capable of producing domestic water piping systems with the following minimum working-pressure ratings, unless otherwise indicated:

1. Domestic Water Distribution Piping: 125 psig (860 kPa).

1.4 SUBMITTALS

A. Product Data: For pipe, tube, fittings, and couplings.

B. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

1.5 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic, potable domestic water piping and components.

C. Comply with NSF 61, "Drinking Water System Components-Health Effects; Sections 1 through 9," for potable domestic water piping and components.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.

B. Transition Couplings for Aboveground Pressure Piping: Coupling or other manufactured fitting the same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.

C. Transition Couplings for Underground Pressure Piping: AWWA C219, metal, sleeve-type coupling or other manufactured fitting the same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.

2.2 COPPER TUBING

A. Soft Copper Tube: ASTM B 88, Types K and L, water tube, annealed temper.

1. Copper Pressure Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.

2. Bronze Flanges: ASME B16.24, Class 150, with solder-joint end. Furnish Class 300 flanges if required to match piping.

3. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces and solder-joint or threaded ends.

B. Hard Copper Tube: ASTM B 88, Types L and M, water tube, drawn temper.

1. Copper Pressure Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought- copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.

2. Bronze Flanges: ASME B16.24, Class 150, with solder-joint end. Furnish Class 300 flanges if required to match piping.

3. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces and solder-joint or threaded ends.

4. Copper, Grooved-End Fittings: ASTM B 75 (ASTM B 75M) copper tube or ASTM B 584 bronze castings.

a. Copper-Tubing, Keyed Couplings: Copper-tube dimensions and design similar to AWWA C606. Include ferrous housing sections, gasket suitable for hot water, and bolts and nuts.

2.3 PVC PIPING

A. PVC Schedule 40 Pipe:

2.4 VALVES

A. Refer to Division 15 Section "Valves" for bronze and cast-iron, general-duty valves.

B. Refer to Division 15 Section "Plumbing Specialties" for balancing and drain valves.

PART 3 - EXECUTION

3.1 EXCAVATION

A. Refer to Division 2 for excavating, trenching, and backfilling.

3.2 PIPING APPLICATIONS

A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below, unless otherwise indicated.

B. Flanges may be used on aboveground piping, unless otherwise indicated.

C. Grooved joints may be used on aboveground grooved-end piping.

D. Fitting Option: Mechanically formed tee-branch outlets and brazed joints may be used on aboveground copper tubing.

E. Aboveground Domestic Water Piping: Use the following piping materials for each size range:

1. NPS 1-1/2 (DN 40) and Smaller: Hard copper tube, Type L (Type B); copper pressure fittings; and soldered joints.

2. NPS 2 (DN 50): Hard copper tube, Type L (Type B); copper pressure fittings; and soldered joints.

3. NPS 2-1/2 to NPS 3-1/2 (DN 65 to DN 90): Hard copper tube, Type L (Type B); copper pressure fittings; and soldered joints.

4. NPS 4 to NPS 6 (DN 100 to DN150): Hard copper tube, Type L (Type B); copper pressure fittings; and soldered joints.

F. Underground Domestic Water Piping NPS 4 (DN 100) and Smaller: Hard copper tube, Type L (Type B); copper pressure fittings; and soldered joints. Water service larger than NPS 4 shall be PVC.

3.3 VALVE APPLICATIONS

A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

1. Shutoff Duty: Use bronze ball or gate valves for piping NPS 2 (DN 50) and smaller. Use cast-iron butterfly or gate valves with flanged ends for piping NPS 2-1/2 (DN 65) and larger.

2. Throttling Duty: Use bronze ball or globe valves for piping NPS 2 (DN 50) and smaller. Use cast-iron butterfly valves with flanged ends for piping NPS 2-1/2 (DN 65) and larger.

3. Hot-Water-Piping, Balancing Duty: Calibrated balancing valves.

4. Drain Duty: Hose-end drain valves.

B. Cast-iron, grooved-end valves may be used with grooved-end piping.

3.4 PIPING INSTALLATION

A. Refer to Division 2 for site water distribution and service piping.

B. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping installation.

C. Extend domestic water service piping to exterior water distribution piping in sizes and locations indicated.

D. Install underground copper tubing according to CDA's "Copper Tube Handbook."

E. Install underground PVC piping according to ASTM D 2774 and ASTM F 645. Install buried piping inside building between wall and floor penetrations and connection to water service piping outside building with restrained joints. Anchor pipe to wall or floor. Install thrust-block supports at vertical and horizontal offsets.

F. Install cast-iron sleeve with water stop and mechanical sleeve seal at each service pipe penetration through foundation wall. Select number of interlocking rubber links required to make installation watertight. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for sleeves and mechanical sleeve seals.

G. Install wall penetration system at each service pipe penetration through foundation wall. Make installation watertight. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for wall penetration systems.

H. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve, inside building at each domestic water service. Refer to Division 15 Section "Meters and Gages" for pressure gages, and to Division 15 Section "Plumbing Specialties" for drain valves and strainers.

I. Install water-pressure regulators downstream from shutoff valves. Refer to Division 15 Section "Plumbing Specialties" for water-pressure regulators.

J. Fill water piping. Check components to determine that they are not air bound and that piping is full of water.

K. Perform the following steps before operation:

1. Close drain valves, hydrants, and hose bibbs.

2. Open shutoff valves to fully open position.

3. Open throttling valves to proper setting.

4. Remove plugs used during testing of piping and plugs used for temporary sealing of piping during installation.

L. Check plumbing equipment and verify proper settings, adjustments, and operation. Do not operate water heaters before filling with water.

3.5 JOINT CONSTRUCTION

A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping joint construction.

B. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure, unless otherwise indicated.

C. Grooved Joints: Assemble joints with keyed-coupling housing, gasket, lubricant, and bolts according to coupling and fitting manufacturer's written instructions.

D. Mechanically Formed Outlets: Form tee in copper tube according to equipment manufacturer's written instructions. Use tool designed for copper tube; drill pilot hole, form collar for outlet, dimple tube to form seating stop, and braze branch tube into collar.

3.6 VALVE INSTALLATION

A. Install shutoff valve on each water supply to equipment and on each water supply to plumbing fixtures without supply stops. Use ball or gate valves for piping NPS 2 (DN 50) and smaller. Use butterfly or gate valves for piping NPS 2-1/2 (DN 65) and larger.

B. Install calibrated balancing valves in each hot-water circulation return branch and discharge side of each pump and circulator. Set calibrated balancing valves partly open to restrict but not stop flow. Refer to Division 15 Section "Plumbing Specialties" for calibrated balancing valves.

3.7 HANGER AND SUPPORT INSTALLATION

A. Refer to Division 15 Section "Hangers and Supports" for pipe hanger and support devices. Install the following:

1. Vertical Piping: MSS Type 8 or Type 42, clamps.

2. Individual, Straight, Horizontal Piping Runs: According to the following:

a. 100 Feet (30 m) and Less: MSS Type 1, adjustable, steel clevis hangers.

b. Longer Than 100 Feet (30 m): MSS Type 43, adjustable roller hangers.

c. Longer Than 100 Feet (30 m), if Indicated: MSS Type 49, spring cushion rolls.

3. Multiple, Straight, Horizontal Piping Runs 100 Feet (30 m) or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.

4. Base of Vertical Piping: MSS Type 52, spring hangers.

B. Install supports according to Division 15 Section "Hangers and Supports."

C. Support vertical piping and tubing at base and at each floor.

D. Rod diameter may be reduced 1 size for double-rod hangers, to a minimum of 3/8 inch (10 mm).

E. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 3/4 (DN 20) and Smaller: 60 inches (1500 mm) with 3/8-inch (10-mm) rod

2. NPS 1 and NPS-1-1/4 (DN 25 and DN 32): 72 inches (1800 mm) with 3/8-inch (10mm) Rod.

3. NPS 1-1/2 and NPS 2 (DN 40 and DN 50): 96 inches (2400 mm) with 3/8-inch (10mm) rod.

4. NPS 2-1/2 (DN 65): 108 inches (2700 mm) with 1/2-inch (13 mm) rod.

5. NPS 3 to NPS 5 (DN 80 to DN 125): 10 feet (3 m) with 1/2-inch (13 mm) rod.

6. NPS 6 (DN 150): 10 feet (3 m) with 5/8-inch (16-mm) rod.

7. NPS 8 (DN 200): 10 feet (3 m) with 3/4-inch (19-mm) rod.

G. Install supports for vertical copper tubing every 10 feet (3m).

3.8 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment and machines to allow service and maintenance.

C. Connect domestic water piping to exterior water service piping. Use transition fitting to join dissimilar piping materials.

D. Connect domestic water piping to service piping with shutoff valve, and extend and connect to the following:

1. Water Heaters: Cold-water supply and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.

2. Plumbing Fixtures: Cold- and hot-water supply piping in sizes indicated, but not smaller than required by plumbing code. Refer to Division 15 Section "Plumbing Fixtures."

3. Equipment: Cold- and hot-water supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 (DN 65) and larger.

3.9 FIELD QUALITY CONTROL

A. Inspect domestic water piping as follows:

1. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

2. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:

    a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.

    b. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

3. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

4. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

B. Test domestic water piping as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.

2. Leave uncovered and unconcealed new, altered, extended, or replaced domestic water piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.

3. Cap and subject piping to static water pressure of 50 psig (345 kPa) above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.

4. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.

5. Prepare reports for tests and required corrective action.

3.10 ADJUSTING

A. Adjust balancing valves in hot-water-circulation return piping to provide adequate flow.

1. Manually adjust ball-type balancing valves in hot-water-circulation return piping to provide flow of hot water in each branch.

2. Adjust calibrated balancing valves to flows indicated.

3.11 CLEANING

A. Clean and disinfect potable domestic water piping as follows:

1. Purge new piping and parts of existing domestic water piping that have been altered, extended, or repaired before using.

2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction or, if methods are not prescribed, procedures described in either AWWA C651 or AWWA C652 or as described below:

    a. Flush piping system with clean, potable water until dirty water does not appear at outlets.

    b. Fill and isolate system according to either of the following:

        1) Fill system or part thereof with water/chlorine solution with at least 50 ppm (50 mg/L) of chlorine. Isolate with valves and allow to stand for 24 hours.

2) Fill system or part thereof with water/chlorine solution with at least 200 ppm (200 mg/L) of chlorine. Isolate and allow to stand for three hours.

c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.

d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.

B. Prepare and submit reports of purging and disinfecting activities.

C. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

END OF SECTION

SECTION 15150
SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes soil and waste, sanitary drainage and vent piping inside the building and to locations indicated.

B. Related Sections include the following:
   1. Division 15 Section "Plumbing Specialties" for soil, waste, and vent piping systems specialties.

1.3 DEFINITIONS

A. The following are industry abbreviations for plastic piping materials:
   1. PVC: Polyvinyl chloride plastic.

1.4 PERFORMANCE REQUIREMENTS

A. Provide components and installation capable of producing piping systems with the following minimum working-pressure ratings, unless otherwise indicated:

   1. Soil, Waste, and Vent Piping: 10-foot head of water (30 kPa).

1.5 SUBMITTALS

A. Product Data: For pipe, tube, fittings, and couplings.

B. Shop Drawings: For sovent drainage system, include plans, elevations, sections, and details.

C. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

1.6 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.

B. Flexible Transition Couplings for Underground Nonpressure Piping: ASTM C 1173 with elastomeric sleeve. Include ends of same sizes as piping to be joined and include corrosion-resistant metal band on each end.

2.2 PVC PIPING

A. PVC Pipe: ASTM D 2665, solid-wall drain, waste, and vent.

1. PVC Socket Fittings: ASTM D 2665, socket type, made to ASTM D 3311, drain, waste, and vent patterns.

B. PVC Special Fittings: ASTM F 409, drainage-pattern tube and tubular fittings with ends as required for application.

PART 3 - EXECUTION

3.1 EXCAVATION

A. Refer to Division 2 Section "Earthwork" for excavating, trenching, and backfilling.

3.2 PIPING APPLICATIONS

A. Transition and special fittings with pressure ratings at least equal to piping pressure ratings may be used in applications below, unless otherwise indicated.

B. Flanges may be used on aboveground pressure piping, unless otherwise indicated.

C. Aboveground, Soil, Waste, and Vent Piping: Use the following piping materials for each size range:

1. NPS 1-1/4 and NPS 1-1/2 (DN 32 and DN 40): PVC pipe, PVC socket fittings, and solvent-cemented joints.
2. NPS 2 to NPS 4 (DN 50 to DN 100): PVC pipe, PVC socket fittings, and solvent-cemented joints.
3. NPS 5 and NPS 6 (DN 125 and DN 150): Use NPS 6 (DN 150) PVC pipe, PVC socket fittings, and solvent-cemented joints.

D. Underground, Soil, Waste, and Vent Piping: Use the following piping materials for each size range:
1. NPS 2 to NPS 4 (DN 50 to DN 100): PVC pipe, PVC socket fittings, and solvent-cemented joints.
2. NPS 5 and NPS 6 (DN 125 and DN 150): PVC pipe, PVC socket fittings, and solvent-cemented joints.

3.3 PIPING INSTALLATION

A. Refer to Division 2 Section "Sanitary Sewerage" for Project-site sanitary sewer piping.

B. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping installation.

C. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers.

D. Install cleanout fitting with closure plug inside the building in sanitary force-main piping.

1. Encase piping with PE film according to ASTM A 674 or AWWA C105.

E. Install cast-iron sleeve with water stop and mechanical sleeve seal at each service pipe penetration through foundation wall. Select number of interlocking rubber links required to make installation watertight. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for sleeves and mechanical sleeve seals.

F. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep ¼ bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8- bend fittings if 2 fixture are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

G. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.

H. Re-verify building drainage piping slope before covering pipe in trench if left uncovered over a 24 hour period of subjected to exterior water. If slope of piping has changed, provide new shoring material to maintain original slope after trench has been covered.

I. Install soil and waste drainage and vent piping at the code required minimum slopes, unless otherwise indicated:

J. Install engineered soil and waste drainage and vent piping systems in locations indicated and as follows:

1. Combination Waste and Vent: Comply with standards of authorities having jurisdiction.
2. Cast-Iron, Sovent, Single Stack: Comply with ASSE 1043 and sovent fitting manufacturer's written installation instructions.
3. Reduced-Size Venting: Comply with standards of authorities having jurisdiction.

K. Sleeves are not required for cast-iron soil piping passing through concrete slabs-on-grade if slab is without membrane waterproofing.

L. Install PVC soil and waste drainage and vent piping according to ASTM D 2665.

M. Install underground PVC soil and waste drainage piping according to ASTM D 2321.

N. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

3.4 JOINT CONSTRUCTION

A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping joint construction.

B. PVC Nonpressure Piping Joints: Join piping according to ASTM D 2665.

3.5 HANGER AND SUPPORT INSTALLATION

A. Refer to Division 15 Section "Hangers and Supports" for pipe hanger and support devices. Install the following:

1. Vertical Piping: MSS Type 8 or Type 42, clamps.
2. Individual, Straight, Horizontal Piping Runs: According to the following:

    a. 100 Feet (30 m) and Less: MSS Type 1, adjustable, steel clevis hangers.
    b. Longer Than 100 Feet (30 m): MSS Type 43, adjustable roller hangers.
    c. Longer Than 100 Feet (30 m), if Indicated: MSS Type 49, spring cushion rolls.

3. Multiple, Straight, Horizontal Piping Runs 100 Feet (30 m) or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
4. Base of Vertical Piping: MSS Type 52, spring hangers.

B. Install supports according to Division 15 Section "Hangers and Supports."

C. Support vertical piping and tubing at base and at each floor.

D. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch (10-mm) minimum rods.

J. Install hangers for PVC piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/2 and NPS 2 (DN 40 and DN 50): 48 inches (1200 mm) with 3/8-inch (10-mm) rod.
2. NPS 3 (DN 80): 48 inches (1200 mm) with ½-inch (13-mm) rod.
3. NPS 4 and NPS 5 (DN 100 and DN 125): 48 inches (1200 mm) with 5/8-inch (16-mm) rod.
4. NPS 6 (DN 150): 48 inches (1200 mm) with ¾-inch (19-mm) rod.
5. NPS 8 to NPS 12 (DN 200 to DN 300): (1200 mm) with 7/8-inch (22-mm) rod.

K. Install supports for vertical PVC piping every 48 inches (1200 mm).

L. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.6 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.

C. Connect drainage and vent piping to the following:

1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code. Refer to Division 15 Section "Plumbing Fixtures."
2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code. Refer to Division 15 Section "Plumbing Specialties."
4. Equipment: Connect drainage piping as indicated. Provide shutoff valve, if indicated, and union for each connection. Use flanges instead of unions for connections NPS 2-1/2 (DN 65) and larger.

3.7 FIELD QUALITY CONTROL

A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.

1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
2. Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
3. Roughing-in Plumbing Test Procedure: Test drainage and vent piping, except outside leaders, on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water (30 kPa). From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.
4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg (250 Pa). Use U-tube or manometer inserted in trap of water closet to measure this pressure. Air pressure must remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.
5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
6. Prepare reports for tests and required corrective action.

3.8 CLEANING

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

END OF SECTION

SECTION 15430
PLUMBING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following plumbing specialties:
   1. Balancing valves.
   2. Washer-supply outlets.
   3. Key-operation hydrants.
   4. Trap seal primer valves.
   5. Drain valves.
   6. Miscellaneous piping specialties.
   7. Sleeve penetration systems.
   8. Flashing materials.
   9. Cleanouts.
   10. Floor drains.
   11. Roof drains.
   12. Grease interceptors.

1.3 DEFINITIONS

A. The following are industry abbreviations for plastic piping materials:

   1. ABS: Acrylonitrile-butadiene-styrene plastic.
   2. PVC: Polyvinyl chloride plastic.

1.4 PERFORMANCE REQUIREMENTS

A. Provide components and installation capable of producing piping systems with following minimum working-pressure ratings, unless otherwise indicated:

   1. Domestic Water Piping: 125 psig (860 kPa).
   2. Sanitary Waste and Vent Piping: 10-foot head of water (30 kPa).
   3. Storm Drainage Piping: 10-foot head of water (30 kPa).

1.5 SUBMITTALS

A. Product Data: Include rated capacities and shipping, installed, and operating weights. Indicate materials, finishes, dimensions, required clearances, and methods of assembly of components; and piping and wiring connections for the following:
   1. Balancing valves.

2. Water hammer arresters, and trap seal primer valves and systems.
3. Hose bibbs, hydrants.
4. Washer-supply outlets.
5. Cleanouts, floor drains, and roof drains.
6. Roof flashing assemblies.
7. Grease interceptors.
8. Sleeve penetration systems.

B. Shop Drawings: Diagram power, signal, and control wiring.

1.6 QUALITY ASSURANCE

A. Product Options: Drawings indicate size, profiles, and dimensional requirements of plumbing specialties and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."

B. Plumbing specialties shall bear label, stamp, or other markings of specified testing agency.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

D. ASME Compliance: Comply with ASME B31.9, "Building Services Piping," for piping materials and installation.

E. NSF Compliance:

1. Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic domestic water piping components. Include marking "NSF-pw" on plastic potable-water piping and "NSF-dwv" on plastic drain, waste, and vent piping.
2. Comply with NSF 61, "Drinking Water System Components--Health Effects, Sections 1 through 9," for potable domestic water plumbing specialties.

PART 2 - PRODUCTS

2.1 BALANCING VALVES

A. Calibrated Balancing Valves: Adjustable, with two readout ports and memory setting indicator. Include manufacturer's standard hoses, fittings, valves, differential pressure meter, and carrying case.
1. Manufacturers:

a. Armstrong Pumps, Inc.
b. Flow Design, Inc.
c. ITT Industries; Bell & Gossett Div.
d. Taco, Inc.
e. Watts Industries, Inc.; Water Products Div.

2. NPS 2 (DN 50) and Smaller: Bronze body with brass ball, adjustment knob, calibrated nameplate, and threaded or solder-joint ends.
3. NPS 2 (DN 50) and Smaller: Bronze, Y-pattern body with adjustment knob and threaded ends.
4. NPS 2-1/2 (DN 65) and Larger: Cast-iron, Y-pattern body with bronze disc and flanged or grooved ends.

B. Memory-Stop Balancing Valves, NPS 2 (DN 50) and smaller: MSS SP-110, ball valve, rated for 400-psig (2760-kPa) mininmum CWP. Include two-piece, copper-alloy body with full-port, chrome-plated brass ball, replaceable seats and seals, threaded or solder-joint ends, and vinyl-covered steel handle with memory-stop device.

1. Manufacturers:

   a. Conbraco Industries, Inc.
   b. Crane Co., Crane Valve Group; Crane Valves.
   c. Grinnell Corporation.
   d. NIBCO INC.
   e. Red-White Valve Corp.

2.2 STRAINERS

A. Strainers: Y-pattern, unless otherwise indicated, and full size of connecting piping. Include ASTM A 666, Type 304, stainless-steel screens with 3/64-inch (1.2-mm) round perforations, unless otherwise indicated.

1. Pressure Rating: 125-psig (860-kPa) minimum steam working pressure, unless otherwise indicated.
2. NPS 2 (DN 50) and Smaller: Bronze body, with female threaded ends.
3. NPS 2-1/2 (DN 65) and Larger: Cast-iron body, with interior AWWA C550 or FDA-approved, epoxy coating and flanged ends.

2.3 OUTLET BOXES

A. Manufacturers:

1. Acorn Engineering Company.
2. Gray, Guy Manufacturing Co., Inc.
3. Symmons Industries, Inc.

B. General: Recessed-mounting outlet boxes with supply fittings complying with ASME A112.18.1M. Include box with faceplate, services indicated for equipment connections, and wood-blocking reinforcement.

C. Clothes Washer Outlet Boxes: With hot- and cold-water hose connections, drain, and the following:

1. Box and Faceplate: [Stainless steel] [Enameled or epoxy-painted steel].
2. Shutoff Fitting: Two hose bibbs.
3. Supply Fittings: Two NPS 1/2 (DN 15) gate, globe, or ball valves and NPS 1/2 (DN 15) copper, water tubing.
4. Drain: NPS 2 (DN 50) standpipe, P-trap, and direct waste connection to drainage piping.
5. Inlet Hoses: Two ASTM D 3571, 60-inch- (1500-mm-) long, rubber household clothes washer inlet hoses with female hose-thread couplings.
6. Drain Hose: One 48-inch- (1200-mm-) long, rubber household clothes washer drain hose with hooked end.

D. Icemaker Outlet Boxes: With hose connection and the following:

1. Box and Faceplate: Stainless steel.
2. Shutoff Fitting: Hose bibb.

3. Supply Fitting: NPS 1/2 (DN 15) gate, globe, or ball valve and NPS 1/2 (DN 15) copper, water tubing.

2.4 KEY-OPERATION HYDRANTS

A. Manufacturers:

1. Josam Co.
2. Smith, Jay R. Mfg. Co.
3. Woodford Manufacturing Co.

B. General: ASME A112.21.3M, key-operation hydrant with pressure rating of 125 psig (860 kPa).

1. Inlet: NPS 3/4 or NPS 1 (DN 20 or DN 25) threaded or solder joint.
2. Outlet: ASME B1.20.7, garden-hose threads.
3. Operating Keys: One with each key-operation hydrant.

C. Moderate-Climate, Concealed-Outlet Wall Hydrants: ASSE 1019, self-drainable with flush-mounting box with cover, integral nonremovable hose-connection vacuum breaker, and concealed outlet.

1. Classification: Type A, for automatic draining with hose removed or Type B, for automatic draining with hose removed or with hose attached and nozzle closed.

D. Hot and Cold, Nonfreeze Concealed-Outlet Wall Hydrants: With deep flush-mounting box with cover; hot- and cold-water casings and operating rods to match wall thickness; concealed outlet; wall clamps; and factory- or field-installed, nonremovable and manual drain-type, hose-connection vacuum breaker complying with ASSE 1011.

2.5 TRAP SEAL PRIMER VALVES

A. Supply-Type Trap Seal Primer Valves: ASSE 1018, water-supply-fed type, with the following characteristics:
1. Manufacturers:

a. Josam Co.
b. MIFAB Manufacturing, Inc.
c. Precision Plumbing Products, Inc.
d. Smith, Jay R. Mfg. Co.

2. 125-psig (860-kPa) minimum working pressure.
3. Bronze body with atmospheric-vented drain chamber.
4. Inlet and Outlet Connections: NPS 1/2 (DN 15) threaded, union, or solder joint.
5. Gravity Drain Outlet Connection: NPS 1/2 (DN 15) threaded or solder joint.
6. Finish: Chrome plated, or rough bronze for units used with pipe or tube that is not chrome finished.

2.6 MISCELLANEOUS PIPING SPECIALTIES

A. Water Hammer Arresters: ASSE 1010 or PDI-WH 201, metal-bellows type with pressurized metal cushioning chamber. Sizes indicated are based on ASSE 1010 or PDI-WH 201, Sizes A through F.
1. Manufacturers:

a. Josam Co.
b. Smith, Jay R. Mfg. Co.
c. Tyler Pipe; Wade Div.
d. Zurn Industries, Inc.; Specification Drainage Operation.

B. Hose Bibbs: Bronze body with replaceable seat disc complying with ASME A112.18.1M for compression-type faucets. Include NPS 1/2 or NPS 3/4 (DN 15 or DN 20) threaded or solder-joint inlet, of design suitable for pressure of at least 125 psig (860 kPa); integral [or field-installed,] nonremovable, drainable hose-connection vacuum breaker; and garden-hose threads complying with ASME B1.20.7 on outlet.

C. Roof Flashing Assemblies: Manufactured assembly made of [4-lb/sq. ft. (20-kg/sq. m), 0.0625-inch-(1.6-mm-)] [6-lb/sq. ft. (30-kg/sq. m), 0.0938-inch- (2.4-mm-)] thick, lead flashing collar and skirt extending at least [6 inches (150 mm)] [8 inches (200 mm)] [10 inches (250 mm)] from pipe with galvanized steel boot reinforcement, and counterflashing fitting.

D. Floor-Drain Inlet Fittings: Cast iron, with threaded inlet and threaded or spigot outlet, and trap seal primer valve connection.

E. Fixed Air-Gap Fittings: Manufactured cast-iron or bronze drainage fitting with semiopen top with threads or device to secure drainage inlet piping in top and bottom spigot or threaded outlet larger than top inlet. Include design complying with ASME A112.1.2 that will provide fixed air gap between installed inlet and outlet piping.

F. Stack Flashing Fittings: Counterflashing-type, cast-iron fitting, with bottom recess for terminating roof membrane, and with threaded or hub top for extending vent pipe.

G. Vent Caps: Cast-iron body with threaded or hub inlet and vandal-proof design. Include vented hood and set-screws to secure to vent pipe.

H. Vent Terminals: Commercially manufactured, shop- or field-fabricated, frost-proof assembly constructed of galvanized steel, copper, or lead-coated copper. Size to provide 1-inch (25-mm) enclosed air space between outside of pipe and inside of flashing collar extension, with counterflashing.

I. Expansion Joints: ASME A112.21.2M, assembly with cast-iron body with bronze sleeve, packing gland, and packing; of size and end types corresponding to connected piping.

2.7 SLEEVE PENETRATION SYSTEMS

A. Manufacturers:

1. ProSet Systems, Inc.

B. Description: UL 1479, through-penetration firestop assembly consisting of sleeve and stack fitting with firestopping plug.

1. Sleeve: Molded PVC plastic, of length to match slab thickness and with integral nailing flange on one end for installation in cast-in-place concrete slabs.
2. Stack Fitting: ASTM A 48 (ASTM A 48M), gray-iron, hubless-pattern, wye-branch stack fitting with neoprene O-ring at base and gray-iron plug in thermal-release harness in branch. Include PVC protective cap for plug.

a. Special Coating: Include corrosion-resistant interior coating on fittings for plastic chemical waste and vent stacks.

2.8 FLASHING MATERIALS

A. Lead Sheet: ASTM B 749, Type L51121, copper bearing, with the following minimum weights and thicknesses, unless otherwise indicated:

1. General Use: 4-lb/sq. ft. (20-kg/sq. m), 0.0625-inch (1.6-mm) thickness.
2. Vent Pipe Flashing: 3-lb/sq. ft. (15-kg/sq. m), 0.0469-inch (1.2-mm) thickness.
3. Burning: 6-lb/sq. ft. (30-kg/sq. m), 0.0938-inch (2.4-mm) thickness.

B. Elastic Membrane Sheet: ASTM D 4068, flexible, chlorinated polyethylene, 40-mil (1.01-mm) minimum thickness.

C. Fasteners: Metal compatible with material and substrate being fastened.

D. Metal Accessories: Sheet metal strips, clamps, anchoring devices, and similar accessory units required for installation; matching or compatible with material being installed.

E. Solder: ASTM B 32, lead-free alloy.

F. Bituminous Coating: SSPC-Paint 12, solvent-type, bituminous mastic.

2.9 CLEANOUTS

A. Cleanouts: Comply with [ASME A112.36.2M] [ASME A112.3.1] <Insert other>.

1. Application: [Floor cleanout] [Wall cleanout] [For installation in exposed piping].
2. Products:
    a. Josam Co.
    b. Mifab
    c. Smith, Jay R. Mfg. Co.
    d. Tyler Pipe, Wade Div.
    e. Zurn Industries, Inc., Specification Drainage Operation.

2.10 FLOOR DRAINS

A. Floor Drains.
1. Products:

    a. Josam Co.
    b. Mifab
    c. Smith, Jay R. Mfg. Co.
    d. Tyler Pipe, Wade Div.
    e. Zurn Industries, Inc.

2.11 ROOF DRAINS

A. Roof Drains: Comply with [ASME A112.21.2M] [ASME A112.3.1].

1. Application: Roof drain.
2. Products:

    a. Josam Co.

b. Mifab
c. Smith, Jay R. Mfg. Co.
d. Tyler Pipe, Wade Div.
e. Watts Industries, Inc., Drainage Products Div.
f. Zurn Industries, Inc.

2.12 GREASE INTERCEPTORS

A. Grease Interceptors: Comply with PDI-G101.
1. Products:

a. American Industrial Precast Products, Inc.
b. Brooks Products
c. Park Equipment Co.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for piping joining materials, joint construction, and basic installation requirements.

B. Install pressure regulators with inlet and outlet shutoff valves and balance valve bypass. Install pressure gages on inlet and outlet.

C. Install strainers on supply side of each control valve, pressure regulator, and solenoid valve.

D. Install trap seal primer valves with outlet piping pitched down toward drain trap a minimum of 1 percent and connect to floor-drain body, trap, or inlet fitting. Adjust valve for proper flow.

E. Install backwater valves in building drain piping. For interior installation, provide cleanout deck plate flush with floor and centered over backwater valve cover, and of adequate size to remove valve cover for servicing.

F. Install expansion joints on vertical risers, stacks, and conductors if indicated.

G. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:

1. Size same as drainage piping up to NPS 4 (DN 100). Use NPS 4 (DN 100) for larger drainage piping unless larger cleanout is indicated.
2. Locate at each change in direction of piping greater than 45 degrees.
3. Locate at minimum intervals of 50 feet (15 m) for piping NPS 4 (DN 100) and smaller and 100 feet (30 m) for larger piping.
4. Locate at base of each vertical soil and waste stack.

H. Install cleanout deck plates with top flush with finished floor, for floor cleanouts for piping below floors.

I. Install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall, for cleanouts located in concealed piping.

J. Install flashing flange and clamping device with each stack and cleanout passing through floors with waterproof membrane.

K. Install vent flashing sleeves on stacks passing through roof. Secure over stack flashing according to manufacturer's written instructions.

L. Install frost-proof vent caps on each vent pipe passing through roof. Maintain 1-inch (25-mm) clearance between vent pipe and roof substrate.

M. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.

1. Position floor drains for easy access and maintenance.
2. Set floor drains below elevation of surrounding finished floor to allow floor drainage. Set with grates depressed according to the following drainage area radii:

    a. Radius, 30 Inches (750 mm) or Less: Equivalent to 1 percent slope, but not less than 1/4-inch (6.35-mm) total depression.
    b. Radius, 30 to 60 Inches (750 to 1500 mm): Equivalent to 1 percent slope.
    c. Radius, 60 Inches (1500 mm) or Larger: Equivalent to 1 percent slope, but not greater than 1-inch (25-mm) total depression.

3. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
4. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.

N. Install roof drains at low points of roof areas according to roof membrane manufacturer's written installation instructions.

1. Install roof-drain flashing collar or flange so no leakage occurs between drain and adjoining roofing. Maintain integrity of waterproof membranes where penetrated.
2. Position roof drains for easy access and maintenance.

O. Install interceptors, including trapping, venting, and flow-control fitting, according to authorities having jurisdiction and with clear space for servicing.

1. Flush with In-Ground Installation: Set unit and extension, if required, with cover flush with finished grade.
2. Install cleanout immediately downstream from interceptors not having integral cleanout on outlet.

P. Fasten wall-hanging plumbing specialties securely to supports attached to building substrate if supports are specified and to building wall construction if no support is indicated.

Q. Fasten recessed-type plumbing specialties to reinforcement built into walls.

R. Install wood-blocking reinforcement for wall-mounting and recessed-type plumbing specialties.

S. Install individual shutoff valve in each water supply to plumbing specialties. Use ball, gate, or globe valve if specific valve is not indicated. Install shutoff valves in accessible locations. Refer to Division 15 Section "Valves" for general-duty ball, butterfly, check, gate, and globe valves.

T. Install escutcheons at wall, floor, and ceiling penetrations in exposed finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding pipe fittings.

3.2 CONNECTIONS

A. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment to allow service and maintenance.

C. Connect plumbing specialties to piping specified in other Division 15 Sections.

D. Ground equipment.

E. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

F. Connect plumbing specialties and devices that require power according to Division 16 Sections.

G. Interceptor Connections: Connect piping, flow-control fittings, and accessories.

1. Grease Interceptors: Connect inlet and outlet to unit, and flow-control fitting and vent to unit inlet piping.

3.3 FLASHING INSTALLATION

A. Fabricate flashing from single piece unless large pans, sumps, or other drainage shapes are required. Join flashing according to the following if required:

1. Lead Sheets: Burn joints of lead sheets 6-lb/sq. ft. (30-kg/sq. m), 0.0938-inch (2.4-mm) thickness or thicker. Solder joints of lead sheets 4-lb/sq. ft. (20-kg/sq. m), 0.0625-inch (1.6-mm) thickness or thinner.

B. Install sheet flashing on pipes, sleeves, and specialties passing through or embedded in floors and roofs with waterproof membrane.

1. Pipe Flashing: Sleeve type, matching pipe size, with minimum length of 10 inches (250 mm), and skirt or flange extending at least 8 inches (200 mm) around pipe.
2. Sleeve Flashing: Flat sheet, with skirt or flange extending at least 8 inches (200 mm) around sleeve.
3. Embedded Specialty Flashing: Flat sheet, with skirt or flange extending at least 8 inches (200 mm) around specialty.

C. Set flashing on floors and roofs in solid coating of bituminous cement.

D. Secure flashing into sleeve and specialty clamping ring or device.

E. Install flashing for piping passing through roofs with counterflashing or commercially made flashing fittings, according to Division 7 Section "Sheet Metal Flashing and Trim."

F. Extend flashing up vent pipe passing through roofs and turn down into pipe, or secure flashing into cast-iron sleeve having calking recess.

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled trap seal primer systems and their installation, including piping and electrical connections. Report results in writing.

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation. Remove malfunctioning units, replace with new units, and retest.
3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.5 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION

SECTION 16010

SUMMARY OF ELECTRICAL WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, Division 1 Specification Sections and other Division 15 Specification Sections, apply to this Section.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

A. The following Summary of Work is intended as an aid to achieve an understanding of the various elements of work included in the project, as is not intended to be all-inclusive. Detailed descriptions of work and requirements are given in drawings and specifications.

B. General Scope of Work:

1. Providing conduits, wiring, and new light fixtures.

1.4 COORDINATION

A. All electrical work shall be done under sub-contract to a General Contractor. Electrical Contractor shall coordinate all work through General Contractor, even in areas where only electrical work is to take place.

B. Work shall take place with minimal disruption to Owner's operations in areas surrounding the new building.

C. Cooperate fully with other contractors so that work under those contracts may be carried out smoothly, without interfering with or delaying work under this Contract.

D. Fully coordinate with mechanical contractor for providing power to mechanical equipment.

1.5 UTILITIES

1. Coordinate with power company and provide conduit, and trenching from transformer to power source. Coordinate with water, telephone, cable and gas utilities to locate all utilities prior to digging in any area.
2. Obtain any approvals required from utilities to relocate utilities.
3. Cost of relocating or bypassing utilities indicated on drawings shall be included in Base Bid.

1.6 CONTRACTOR USE OF PREMISES

A. Use of the Site: Limit use of the premises to work in areas indicated. Confine operations to areas within contract limits indicated. Do not disturb portions of the site beyond the areas in which the Work is indicated.

1. Owner Occupancy: Allow for Owner occupancy and use by the public.
2. Driveways and Entrances: Keep driveways and entrances serving the premises, clear and available to the Owner, the Owner's employees, and emergency vehicles at all time. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

B. Site Safety: Take every precaution to ensure the site does not present a threat to the safety of occupants and/or workers. Minimal safety requirements include, but are not limited to the following:

1. Temporary fencing around construction areas.

2. Yellow caution tape and construction barricades along open trenches during the day. Trenches shall be covered at night and warning lights provided on construction barricades.
3. Temporary fencing around equipment while site work is in progress.

1.7 SUBMITTALS

1. To extradite the submittal process more efficiently, do not piece-meal the submittals. Submit entire electrical in a bound enclosure. This will eliminate delays in the submittal process. Unbound submittals shall be returned without review. Submit 10 copies minimum.

END OF SECTION

SECTION 16020

BASIC ELECTRICAL REQUIREMENTS

PART 1 – GENERAL

1.1 RELATED REQUIREMENTS

A. The General Provisions, Supplemental General Provisions, Special Provisions, Division 1 Specification Sections and all relevant documents shall form a part of this Division of the Specifications, and shall be incorporated in this Section and each Division 16 Section hereinafter as if repeated verbatim herein. All conditions imposed by these documents shall be applicable to all portions of the work under this Division. Certain specific paragraphs of said references may be referred to hereinafter in this Division. These references are intended to point out specific items to the Contractor, but in no way relieve him of the responsibility of reading and complying with all relevant parts of the entire Specification.

B. The Contractor shall examine and coordinate with all Contract Drawings and Specifications, and all Addenda issued. Failure to comply shall not relieve him of responsibility. The omission of details of other portions of the work from this Division shall not be used as a basis for a request for additional compensation.

C. The specific features and details for other portions of the work related to the construction in progress or to the adjacent building shall be determined by examination at the site.

1.2 SCOPE OF WORK

A. The requirements contained in this Section apply to all work performed under Division 16 of these Specifications.

B. The work covered by this Division of the Specifications comprises the furnishing of labor, material, equipment, transportation, tools and services, and performing operations required for, and reasonably incidental to, the installation of the work in accordance with the applicable Contract Documents, and subject to the terms and conditions of the Contract.

C. Refer to other Divisions of the Specifications for related work.

1.3 DEFINITION OF "CONTRACTOR"

A. Where the word "Contractor" is used under any Section of this Division of the Specifications, it shall mean the Contractor engaged to execute the work included under that Section, even though this Contractor may be technically described as a Subcontractor, or an authorized representative.

B. If the Contractor, engaged to execute a portion of the work, employs a Subcontractor to perform some of that work, he shall be completely responsible for the proper execution of this Subcontractor’s work, in full conformity with the Contract Documents.

1.4 RESPONSIBILITY OF THE CONTRACTOR

A. The Contractor shall be responsible for all work of every description in connection with this Division of the Specifications. The Contractor shall specifically and distinctly assume, and does so assume, all risk for damage or injury from whatever cause to property or person used or employed on or in connection with this work and of all damages or injury to any person or property wherever located, resulting from an action or operation under the Contract in connection with the work, and undertake the responsibility to defend the Owner against all claims on account of any such damage or injury.

B. The Contractor will be held responsible for the satisfactory execution and completion of the work in accordance with the true intent of the Contract Documents. The Contractor shall provide without extra charge all incidental items required as part of the work, even though it may not be specifically indicated. If the Contractor has reason for objecting to the use of any material, equipment, device or method of construction as indicated, the Contractor shall make report of such objections to the Owner's Representative, obtain proper approval and adjustment to the Contract, and shall proceed with the work.

1.5 TERMINOLOGY

A. Whenever the words "furnish", "provide", "furnish and install", "provide and install", and similar phrases occur, it is the intent that the materials, equipment and devices described be furnished, installed and connected under this Division, complete for operation, unless specifically noted to the contrary.

B. It is also the intent, unless specifically noted to the contrary, that all materials, equipment and devices described and specified under this Division of the Specifications be similarly furnished, installed and connected under this Division, whether or not a phrase as described in the preceding paragraph has been actually included.

C. Whenever the words “Owner’s Representative” occurs, it is intended to refer to the Architect, Engineer and/or specific Owner’s Representative responsible for or capable of providing the necessary direction pertaining to the referenced issue.

1.6 ORDINANCES, PERMITS AND CODES

A. It shall be the Contractor's duty to perform the work and provide the materials covered by these specifications in conformance with all ordinances and regulations of all authorities having jurisdiction.

B. All work herein shall conform to all applicable laws, ordinances and regulations of the local utility companies.

C. The Contractor shall obtain and pay for all permit and connection fees as required for the complete installation of the specified systems, equipment, devices and materials.

D. The Contractor shall obtain permits, plan checks, inspections and approvals applicable to the work as required by the regulatory authorities. Fees and costs of any nature whatsoever incidental to these permits, inspections and approvals shall be assumed and paid by the Contractor. The pro-rata costs, if any, for utilities serving this property will be paid for by the Owner and shall not be included as part of this Contract.

E. The work shall be in accordance with, but shall not be limited to, the requirements of:

1 National Fire Protection Association

2 National Electrical Code

3 National Safety Code

4 State of Texas Safety Code

5. Local City Building Codes

6. State of Texas Building Codes

F. Codes and standards referred to are minimum standards. Where the requirements of the Drawings or Specifications exceed those of the codes and regulations, the Drawings and Specifications govern.

1.7 MATERIALS, EQUIPMENT AND DEVICE DESCRIPTION

A. Materials, equipment and devices shall be of the best quality customarily applied in quality commercial practice, and shall be the products of reputable manufacturers. Each major component shall bear a nameplate giving the name and address of the manufacturer, and the catalog number or designation of the component.

B. Materials, equipment and devices furnished under this Division of the Specifications shall be essentially the standard product of the specified manufacturer, or where allowed, an alternate manufacturer. Where two or more units of the same kind or class of a specific item are required, these shall be the products of a single manufacturer; however, the component parts of the item need not be the products of one manufacturer.

C. In describing the various materials, equipment and devices, in general each item will be described singularly, even though there may be a multiplicity of identical items. Also, where the description is only general in nature, exact sizes, duties, space arrangements, horsepower requirements and other data shall be determined by reference to the Contract Documents.

D. Space allocations for materials, equipment and devices have been made on the basis of present and known future requirements and the dimensions of items of equipment or devices of a particular manufacturer whether indicated or not. The Contractor shall verify that all materials, equipment and devices proposed for use on this project are within the constraints of the allocated space.

1.8 QUALITY ASSURANCE

A. Materials, equipment and devices shall be new and of the quality specified, and shall be free from defects at the time of installation. Materials, equipment and devices damaged in shipment or otherwise damaged or found defective prior to acceptance by the Owner shall not be repaired at the job site, but shall be replaced with new materials, equipment or devices identical with those damaged, unless specifically approved otherwise by the Owner's Representative.

B. Wherever a UL standard has been established for a particular type of material, equipment or device, each item of such material, equipment or device provided on this project shall meet the requirements of the UL standard in every way, and shall be UL listed and labeled.

1.9 REFERENCE STANDARDS

A. Materials, equipment, devices and workmanship shall comply with applicable local, county, state and national codes, laws and ordinances, utility company regulations and industry standards.

B. In case of differences between building codes, state laws, local ordinances, industry standards, utility company regulations and the Contract Documents, the most stringent shall govern. The Contractor shall promptly notify the Owner's Representative in writing of any such difference. Should the Contractor perform any work that does not comply with local codes, laws and ordinances, industry standards or other governing regulations, the work shall be corrected of noncompliance deficiencies with the Contractor bearing all costs.

C. In addition to the aforementioned ordinances, industry standards published by the following organizations shall apply:

AABM	-	American Association of Battery Manufacturers
ADA	-	American's with Disabilities Act
AIA	-	American Institute of Architects
ANSI	-	American National Standards Institute
ASTM	-	American Society for Testing and Materials
CBM	-	Certified Ballast Manufacturers Association
ETL	-	Electrical Testing Laboratories
FM	-	Factory Mutual
ICEA	-	Insulated Cable Engineers Associated
IEEE	-	Institute of Electrical and Electronic Engineers
IES	-	Illuminating Engineering Society
IRI	-	Industrial Risk Insurance
NBS	-	National Bureau of Standards
NEC	-	National Electrical Code
NECA	-	National Electrical Contractors Association
NEMA	-	National Electrical Manufacturers Association
NESC	-	National Electrical Safety Code
NETA	-	National Electrical Testing Association
NFPA	-	National Fire Protection Association
UL	-	Underwriters Laboratories

1.10 DRAWINGS AND SPECIFICATIONS

A. The interrelation of the Drawings (including the schedules) and the Specifications are as follows:

1 The Drawings establish quantities, locations, dimensions and details of materials, equipment and devices. The schedules on the Drawings indicate the capacities, characteristics and components.

2 The Specifications provide written requirements for the quality, standard and nature of the materials, equipment, devices and construction systems.

B. The Drawings and Specifications shall be considered as being compatible; therefore, the work

called for by one and not by the other shall be furnished and installed as though called for by both. Resolution of conflicts between Drawings and Specifications shall be as follows:

1 If the Drawings and Specifications disagree in themselves, or with each other, the Contractor's pricing shall be based on furnishing and installing the most expensive combination of quality and quantity of work indicated for a complete operable system. Contractor is responsible to notifying the Architect and Engineer. In the event of this type of disagreement, the resolution shall be determined by the Owner's Representative. The contractor shall assume for an operable system at the most expensive combination as per the latest National Electrical Code. The contractor shall review all drawings and specifications prior to bid date.

2 The Contractor shall be responsible for bringing any conflicts in the Drawings and the Specifications to the attention of the Owner's Representative immediately, prior to bid date.

3 In general, if there is conflict between the Drawings and Specifications, the Drawings shall govern the Specifications.

4 Where the Specifications do not fully agree with schedules on the Drawings, the schedules shall govern. Actual numerical dimensions indicated on the Drawings govern scale measurements and large scale details govern small scale drawings.

5 Materials, equipment and devices called for on the Drawings and not indicated herein, shall be completely provided and installed as though it were fully described herein.

6 Materials, equipment and devices called for herein shall be completely provided and installed, whether or not it is fully detailed, scheduled or indicated on the Drawings.

C. The Contractor shall examine the Drawings and Specifications of the other portions of the work for fixtures and finishes in connection with this work. The Contractor shall carefully examine the Drawings to determine the general construction conditions, and shall familiarize himself with all limitations caused by such conditions.

D. When discrepancies exist between scale and dimension, or between the Drawings of the various portions of the work, they shall be called to the attention of the Owner's Representative for further instruction, whose instructions shall be final and binding and work promptly resumed without any additional cost to the Owner.

E. Review the construction details of the building(s) as illustrated on the Drawings of the other portions of the work, i.e., architectural, structural, civil, landscape, etc., and be guided thereby. Route conduits and set all boxes as required by the pace of the general construction.

F. The Drawings diagrammatically show the sizes and locations of the various equipment and devices, and the sizes of the major interconnecting wires, without showing exact details as to elevations, offsets, control wiring and other installation requirements. Carefully layout the work at the site to conform to the architectural and structural conditions, to avoid obstructions and to permit proper grading of pipe associated with other portions of the work. In cooperation with other Contractors, determine the exact location of equipment and devices and connections thereto by reference to the submittals and rough-in drawings, and by measurements at the site. Make minor relocations necessitated by the conditions at the site, or directed by the Owner's Representative, without additional cost to the Owner.

G. The Drawings and Specifications are intended to describe and illustrate systems which will not interfere with the structure of the building(s), fit into the available spaces, and insure complete and satisfactory operating installations. Prepare installation drawings as required for all critical areas

illustrating the installation of the work in this Division as related to the work of all other Divisions and correct all interferences with the other portions of the work or with the building structures before the work proceeds.

H. The Drawings do not indicate the existing electrical installations other than to identify modifications or extensions thereto. Visit the site and ascertain the conditions to be met and the work to be accomplished in removing and modifying the existing work, and in installing the new work. Failure to comply with this shall not constitute grounds for any additional payment in connection with removing or modifying any part of the existing installation or installing any new or temporary work under this Division.

1.11 SUBMITTALS

A. Submit product data and shop drawings in accordance with Division 1 of the Specifications.

B. Process product data and shop drawings to insure that the proposed materials, equipment and devices conform to the requirements of the Contract Documents, and that there are no omissions or duplications. Provide layouts, fabrication information and data for systems, materials, equipment and devices proposed for the project.

C. Submittals shall be provided for review and approval on all systems, equipment, devices and materials proposed for use on this project. Submittals shall include, but not be limited to, the following:

1 Lighting and Appliance Panelboards

2 Disconnect Switches

3 Circuit Breakers and Fuses

4 Materials: conduit, conductors, connectors, supports, etc.

5 Lighting Fixtures, Lamps and Control Systems/Devices

6 Wiring Devices

7 Transformers

8 Distribution Panelboards

9 Motor Control Center

10 As indicated on each submittal section

D. The product data shall not consist of manufacturer's catalogs or cut sheets that contain no indication of the exact item offered. The submission on individual items shall designate the exact item offered.

E. Do not submit detailed quantitative listings of materials, equipment and devices. It is the Contractor's responsibility to provide proper sizes and quantities to conform to Contract Documents.

F. Assemble submittals on related items procured from a single manufacturer in bound brochures or other suitable package form, rather than submitting a multiplicity of loose sheets.

G. Prepare shop drawings whenever equipment proposed varies in physical size and arrangement

from that indicated thus causing rearrangement of equipment space, where tight spaces require extreme coordination between this work and other work, where called for elsewhere in these Specifications and where specifically requested by the Owner's Representative. Shop drawings shall be prepared at a scale of not less than 1/4 inch equals 1 foot.

H. The Contractor shall sign the submittal as an indication of compliance with the Contract Documents. If there are any deviations from the Contract Documents, he shall so indicate on the submittal. Any deviations not so indicated shall be cause for rejection and removal of the non-complying equipment at the Contractor's expense.

1.12 SUBSTITUTIONS

A. Where a single manufacturer is mentioned by trade name or manufacturer's name, unless specifically noted otherwise, it is the only manufacturer that will be accepted.

B. Where multiple manufacturers are listed, none other than those manufacturers will be accepted.

C. Manufacturers not listed will be considered for substitution prior to bid only. The substitute manufacturer shall submit a complete copy of the appropriate technical specification section minimum seven (7) business days prior to bid with each sub-paragraph noted with the comment, "compliance", "deviation", "alternate" or "not applicable". In the case of non-primary, vendor-supplied items, the name of the sub-vendor supplying said item, including model number, shall be indicated.

1 By noting the term "compliance" or "C", it shall be understood that the manufacturer is in full compliance with the item specified and will provide exactly the same with no deviations.

2 By noting the term "deviation" or "D", it shall be understood that the manufacturer prefers to provide a different component in lieu of that specified. Manufacturer shall indicate all deviations.

3 By noting the term "alternate" or "A", it shall be understood that the manufacturer proposes to provide the same operating function but prefers to do it in a different manner. An alternate shall be fully described as to what the manufacturer proposes to provide.

4 By noting the term "not applicable" or "N/A", it shall be understood that the specified item is not applicable to the project.

D. It shall be understood that space allocations have been made on the basis of present and known future requirements and the dimensions of items of equipment or devices of a particular manufacturer whether indicated or not. If any item of equipment or device is offered in substitution which differs substantially in dimension or configuration from that indicated on the Drawings or specifications, provide as part of the submittal 1/4 inch equals 1 foot scaled drawings showing that the substitute can be installed in the space available without interfering with other portions of the work or with access for operations and maintenance in the completed project.

E. Where substitute equipment or devices requiring different arrangement or connections from that indicated is accepted by the Owner's Representative, install the equipment or devices to operate properly and in harmony with the intent of the Contract Documents, making all incidental changes in piping, ductwork or wiring resulting from the equipment or device selection without any additional cost to the Owner. The Contractor shall pay all additional costs incurred by other

portions of the work in connection with the substituted equipment or device.

F. The Owner's Representative reserves the right to call for samples of any item of material, equipment or device offered in substitution, together with a sample of the specific item when, in their opinion, the quality of the item and/or the appearance is involved, and it is deemed that an evaluation of the item may be better made by visual inspection.

G. When any request for a substitution of material, equipment or device is submitted and rejected, the item named in the Contract Documents shall be furnished. Repetitive submittal of substitutions for the same item will not be considered.

1.13 INSTALLATION DRAWINGS

A. Prepare installation drawings for coordinating the work of this Division with the work of other Divisions, to illustrate its concealment in finished spaces, to avoid obstructions, and to demonstrate the adaptability of any item of material, equipment or device in the space upon which the Contract Documents are based.

B. Use these drawings in the field for the actual installation of this work. Provide three (3) copies, not for approval, to the Owner's Representative for his information, review and record.

1.14 WORKMANSHIP AND INSTALLATION

A. In no case shall the Contractor provide a class of material, equipment, device or workmanship less than that required by the Contract Documents or applicable codes, regulations, ordinances or standards. All modifications which may be required by a local authority having legal jurisdiction over all or any part of the work shall be made by the Contractor without any additional charge. In all cases where such authority requires deviations from the requirements of the Drawings or Specifications, the Contractor shall report same to the Owner's Representative and shall secure his approval before the work is started.

B. The work shall be performed by properly licensed technicians skilled in their respective trades. All materials, equipment and devices shall be installed in accordance with the recommendations of the manufacturer and in the best standard practice to bring about results of a first class condition.

C. The NECA "Standards of Installation" as published by the National Electrical Contractors Association shall be considered a part of these Specifications, except as specifically modified by other provisions contained in these Specifications.

1.15 INSPECTION OF SITE

A. The accompanying drawings do not indicate existing installations other than to identify modifications of and extensions thereto. The Contractor shall visit the site, inspect the installations and ascertain the conditions to be met and the work to be performed. Failure to comply with this shall not constitute ground for any additional payments in connection with removing or modifying any part of the existing installations and/or installing any new work under this Division.

B. Review construction details of the adjacent building presently under construction during the site inspection and include all work required to modify the existing installations and install new materials, comprising a part of the installation. Review all construction details of the new building as illustrated on the drawings and be guided thereby.

1.16 WARRANTY

A. All materials, equipment, devices and workmanship shall be warranted for a period of one year

from the date of acceptance by the Owner's Representative for beneficial use by the Owner, except that where specific equipment is noted to have extended warranties. The warranty shall be in accordance with AIA Document A201. The Contractor shall be responsible for the proper registration of these warranties so that the Owner can make all proper claims should future need develop.

B. The Contractor shall furnish to the Owner's Representative for transmittal to the Owner, the name, address and telephone number of those persons responsible for service on systems and equipment covered by the warranty.

1.17 OPERATION PRIOR TO ACCEPTANCE

A. When any equipment is operable, and it is to the advantage of the Contractor to operate the equipment, the Contractor may do so provided that he properly supervises the operation, and retains full responsibility for the equipment operated. Regardless of whether or not the equipment has or has not been operated, the Contractor shall clean the equipment properly, make required adjustments and complete punch list items before final acceptance by the Owner.

1.18 INSTRUCTION OF OWNER'S PERSONNEL

A. Provide the services of competent engineers and/or technicians acceptable to the Owner's Representative to instruct other representatives of the Owner in the complete and detailed operation of each item of equipment or device of all the various electrical systems. These instructions shall be provided for whatever periods may be necessary to accomplish the desired results. Upon completion of these instructions, the Contractor shall obtain a letter of release, acknowledged by the Owner or his authorized representative, stating the dates on which the various kinds of instruction were given, and the personnel to whom the instructions were given.

B. The Contractor shall be fully responsible for proper maintenance of equipment and systems until the instructions have been given to the Owner's personnel and the letter of release acknowledged.

C. In providing the instructions to the Owner's personnel, the written operating and maintenance manuals shall be followed in all instances, and the Owner's personnel shall be familiarized with such manuals. Operating and maintenance manuals used for instructions shall include wiring diagrams, manufacturer's operating and maintenance instructions, parts lists (with sources identified), and other data as appropriate for each system.

1.19 SCHEDULE AND SEQUENCE OF WORK

A. The Contractor shall meet and cooperate with the Owner and Owner's Representative to schedule and sequence this work so as to insure meeting scheduled completion dates and avoid delaying other portions of the work. Work requiring special sequencing shall be at no additional cost to the Owner and shall have no impact on the schedule.

1.20 INSTALLATION INSPECTIONS AND CERTIFICATIONS

A. Obtain timely inspections of the installation by the regulatory authorities. Remedy any deficiencies to the satisfaction of the inspecting official.

B. Upon final completion of the work, obtain certificates of acceptance from the regulatory authorities. Deliver the certificates to the Owner's Representative for transmission to the Owner.

1.21 EQUIPMENT INSTALLATION

A. Install equipment and devices in a manner to permit access to all surfaces or components, requiring such access, without the need to disassemble other unrelated parts of the work.

B. Equipment specified to be factory assembled and tested prior to shipment shall not be disassembled at the job site and reassembled at its final location. Apparatus not so specified may be disassembled and reassembled in the proper location.

C. Furnish all scaffolding, rigging and hoisting required for the installation of all the work.

1.22 CONCRETE HOUSEKEEPING PADS

A. Concrete housekeeping pads shall be provided for all floor mounted equipment, unless noted or required otherwise.

B. All pads shall be not less than 3-1/2" high and extend a maximum 3" beyond the actual equipment size. Coordinate the proper size of the pad with the equipment furnished. Pads shall be poured in forms built of new dressed lumber with corners chamfered using sheet metal or triangular wood strips nailed to the form. Use 6 x 6 No. 3 mesh for reinforcing. Install heavy duty adjustable anchor bolts, set in the form and positioned using templates, prior to pouring concrete. After the equipment is set on the pad, the equipment shall be aligned, leveled and fully grouted to the pad and all void spaces shall be filled with a non-shrinking grout.

C. Perform all concrete work specified to be provided under this Division in strict accordance with the applicable provisions of Division 3, CONCRETE.

1.23 SLEEVES

A. Each conduit, regardless of material, which passes through a concrete slab, masonry wall, or roof or portion of the building structure shall be free from the structure and shall pass through a sleeve.

B. All sleeves shall be constructed from electrical-metallic tubing or equivalent weight galvanized steel tubing and shall be flush on both sides of the surface penetrated, unless noted otherwise. All sleeves penetrating the roof areas shall extend a minimum 10 inches above the roof with approved weatherproof counterflashing attached to the conduit above the roof. All sleeves penetrating floors shall extend a minimum of 6 inches above the finished floors. The sleeves shall be sized to allow free passage of the conduit to be inserted.

C. Sleeves passing through walls or floors on or below grade or in moist areas shall be constructed of galvanized rigid steel and shall be designed with a suitable flange in the center to form a waterproof passage. After the conduit has been installed in the sleeves, the void space around the conduit shall be caulked and filled with an asphalt-base compound to insure a waterproof penetration. Jute twine caulking shall not be used due to susceptibility to termite infestation.

1.24 ESCUTCHEONS

A. In each finished space, provided a chromium plated, sectional escutcheon on each conduit, or hanger rod penetrating a wall, floor or ceiling.

B. Size escutcheons and collars to fit snugly around conduit and rods.

C. Where required, provide escutcheons with set screws so that they fit snugly against the finished surface.

1.25 ACCESS PANELS

A. Provide wall and ceiling access panels for unrestricted access to all concealed electrical equipment items and devices installed behind furrings, chases or non-removable suspended ceilings.

B. Access panels shall be UL listed and labeled as required to suit the fire rating of the surface in which installed, with mounting straps, concealed hinges, screwdriver locks, 180 degree open door design, 16 gauge steel construction and door and frame finished in prime coat finish. Panels shall be 12-inch by 12-inch minimum size, but shall be larger as the access requirement of the concealed electrical equipment item or device increases.

1.26 SEALING OF PENETRATIONS

A. All penetrations in horizontal or vertical fire-rated construction shall be sealed using approved fire-rated sealing materials equivalent to the following:

1 Foam: Dow Corning 3-6548 RTV silicone foam, liquid component Part 4 (black) and liquid component Part B (off-white).

2 Sealant: Dow Corning 96-081 RTV silicone adhesive sealant.

3 Damming Materials: Mineral fiberboard, mineral fiber matting, mineral fiber putty, plywood or particle board, as selected by applicator.

B. Preparation: Remove combustible materials and loose impediments from penetration opening and involved surfaces. Remove free liquid and oil from penetration surfaces.

C. Installation: In accordance with manufacturer's instructions, install damming materials and sealant to cover and seal penetration openings; inject foam mixtures into openings.

D. In addition to the Dow Corning products, equal products by Spec Seal Firestop Products, 3M Fire Barrier or CS240 Firestop are acceptable.

1.27 PROTECTION OF APPARATUS

A. At all times take every precaution to properly protect apparatus from damage due to dust, dirt, water, etc. or from damage due to physical forces. Include the erection of temporary shelters as required, to adequately protect any apparatus stored at the site, the cribbing of any apparatus directly above the construction, and the covering of apparatus in the incomplete building with tarpaulins or other protective covering. Failure on the part of the Contractor to comply with the above to the entire satisfaction of the Owner's Representative will be sufficient cause for the rejection of the pieces of apparatus in question.

B. Responsibility for the protection of apparatus extend also to existing apparatus involved in this Division of the work, whether such apparatus is designated to be used temporarily and later removed, or is to be reused as a part of the permanent installation. Erect temporary sheltering structures, provide temporary bracing and supports, or cover equipment as required or directed to afford proper protection for that equipment.

C. The Contractor shall protect this work and the work of all other Contractors from damage by his work or workmen and shall make good any damage thus caused. He shall also be responsible for the proper protection of his equipment, machinery, materials and accessories delivered and installed on the job.

1.28 INSTALLATION OF CONTROL AND OPERATING DEVICES

A. The highest operable part of controls (light switches, dimmer switches, emergency power off devices, etc.), receptacles (electrical and communications) and other operable devices shall be 48"

above finish floor. The lowest operable part shall be no less than 15" above finished floor. For purposes of uniformity, unless noted otherwise, the top of a device shall be maximum 48" AFF and the bottom of a device shall be minimum 15" AFF. Refer to the electrical symbols list on the Drawings for specific requirements.

B. Visual alarm appliances shall be placed 80" above finished floor (the highest floor level within a space) or 6" below the ceiling, whichever is lower.

1.29 INSTALLATION AND CONNECTION OF OTHER DIVISION'S EQUIPMENT

A. Verify the electrical requirements of all equipment furnished under other Divisions, separate contracts, or by the Owner. Install conduit, power wiring, control wiring, devices, etc. as required for complete operation of all equipment.

1.30 OPTION TO RELOCATE OUTLETS AND RELATED DEVICES

A. The location of power, data and telephone outlets, wall switches and other related devices may be relocated at the Owner's option, at no additional cost to the Owner, to a point within 10 feet of their present location provided the Contractor is notified prior to installation.

1.31 COOPERATION AND CLEAN-UP

A. It shall be the responsibility of the Contractor to cooperate fully to keep the job site in a clean and safe condition. Upon the completion of the job, the Contractor shall immediately remove all of his tools, equipment, surplus materials and debris.

B. After the installation is complete, and before the equipment is energized, clean the interior and exterior of all equipment thoroughly. Clean equipment, removing all debris, rubbish and foreign materials. Each component shall be cleaned and all dust and other foreign material removed. Components shall be cleaned of oxidation. The inside and outside of all switchgear shall also be wiped clean with a lemon-oil rag after all other cleaning is complete.

C. Any portion of the work requiring touch-up finishing shall be so finished to equal the specified finish on the product.

1.32 RECORD DRAWINGS AND DOCUMENTATION FOR OWNER

A. The Contractor shall obtain at his own expense a complete set of blueline prints on which to keep an accurate record of the installation of all materials, equipment and devices covered by the Contract. The Contractor shall record up to date information at least once a week and retain the set of prints on site for periodic review by the Architect/Engineer. The record drawings shall indicate the location of all equipment and devices, and the routing of all systems. If the Contractor prepared large scale installation drawings of electrical rooms, conduit routing, busduct, routing, etc., these drawings or reproducible sepias therefrom shall be revised as required to accurately illustrate the actual installation. All conduit buried in concrete slabs, walls and below grade shall be located by dimension; both horizontally and by vertical elevation, unless a surface mounted device in each space indicates the exact location.

B. Upon anticipated completion of the job, obtain one complete reproducible set of the original drawings on which to neatly, legibly and accurately transfer all project related notations and deliver these record drawings to the Architect/Engineer at job completion before final payment and delivery to the Owner. This information shall be delivered prior to final acceptance.

C. The Contractor shall accumulate in duplicate during the job progress, the following data prepared in indexed 3-ring looseleaf, hard-back binders sized for 8-1/2 inch by 11 inch sheets. No binder

shall exceed 3-1/2 inches thick. This data shall be turned over to the Owner's Representative for review and subsequent delivery to the Owner prior to final acceptance.

1 Warranties, guarantees and manufacturer's directions on material, equipment and devices covered by the Contract.

2 Approved lighting fixture brochures, wiring diagrams and control diagrams.

3 Copies of approved submittals and shop drawings.

4 Operating instructions and recommended maintenance procedures for major apparatus.

5 Copies of all other data and/or drawings required during construction.

6 Repair parts list of major apparatus, including name, address and telephone number of local supplier or representative.

7 Tag charts and diagrams hereinbefore specified.

1.33 FINAL OBSERVATION

A. The purpose of the final observation is to determine whether the Contractor has completed the construction in accordance with the Contract Documents and that in the Owner Representative's opinion the installation is satisfactory for final acceptance by the Owner.

B. It shall be the responsibility of the Contractor to assure that the installation is ready for final acceptance prior to calling upon the Owner's Representative to make a final observation.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 16050

BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Raceways.
2. Building wire and connectors.
3. Supporting devices for electrical components.
4. Electrical identification.
5. Electricity-metering components.
6. Concrete equipment bases.
7. Electrical demolition.
8. Cutting and patching for electrical construction.
9. Touchup painting.

1.3 DEFINITIONS

A. EMT: Electrical metallic tubing.

B. FMC: Flexible metal conduit.

C. IMC: Intermediate metal conduit.

D. LFMC: Liquidtight flexible metal conduit.

E. RNC: Rigid nonmetallic conduit.

1.4 SUBMITTALS

A. Product Data: For electricity-metering equipment.

B. Shop Drawings: Dimensioned plans and sections or elevation layouts of electricity-metering equipment.

C. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

1.6 COORDINATION

A. Coordinate chases, slots, inserts, sleeves, and openings with general construction work and arrange in building structure during progress of construction to facilitate the electrical installations that follow.

1. Set inserts and sleeves in poured-in-place concrete, masonry work, and other structural components as they are constructed.

B. Sequence, coordinate, and integrate installing electrical materials and equipment for efficient flow of the Work. Coordinate installing large equipment requiring positioning before closing in the building.

C. Coordinate electrical service connections to components furnished by utility companies.

1. Coordinate installation and connection of exterior underground and overhead utilities and services, including provision for electricity-metering components.

2. Comply with requirements of authorities having jurisdiction and of utility company providing electrical power and other services.

D. Coordinate location of access panels and doors for electrical items that are concealed by finished surfaces. Access doors and panels are specified in Division 8 Section "Access Doors."

E. Where electrical identification devices are applied to field-finished surfaces, coordinate installation of identification devices with completion of finished surface.

F. Where electrical identification markings and devices will be concealed by acoustical ceilings and similar finishes, coordinate installation of these items before ceiling installation.

PART 2 - PRODUCTS

2.1 EQUIPMENT FOR UTILITY COMPANY'S ELECTRICITY METERING

A. Current-Transformer Cabinets: Comply with requirements of electrical power utility company.

B. Meter Sockets: Comply with requirements of electrical power utility company.

C. Modular Meter Centers: Factory-coordinated assembly of a main meter center circuit-breaker unit with wireways, tenant meter socket modules, and tenant branch circuit breakers arranged in adjacent vertical sections, complete with interconnecting buses.

1. Housing: NEMA 250, Type 3R enclosure.

2. Tenant Branch Circuit Breakers: Series combination rated to protect circuit breakers in downstream panelboards that have 10,000-A interrupting capacity, minimum.

2.2 CONCRETE BASES

A. Concrete Forms and Reinforcement Materials: As specified in Division 3 Section "Cast-in-Place Concrete."

B. Concrete: 3000-psi (20.7-MPa), 28-day compressive strength as specified in Division 3 Section "Cast-in-Place Concrete."

2.3 TOUCHUP PAINT

A. For Equipment: Equipment manufacturer's paint selected to match installed equipment finish.

B. Galvanized Surfaces: Zinc-rich paint recommended by item manufacturer.

PART 3 - EXECUTION

3.1 ELECTRICAL EQUIPMENT INSTALLATION

A. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide the maximum possible headroom.

B. Materials and Components: Install level, plumb, and parallel and perpendicular to other building systems and components, unless otherwise indicated.

C. Equipment: Install to facilitate service, maintenance, and repair or replacement of components. Connect for ease of disconnecting, with minimum interference with other installations.

D. Right of Way: Give to raceways and piping systems installed at a required slope.

3.2 RACEWAY AND CABLE INSTALLATION

A. Conceal raceways and cables, unless otherwise indicated, within finished walls, ceilings, and floors.

B. Install raceways and cables at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Locate horizontal raceway runs above water and steam piping.

C. Use temporary raceway caps to prevent foreign matter from entering.

D. Make conduit bends and offsets so ID is not reduced. Keep legs of bends in the same plane and straight legs of offsets parallel, unless otherwise indicated.

E. Use raceway and cable fittings compatible with raceways and cables and suitable for use and location.

F. Install raceways embedded in slabs in middle third of slab thickness where practical, and leave at least 1-inch (25-mm) concrete cover.

1. Secure raceways to reinforcing rods to prevent sagging or shifting during concrete placement.

2. Space raceways laterally to prevent voids in concrete.

3. Install conduit larger than 1-inch trade size (DN27) parallel to or at right angles to main reinforcement. Where conduit is at right angles to reinforcement, place conduit close to slab support.

4. Transition from nonmetallic tubing to Schedule 80 nonmetallic conduit, rigid steel conduit, or IMC before rising above floor.

5. Make bends in exposed parallel or banked runs from same centerline to make bends parallel. Use factory elbows only where elbows can be installed parallel; otherwise, provide field bends for exposed parallel raceways.

G. Install pull wires in empty raceways. Use No. 14 AWG zinc-coated steel or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of the pull wire.

H. Install telephone and signal system raceways, 2-inch trade size (DN53) and smaller, in maximum lengths of 150 feet (45 m) and with a maximum of two 90-degree bends or equivalent. Separate lengths with pull or junction boxes where necessary to comply with these requirements, in addition to requirements above.

I. Connect motors and equipment subject to vibration, noise transmission, or movement with a maximum of 72-inch (1830-mm) flexible conduit. Install LFMC in wet or damp locations. Install separate ground conductor across flexible connections.

J. Set floor boxes level and trim after installation to fit flush to finished floor surface.

3.3 ELECTRICAL SUPPORTING DEVICE APPLICATION

A. Damp Locations and Outdoors: Hot-dip galvanized materials or nonmetallic, U-channel system components.

B. Dry Locations: Steel materials.

C. Support Clamps for PVC Raceways: Click-type clamp system.

D. Selection of Supports: Comply with manufacturer's written instructions.

E. Strength of Supports: Adequate to carry present and future loads, times a safety factor of at least four; minimum of 200-lb (90-kg) design load.

3.4 SUPPORT INSTALLATION

A. Install support devices to securely and permanently fasten and support electrical components.

B. Install individual and multiple raceway hangers and riser clamps to support raceways. Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assemblies and for securing hanger rods and conduits.

C. Support parallel runs of horizontal raceways together on trapeze- or bracket-type hangers.

D. Size supports for multiple raceway installations so capacity can be increased by a 25 percent minimum in the future.

E. Support individual horizontal raceways with separate, malleable-iron pipe hangers or clamps.

F. Install 1/4-inch- (6-mm-) diameter or larger threaded steel hanger rods, unless otherwise indicated.

G. Spring-steel fasteners specifically designed for supporting single conduits or tubing may be used instead of malleable-iron hangers for 1-1/2-inch (38-mm) and smaller raceways serving lighting and receptacle branch circuits above suspended ceilings and for fastening raceways to slotted channel and angle supports.

H. Arrange supports in vertical runs so the weight of raceways and enclosed conductors is carried entirely by raceway supports, with no weight load on raceway terminals.

I. Simultaneously install vertical conductor supports with conductors.

J. Separately support cast boxes that are threaded to raceways and used for fixture support. Support sheet-metal boxes directly from the building structure or by bar hangers. If bar hangers are used, attach bar to raceways on opposite sides of the box and support the raceway with an approved fastener not more than 24 inches (610 mm) from the box.

K. Install metal channel racks for mounting cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices unless components are mounted directly to structural elements of adequate strength.

L. Install sleeves for cable and raceway penetrations of concrete slabs and walls unless core-drilled holes are used. Install sleeves for cable and raceway penetrations of masonry and fire-rated gypsum walls and of all other fire-rated floor and wall assemblies. Install sleeves during erection of concrete and masonry walls.

M. Securely fasten electrical items and their supports to the building structure, unless otherwise indicated. Perform fastening according to the following unless other fastening methods are indicated:

1. Wood: Fasten with wood screws or screw-type nails.

2. Masonry: Toggle bolts on hollow masonry units and expansion bolts on solid masonry units.

3. New Concrete: Concrete inserts with machine screws and bolts.

4. Existing Concrete: Expansion bolts.

5. Instead of expansion bolts, threaded studs driven by a powder charge and provided with lock washers may be used in existing concrete.

6. Steel: Welded threaded studs or spring-tension clamps on steel.

   a. Field Welding: Comply with AWS D1.1.

7. Welding to steel structure may be used only for threaded studs, not for conduits, pipe straps, or other items.

8. Light Steel: Sheet-metal screws.

9. Fasteners: Select so the load applied to each fastener does not exceed 25 percent of its proof-test load.

3.5 IDENTIFICATION MATERIALS AND DEVICES

A. Install at locations for most convenient viewing without interference with operation and maintenance of equipment.

B. Coordinate names, abbreviations, colors, and other designations used for electrical identification with corresponding designations indicated in the Contract Documents or required by codes and standards. Use consistent designations throughout Project.

C. Self-Adhesive Identification Products: Clean surfaces before applying.

D. Identify raceways and cables with color banding as follows:

1. Bands: Pretensioned, snap-around, colored plastic sleeves or colored adhesive marking tape. Make each color band 2 inches (51 mm) wide, completely encircling conduit, and place adjacent bands of two-color markings in contact, side by side.

2. Band Locations: At changes in direction, at penetrations of walls and floors, at 50-foot (15-m) maximum intervals in straight runs, and at 25-foot (8-m) maximum intervals in congested areas.

3. Colors: As follows:

a. Fire Alarm System: Red.

b. Security System: Blue and yellow.

c. Telecommunication System: Green and yellow.

E. Tag and label circuits designated to be extended in the future. Identify source and circuit numbers in each cabinet, pull and junction box, and outlet box. Color-coding may be used for voltage and phase identification.

F. Install continuous underground plastic markers during trench backfilling, for exterior underground power, control, signal, and communication lines located directly above power and communication lines. Locate 6 to 8 inches (150 to 200 mm) below finished grade. If width of multiple lines installed in a common trench or concrete envelope does not exceed 16 inches (400 mm), overall, use a single line marker.

G. Color-code 208/120-V system secondary service, feeder, and branch-circuit conductors throughout the secondary electrical system as follows:

1. Phase A: Black.

2. Phase B: Red.

3. Phase C: Blue.

4. Neutral: White.

5. Ground: Green.

H. Color-code 480/277-V system secondary service, feeder, and branch-circuit conductors throughout the secondary electrical system as follows:

1. Phase A: BROWN.

2. Phase B: ORANGE.

3. Phase C: YELLOW.

4. Neutral: White with a colored stripe or gray.

5. Ground: Green.

I. Install warning, caution, and instruction signs where required to comply with 29 CFR, Chapter XVII, Part 1910.145, and where needed to ensure safe operation and maintenance of electrical systems and of items to which they connect. Install engraved plastic-laminated instruction signs with approved legend where instructions are needed for system or equipment operation. Install metal-backed butyrate signs for outdoor items.

J. Install engraved-laminated emergency-operating signs with white letters on red background with minimum 3/8-inch- (9-mm-) high lettering for emergency instructions on power transfer, load shedding, and other emergency operations.

3.6 UTILITY COMPANY ELECTRICITY-METERING EQUIPMENT

A. Install equipment according to utility company's written requirements. Provide grounding and empty conduits as required by utility company.

3.7 FIRESTOPPING

A. Apply firestopping to cable and raceway penetrations of fire-rated floor and wall assemblies to achieve fire-resistance rating of the assembly. Firestopping materials and installation requirements are specified in Division 7 Section "Firestopping."

3.8 CONCRETE BASES

A. Construct concrete bases of dimensions indicated, but not less than 4 inches (100 mm) larger, in both directions, than supported unit. Follow supported equipment manufacturer's anchorage recommendations and setting templates for anchor-bolt and tie locations, unless otherwise indicated. Use 3000-psi (20.7-MPa), 28-day compressive-strength concrete and reinforcement as specified in Division 3 Section "Cast-in-Place Concrete."

3.9 CUTTING AND PATCHING

A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces required to permit electrical installations. Perform cutting by skilled mechanics of trades involved.

B. Repair and refinish disturbed finish materials and other surfaces to match adjacent undisturbed surfaces. Install new fireproofing where existing firestopping has been disturbed. Repair and refinish materials and other surfaces by skilled mechanics of trades involved.

3.10 FIELD QUALITY CONTROL

A. Inspect installed components for damage and faulty work, including the following:

1. Raceways.
2. Building wire and connectors.
3. Supporting devices for electrical components.
4. Electrical identification.
5. Electricity-metering components.
6. Concrete bases.

7. Electrical demolition.

8. Cutting and patching for electrical construction.

9. Touchup painting.

B. Test Owner's electricity-metering installation for proper operation, accuracy, and usability of output data.

1. Connect a load of known kW rating, 1.5 kW minimum, to a circuit supplied by the metered feeder.

2. Turn off circuits supplied by the metered feeder and secure them in the "off" condition.

3. Run the test load continuously for eight hours, minimum, or longer to obtain a measurable meter indication. Use a test load placement and setting that ensure continuous, safe operation.

4. Check and record meter reading at end of test period and compare with actual electricity used based on test load rating, duration of test, and sample measurements of supply voltage at the test load connection. Record test results.

5. Repair or replace malfunctioning metering equipment or correct test setup; then retest. Repeat for each meter in installation until proper operation of entire system is verified.

3.11 REFINISHING AND TOUCHUP PAINTING

A. Refinish and touch up paint. Paint materials and application requirements are specified in Division 9 Section "Painting."

1. Clean damaged and disturbed areas and apply primer, intermediate, and finish coats to suit the degree of damage at each location.

2. Follow paint manufacturer's written instructions for surface preparation and for timing and application of successive coats.

3. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.

4. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

3.12 CLEANING AND PROTECTION

A. On completion of installation, including outlets, fittings, and devices, inspect exposed finish. Remove burrs, dirt, paint spots, and construction debris.

B. Protect equipment and installations and maintain conditions to ensure that coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 16055

SITE ELECTRICAL

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

A. The General Provisions, Supplemental General Provisions, Special Provisions and Division 1 Specification sections, apply to work covered by this Section.

1.2 SCOPE OF WORK

A. Provide labor, materials, equipment, tools and services, and perform operations required for, and reasonably incidental to, the providing of all site electrical work.

B. The site electrical work shall include, but not be limited to, the furnishing and installation of necessary materials and making arrangements for:

1. The connection of electrical and telephone utilities.

2. Underground conduit.

1.3 SUBMITTALS

A. Submit product data and shop drawings in accordance with Division 1 for products specified under PARTS 2 PRODUCTS.

1.4 REFERENCE STANDARDS

A. National Electrical Code (NEC), Article 300

B. Service installation standards of the serving utility company(s).

PART 2 PRODUCTS

2.1 ELECTRICAL SERVICE

A. Coordination: The location of the service entrance shall be coordinated with all other trades. Provide materials and equipment required to connect the electrical service. Contractor shall coordinate with the Power Company for all requirements prior to bid date. Contractor shall include all cost to for Utility Company to extend service to project site bid.

B. Materials: Provide materials in accordance with other Sections of these Specifications.

2.2 COMMUNICATION SERVICE

A. Coordination: The location of the telephone, cable, and internet service entrance shall be coordinated with all other trades. Provide materials and equipment required to connect the telephone, cable and internet services. Contractor shall coordinate with the Telephone , cable, and internet company for all requirements prior to bid date. Contractor is responsible to coordinate with utility companies.

B. Materials: Provide materials in accordance with other sections of this specification.

PART 3 EXECUTION

3.1 GENERAL

A. Underground installation of more than one conduit shall be in a duct arrangement as indicated. All conduits shall be laid so joints are staggered. All bends and stub-ups shall be rigid steel.

B. Pour a red colored concrete envelope 3" thick over utility service, emergency generator and fire pump conduits. Where conduits cross a driveway, road or parking area, reinforcing rods shall be installed.

C. Perform excavation, shoring, backfilling and concrete work in connection with electrical work in accordance with other Divisions of the Specifications.

D. All conduit shall be sloped away from the building to negate water entering the building through the conduit system.

3.2 UTILITIES

A. The locations, elevations and voltage of electrical lines and the location of the telephone lines included within the area of this work are indicated on the Drawings or in the Specifications in accordance with information received by the Architect/Engineer and Owner.

B. The Contractor shall examine the site and shall verify, to his own satisfaction, the location and elevation of all utilities, and shall adequately inform himself as to their relation to the work.

C. Existing utility lines not indicated but encountered during construction shall be protected, relocated or capped as directed by the Architect/Engineer. All precautions shall be exercised to prevent damage to existing lines not shown, but should work become necessary, it must be authorized prior to execution except in an emergency situation.

D. Before beginning excavations of any nature whatsoever, the Contractor shall make an attempt to locate all underground utilities of every nature occurring within the bounds of the area to be excavated. The Contractor shall then proceed with caution in his excavation work so that no utility shall be damaged with a resultant loss of service.

E. Should a damage result to any utility through the Contractor's negligence or failure to comply with the above directive, he shall be liable for such damage and for all expense incurred in the expeditious repair or replacement of such damaged utilities.

F. Repair of damaged utilities shall be to a condition equal to or better than the adjacent undamaged portion of such utility and to the complete satisfaction of the Architect/Engineer and Owner.

END OF SECTION

SECTION 16060

GROUNDING AND BONDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes grounding and bonding of electrical systems and equipment. Grounding requirements specified in this Section may be supplemented by special requirements of systems described in other Sections.

B. Related Sections include the following:

1. Division 2 Section "Underground Ducts and Utility Structures" for ground test wells.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Product Data: For the following:

1. Ground rods.

2. Chemical rods.

C. Qualification Data: For firms and persons specified in "Quality Assurance" Article.

D. Field Test Reports: Submit written test reports to include the following:

1. Test procedures used.

2. Test results that comply with requirements.

3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1. Comply with UL 467.

B. Comply with NFPA 70; for overhead-line construction and medium-voltage underground construction, comply with IEEE C2.

C. Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Grounding Conductors, Cables, Connectors, and Rods:

a. Apache Grounding/Erico Inc.

b. Boggs, Inc.

c. Chance/Hubbell.

d. Copperweld Corp.

e. Dossert Corp.

f. Erico Inc.; Electrical Products Group.

g. Framatome Connectors/Burndy Electrical.

h. Galvan Industries, Inc.

i. Hastings Fiber Glass Products, Inc.

j. Ideal Industries, Inc.

k. ILSCO.

l. Kearney/Cooper Power Systems.

m. Korns: C. C. Korns Co.; Division of Robroy Industries.

n. Lightning Master Corp.

o. Lyncole XIT Grounding.

p. O-Z/Gedney Co.; a business of the EGS Electrical Group.

q. Raco, Inc.; Division of Hubbell.

r. Robbins Lightning, Inc.

s. Salisbury: W. H. Salisbury & Co.

t. Superior Grounding Systems, Inc.

u. Thomas & Betts, Electrical.

2.2 GROUNDING CONDUCTORS

A. For insulated conductors, comply with Division 16 Section "Conductors and Cables."

B. Material: copper.

C. Equipment Grounding Conductors: Insulated with green-colored insulation.

D. Isolated Ground Conductors: Insulated with green-colored insulation with yellow stripe. On feeders with isolated ground, use colored tape, alternating bands of green and yellow tape to provide a minimum of three bands of green and two bands of yellow.

E. Grounding Electrode Conductors: Stranded cable.

F. Underground Conductors: stranded, unless otherwise indicated.

G. Copper Bonding Conductors: As follows:

1. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG copper conductor, 1/4 inch (6.4 mm) in diameter.

2. Bonding Conductor: No. 4 or No. 6 AWG, stranded copper conductor.

3. Bonding Jumper: Bare copper tape, braided bare copper conductors, terminated with copper ferrules; 1-5/8 inches (42 mm) wide and 1/16 inch (1.5 mm) thick.

4. Tinned Bonding Jumper: Tinned-copper tape, braided copper conductors, terminated with copper ferrules; 1-5/8 inches (42 mm) wide and 1/16 inch (1.5 mm) thick.

H. Ground Conductor and Conductor Protector for Wood Poles: As follows:

1. No. 4 AWG minimum, soft-drawn copper conductor.

2. Conductor Protector: Half-round PVC or wood molding. If wood, use pressure-treated fir, or cypress or cedar.

I. Grounding Bus: Bare, annealed copper bars of rectangular cross section, with insulators.

2.3 CONNECTOR PRODUCTS

A. Comply with IEEE 837 and UL 467; listed for use for specific types, sizes, and combinations of conductors and connected items.

B. Bolted Connectors: Bolted-pressure-type connectors, or compression type.

C. Welded Connectors: Exothermic-welded type, in kit form, and selected per manufacturer's written instructions.

2.4 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad steel.

1. Size: 3/4 by 120 inches (19 by 3000 mm) in diameter.

B. Chemical Electrodes: Copper tube, straight or L-shaped, filled with nonhazardous chemical salts, terminated with a 4/0 bare conductor. Provide backfill material recommended by manufacturer.

C. Test Wells: Provide handholes as specified in Division 2 Section "Underground Ducts and Utility Structures."

PART 3 - EXECUTION

3.1 APPLICATION

A. Use only copper conductors for both insulated and bare grounding conductors in direct contact with earth, concrete, masonry, crushed stone, and similar materials.

B. In raceways, use insulated equipment grounding conductors.

C. Exothermic-Welded Connections: Use for connections to structural steel and for underground connections, except those at test wells.

D. Equipment Grounding Conductor Terminations: Use bolted pressure clamps.

E. Ground Rod Clamps at Test Wells: Use bolted pressure clamps with at least two bolts.

F. Grounding Bus: Install in electrical and telephone equipment rooms, in rooms housing service equipment, and elsewhere as indicated.

1. Use insulated spacer; space 1 inch (25.4 mm) from wall and support from wall 6 inches (150 mm) above finished floor, unless otherwise indicated.

2. At doors, route the bus up to the top of the door frame, across the top of the doorway, and down to the specified height above the floor.

G. Underground Grounding Conductors: Use tinned copper conductor, No. 2/0 AWG minimum. Bury at least 24 inches (600 mm) below grade or bury 12 inches (300 mm) above duct bank when installed as part of the duct bank.

3.2 EQUIPMENT GROUNDING CONDUCTORS

A. Comply with NFPA 70, Article 250, for types, sizes, and quantities of equipment grounding conductors, unless specific types, larger sizes, or more conductors than required by NFPA 70 are indicated.

B. Install equipment grounding conductors in all feeders and circuits.

C. Install insulated equipment grounding conductor with circuit conductors for the following items, in addition to those required by NEC:

1. Feeders and branch circuits.

2. Lighting circuits.

3. Receptacle circuits.

4. Single-phase motor and appliance branch circuits.

5. Three-phase motor and appliance branch circuits.

6. Flexible raceway runs.

7. Armored and metal-clad cable runs.

D. Busway Supply Circuits: Install insulated equipment grounding conductor from the grounding bus in the switchgear, switchboard, or distribution panel to equipment grounding bar terminal on busway.

E. Computer Outlet Circuits: Install insulated equipment grounding conductor in branch-circuit runs from computer-area power panels or power-distribution units.

F. Isolated Grounding Receptacle Circuits: Install an insulated equipment grounding conductor connected to the receptacle grounding terminal. Isolate grounding conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service, unless otherwise indicated.

G. Isolated Equipment Enclosure Circuits: For designated equipment supplied by a branch circuit or feeder, isolate equipment enclosure from supply raceway with a nonmetallic raceway fitting listed for the purpose. Install fitting where raceway enters enclosure, and install a separate equipment grounding conductor. Isolate equipment grounding conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service, unless otherwise indicated.

H. Nonmetallic Raceways: Install an equipment grounding conductor in nonmetallic raceways unless they are designated for telephone or data cables.

I. Air-Duct Equipment Circuits: Install an equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners and heaters. Bond conductor to each unit and to air duct.

J. Water Heater, Heat-Tracing, and Antifrost Heating Cables: Install a separate equipment grounding conductor to each electric water heater, heat-tracing, and antifrost heating cable. Bond conductor to heater units, piping, connected equipment, and components.

K. Signal and Communication Systems: For telephone, alarm, voice and data, and other communication systems, provide No. 4 AWG minimum insulated grounding conductor in raceway from grounding electrode system to each service location, terminal cabinet, wiring closet, and central equipment location.

1. Service and Central Equipment Locations and Wiring Closets: Terminate grounding conductor on a 1/4-by-2-by-12-inch (6.4-by-50-by-300-mm) grounding bus.

2. Terminal Cabinets: Terminate grounding conductor on cabinet grounding terminal.

L. Metal Poles Supporting Outdoor Lighting Fixtures: Provide a grounding electrode in addition to installing a separate equipment grounding conductor with supply branch-circuit conductors.

3.3 INSTALLATION

A. Ground Rods: Install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes.

1. Drive ground rods until tops are 2 inches (50 mm) below finished floor or final grade, unless otherwise indicated.

2. Interconnect ground rods with grounding electrode conductors. Use exothermic welds, except at test wells and as otherwise indicated. Make connections without exposing steel or damaging copper coating.

B. Grounding Conductors: Route along shortest and straightest paths possible, unless otherwise indicated. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

C. Bonding Straps and Jumpers: Install so vibration by equipment mounted on vibration isolation hangers and supports is not transmitted to rigidly mounted equipment. Use exothermic-welded connectors for outdoor locations, unless a disconnect-type connection is required; then, use a bolted clamp. Bond straps directly to the basic structure taking care not to penetrate any adjacent parts. Install straps only in locations accessible for maintenance.

D. Metal Water Service Pipe: Provide insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes by grounding clamp connectors. Where a dielectric main water fitting is installed, connect grounding conductor to street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.

E. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with grounding clamp connectors.

F. Bond interior metal piping systems and metal air ducts to equipment grounding conductors of associated pumps, fans, blowers, electric heaters, and air cleaners. Use braided-type bonding straps.

G. Bond each aboveground portion of gas piping system upstream from equipment shutoff valve.

H. Install one test well for each service at the ground rod electrically closest to the service entrance. Set top of well flush with finished grade or floor.

I. Ufer Ground (Concrete-Encased Grounding Electrode): Fabricate according to NFPA 70, Paragraph 250-81(c), using a minimum of 20 feet (6 m) of bare copper conductor not smaller than No. 4 AWG. If concrete foundation is less than 20 feet (6 m) long, coil excess conductor within the base of the foundation. Bond grounding conductor to reinforcing steel in at least four locations and to anchor bolts. Extend grounding conductor below grade and connect to building grounding grid or to a grounding electrode external to concrete.

3.4 CONNECTIONS

A. General: Make connections so galvanic action or electrolysis possibility is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.

1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer to order of galvanic series.

2. Make connections with clean, bare metal at points of contact.

3. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.

4. Make aluminum-to-galvanized steel connections with tin-plated copper jumpers and mechanical clamps.

5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

B. Exothermic-Welded Connections: Comply with manufacturer's written instructions. Welds that are puffed up or that show convex surfaces indicating improper cleaning are not acceptable.

C. Equipment Grounding Conductor Terminations: For No. 8 AWG and larger, use pressure-type grounding lugs. No. 10 AWG and smaller grounding conductors may be terminated with winged pressure-type connectors.

D. Noncontact Metal Raceway Terminations: If metallic raceways terminate at metal housings without mechanical and electrical connection to housing, terminate each conduit with a grounding bushing. Connect grounding bushings with a bare grounding conductor to grounding bus or terminal in housing. Bond electrically noncontinuous conduits at entrances and exits with grounding bushings and bare grounding conductors, unless otherwise indicated.

E. Connections at Test Wells: Use compression-type connectors on conductors and make bolted- and clamped-type connections between conductors and ground rods.

F. Tighten screws and bolts for grounding and bonding connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

G. Compression-Type Connections: Use hydraulic compression tools to provide correct circumferential pressure for compression connectors. Use tools and dies recommended by connector manufacturer. Provide embossing die code or other standard method to make a visible indication that a connector has been adequately compressed on grounding conductor.

H. Moisture Protection: If insulated grounding conductors are connected to ground rods or grounding buses, insulate entire area of connection and seal against moisture penetration of insulation and cable.

3.5 FIELD QUALITY CONTROL

A. Testing: Owner will engage a qualified testing agency to perform the following field quality-control testing:

B. Testing: Engage a qualified testing agency to perform the following field quality-control testing:

C. Testing: Perform the following field quality-control testing:

1. After installing grounding system but before permanent electrical circuitry has been energized, test for compliance with requirements.

2. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at ground test wells. Measure ground resistance not less than two full days after the last trace of precipitation, and without the soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance. Perform tests, by the fall-of-potential method according to IEEE 81.

3. Provide drawings locating each ground rod and ground rod assembly and other grounding electrodes, identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location and include

observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.

a. Equipment Rated 500 kVA and Less: 10 ohms.

b. Equipment Rated 500 to 1000 kVA: 5 ohms.

c. Equipment Rated More Than 1000 kVA: 3 ohms.

d. Substations and Pad-Mounted Switching Equipment: 5 ohms.

e. Manhole Grounds: 10 ohms.

4. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

3.6 GRADING AND PLANTING

A. Restore surface features, including vegetation, at areas disturbed by Work of this Section. Reestablish original grades, unless otherwise indicated. If sod has been removed, replace it as soon as possible after backfilling is completed. Restore areas disturbed by trenching, storing of dirt, cable laying, and other activities to their original condition. Include application of topsoil, fertilizer, lime, seed, sod, sprig, and mulch. Comply with Division 2 Section "Landscaping." Maintain restored surfaces. Restore disturbed paving as indicated.

END OF SECTION

SECTION 16075

ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

A. The General Provisions, Supplemental General Provisions, Special Provisions and Division 1 Specification sections, apply to work covered by this Section.

B. Comply with Division 16 Sections, as applicable. Refer to other Divisions for coordination of work.

1.2 SCOPE OF WORK

A. Provide labor, material, equipment, tools and services, and perform operations required for, and reasonably incidental to, the providing of electrical identification, including related accessories.

B. Provide electrical identification for the following:

1. Panelboards, motor starters, contactors, disconnect switches, circuit breakers and other electrical equipment with nameplate identifying the item of equipment and the equipment serving the same.

2. Raceways, junction boxes and pull boxes.

1. Label each panelboard index indicating the room #s to the related circuit. Also add the index sheet in a laminated white core, plastic with beveled edges, minimum 1/16 inch thick. Lettering shall be machine-engraved, not less than 1/4" high, cut through the black or red surface to the white core.

3. Wiring devices.

4. Wiring.

5. Three phase motor rotation.

1.3 SUBMITTALS

A. Submit product data in accordance with Division 1 for products specified under PART 2 - PRODUCTS.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

B. Brady

C. Panduit

D. Thomas & Betts

E. Seton

2.2 IDENTIFICATION

A. Nameplates

1. Nameplates shall be black engraved surface on white core for normal power circuits and red engraved surface on white core for emergency power circuits.

2. Provide for each distribution panelboard, branch circuit panelboard, transformer and any other similar equipment furnished under this Division identification as to its given name, voltage and origination of service. Examples are as follows:

'LB'	'HD'
480Y/277V	480Y/277V
FED FROM 'MDP'	FED FROM 'MDP'

'RDP'	'TX-R'
208Y/120V	300 KVA, 480V to
FED FROM TX-R	208Y/120V
FED FROM 'MDP'	

3. Provide for each motor starter enclosure, circuit breaker enclosure, disconnect switch and any other similar equipment furnished under this Division, identification as to the specific load that it serves and the origination of service. Examples are as follows:

'CH-1'	'AHU-1'
FED FROM 'MDP'	FED FROM 'DPA'

4. Provide for each feeder protective device in each distribution panelboard and any other similar equipment furnished under this Division, identification as to the specific load that it serves.

5. Nameplates shall be laminated, white core, plastic with beveled edges, minimum 1/16 inch thick. Lettering shall be machine-engraved, not less than 1/4" high, cut through the black or red surface to the white core.

B. Junction Boxes and Pull Boxes

1. Identification shall be with a black permanent marking pen on the top of 4" x 4" junction box covers or on the back of an outlet box cover plate identifying the branch circuits and systems within the conduit. Pull boxes shall be

provided with a nameplate stating voltage and system served.

C. Wiring Device Wall Plates

1. On the back side of wiring device wall plates identify with a black permanent marking pen the panelboard and branch circuit number the device is served from.

D. Wire Markers

1. Wire markers for identification of wiring shall be self-adhesive type having letters and numerals indicating serving equipment and feeder or branch circuit number.

F. Rotation Tags

1. Rotation tags shall be brass or aluminum securely attached to equipment.

PART 3 EXECUTION

3.1 PREPARATION

A. Surfaces to receive labels or nameplates shall be carefully prepared in accordance with the manufacturer's instructions and recommendations.

3.2 NAMEPLATES

A. Nameplates shall be properly attached to identify panelboards, feeder circuit breakers, disconnect switches, pull boxes and other similar equipment furnished under this Division.

3.3 WIRE MARKERS

A. Wire markers shall be applied to each conductor or cable within panelboards, motor starter enclosures, circuit breaker enclosures, disconnect switches, cabinets, junction boxes, pull boxes, and other similar equipment identifying the serving equipment and feeder or branch circuit from which the conductors originate.

END OF SECTION

SECTION 16120

BUILDING WIRE AND CABLE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes building wires and cables and associated connectors, splices, and terminations for wiring systems rated 600 V and less.

1.3 SUBMITTALS

A. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

1.4 QUALITY ASSURANCE

A. Listing and Labeling: Provide wires and cables specified in this Section that are listed and labeled.
   1. The Terms "Listed" and "Labeled": As defined in NFPA 70, Article 100.

B. Comply with NFPA 70.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver wires and cables according to NEMA WC 26.

1.6 COORDINATION

A. Coordinate layout and installation of cables with other installations.

B. Revise locations and elevations from those indicated, as required to suit field conditions and as approved by Architect.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Wires and Cables:
      a. American Insulated Wire Corp.; Leviton Manufacturing Co.
      b. BICC Brand-Rex Company.
      c. Carol Cable Co., Inc.
      d. Senator Wire & Cable Company.
      e. Southwire Company.
   2. Connectors for Wires and Cables:
      a. AMP Incorporated.
      b. General Signal; O-Z/Gedney Unit.

c. Monogram Co.; AFC.

d. Square D Co.; Anderson.

e. 3M Company; Electrical Products Division.

2.2 BUILDING WIRES AND CABLES

A. UL-listed building wires and cables with conductor material, insulation type, cable construction, and rating as specified in Part 3 "Wire and Insulation Applications" Article.

B. Rubber Insulation Material: Comply with NEMA WC 3.

C. Thermoplastic Insulation Material: Comply with NEMA WC 5.

D. Ethylene Propylene Rubber Insulation Material: Comply with NEMA WC 8.

E. Conductor Material: Copper.

F. Stranding: Solid conductor for No. 10 AWG and smaller; stranded conductor for larger than No. 10 AWG.

G. Plenum rated cable for all cables above the ceiling.

2.3 CONNECTORS AND SPLICES

A. UL-listed, factory-fabricated wiring connectors of size, ampacity rating, material, type, and class for application and service indicated. Comply with Project's installation requirements and as specified in Part 3 "Wire and Insulation Applications" Article.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine raceways and building finishes to receive wires and cables for compliance with requirements for installation tolerances and other conditions affecting performance of wires and cables. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 WIRE AND INSULATION APPLICATIONS

A. Service Entrance: Type RHW or THWN, in raceway.

B. Feeders: Type 75C insulation THHN/THWN, in raceway.

C. Fire-Pump Feeder: Type MI, 3-conductor.

D. Branch Circuits: Type THHN/THWN, in raceway.

E. Fire Alarm Circuits: Type THHN/THWN, in raceway.

F. Class 1 Control Circuits: Type THHN/THWN, in raceway.

G. Class 2 Control Circuits: Type THHN/THWN, in raceway.

H. Equipment or any device rated 100 amperes or less, conductor shall be rated 60C as per National Electrical Code.

I. Equipment or any device rated over 100 amperes, conductor shall be rated 75C as per National Electrical Code.

3.3 INSTALLATION

A. Install wires and cables as indicated, according to manufacturer's written instructions and NECA's "Standard of Installation."

B. Remove existing wires from raceway before pulling in new wires and cables.

C. Pull Conductors: Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

E. Install exposed cables, parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

F. Support cables according to Division 16 Section "Basic Electrical Materials and Methods."

G. Seal around cables penetrating fire-rated elements according to Division 7 Section "Firestopping."

H. Identify wires and cables according to Division 16 Section "Basic Electrical Materials and Methods."

I. Identify wires and cables according to Division 16 Section "Electrical Identification."

3.4 CONNECTIONS

A. Conductor Splices: Keep to minimum.

B. Install splices and tapes that possess equivalent or better mechanical strength and insulation ratings than conductors being spliced.

C. Use splice and tap connectors compatible with conductor material.

D. Use oxide inhibitor in each splice and tap connector for aluminum conductors.

E. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches (300 mm) of slack.

F. Connect outlets and components to wiring and to ground as indicated and instructed by manufacturer.

G. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.5 FIELD QUALITY CONTROL

A. Testing: On installation of wires and cables and before electrical circuitry has been energized, demonstrate product capability and compliance with requirements.

1. Procedures: Perform each visual and mechanical inspection and electrical test stated in NETA ATS, Section 7.3.1. Certify compliance with test parameters.

B. Correct malfunctioning conductors and cables at Project site, where possible, and retest to demonstrate compliance; otherwise, remove and replace with new units and retest.

END OF SECTION

SECTION 16130

RACEWAYS AND BOXES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

1. Raceways include the following:

a. RMC.

b. IMC.

c. PVC externally coated, rigid steel conduits.

d. PVC externally coated, IMC.

e. EMT.

f. FMC.

g. LFMC.

h. LFNC.

i. RNC.

j. ENT.

k. Wireways.

l. Surface raceways.

2. Boxes, enclosures, and cabinets include the following:

a. Device boxes.

b. Floor boxes.

c. Outlet boxes.

d. Pull and junction boxes.

e. Cabinets and hinged-cover enclosures.

B. Related Sections include the following:

1. Division 16 Section "Basic Electrical Materials and Methods" for raceways and box supports.

2. Division 16 Section "Wiring Devices" for devices installed in boxes and for floor-box service fittings.

1.3 DEFINITIONS

A. EMT: Electrical metallic tubing.

B. ENT: Electrical nonmetallic tubing.

C. FMC: Flexible metal conduit.

D. IMC: Intermediate metal conduit.

E. LFMC: Liquidtight flexible metal conduit.

F. LFNC: Liquidtight flexible nonmetallic conduit.

G. RMC: Rigid metal conduit.

H. RNC: Rigid nonmetallic conduit.

1.4 SUBMITTALS

A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

B. Shop Drawings: Include layout drawings showing components and wiring for nonstandard boxes, enclosures, and cabinets.

1.5 QUALITY ASSURANCE

A. Listing and Labeling: Provide raceways and boxes specified in this Section that are listed and labeled.

1. The Terms "Listed" and "Labeled": As defined in NFPA 70, Article 100.

2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" as defined in OSHA Regulation 1910.7.

B. Comply with NECA's "Standard of Installation."

C. Comply with NFPA 70.

1.6 COORDINATION

A. Coordinate layout and installation of raceways and boxes with other construction elements to ensure adequate headroom, working clearance, and access.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Metal Conduit and Tubing:

a. Alflex Corp.

b. Anamet, Inc.; Anaconda Metal Hose.

c. Anixter Brothers, Inc.

d. Carol Cable Co., Inc.

e. Cole-Flex Corp.

f. Electri-Flex Co.

g. Flexcon, Inc.; Coleman Cable Systems, Inc.

h. Grinnell Co.; Allied Tube and Conduit Div.

i. Monogram Co.; AFC.

j. Spiraduct, Inc.

k. Triangle PWC, Inc.

l. Wheatland Tube Co.

2. Nonmetallic Conduit and Tubing:

a. Anamet, Inc.; Anaconda Metal Hose.

b. Arnco Corp.
c. Breeze-Illinois, Inc.
d. Cantex Industries; Harsco Corp.
e. Certainteed Corp.; Pipe & Plastics Group.
f. Cole-Flex Corp.
g. Condux International; Electrical Products.
h. Electri-Flex Co.
i. George-Ingraham Corp.
j. Hubbell, Inc.; Raco, Inc.
k. Lamson & Sessions; Carlon Electrical Products.
l. R&G Sloan Manufacturing Co., Inc.
m. Spiraduct, Inc.
n. Thomas & Betts Corp.

3. Conduit Bodies and Fittings:
   a. American Electric; Construction Materials Group.
   b. Crouse-Hinds; Div. of Cooper Industries.
   c. Emerson Electric Co.; Appleton Electric Co.
   d. Hubbell, Inc.; Killark Electric Manufacturing Co.
   e. Lamson & Sessions; Carlon Electrical Products.
   f. O-Z/Gedney; Unit of General Signal.
   g. Scott Fetzer Co.; Adalet-PLM.
   h. Spring City Electrical Manufacturing Co.

4. Metal Wireways:
   a. Hoffman Engineering Co.
   b. Keystone/Rees, Inc.
   c. Square D Co.

2.2 METAL CONDUIT AND TUBING

A. Rigid Steel Conduit: ANSI C80.1.
B. Rigid Aluminum Conduit: ANSI C80.5.
C. IMC: ANSI C80.6.
D. EMT and Fittings: ANSI C80.3.
   1. Fittings: Set-screw type.
E. Fittings: NEMA FB 1; compatible with conduit/tubing materials.

2.3 NONMETALLIC CONDUIT AND TUBING

A. RNC: NEMA TC 2, Schedule 40 or 80 PVC.
B. RNC Fittings: NEMA TC 3; match to conduit or conduit/tubing type and material.
C. LFNC: UL 1660.

2.4 METAL WIREWAYS

A. Material: Sheet metal sized and shaped as indicated.

B. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

C. Select features, unless otherwise indicated, as required to complete wiring system and to comply with NFPA 70.

D. Wireway Covers: Screw – cover type flanged-and-gasketed type.

E. Finish: Manufacturer's standard enamel finish.

2.5 OUTLET AND DEVICE BOXES

A. Sheet Metal Boxes: NEMA OS 1.

B. Cast-Metal Boxes: NEMA FB 1, Type FD, cast box with gasketed cover.

2.6 PULL AND JUNCTION BOXES

A. Small Sheet Metal Boxes: NEMA OS 1.

B. Cast-Metal Boxes: NEMA FB 1, cast aluminum with gasketed cover.

2.7 ENCLOSURES AND CABINETS

A. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous hinge cover and flush latch.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.

2. Nonmetallic Enclosures: Plastic, finished inside with radio-frequency-resistant paint.

B. Cabinets: NEMA 250, Type 1, galvanized steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel. Hinged door in front cover with flush latch and concealed hinge. Key latch to match panelboards. Include metal barriers to separate wiring of different systems and voltage, and include accessory feet where required for freestanding equipment.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to receive raceways, boxes, enclosures, and cabinets for compliance with installation tolerances and other conditions affecting performance of raceway installation. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 WIRING METHODS

A. Outdoors: Use the following wiring methods:

1. Exposed: Rigid steel.

2. Concealed: Rigid steel.

3. Underground, Single Run: RNC.

4. Underground, Grouped: RNC.

5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.

6. Boxes and Enclosures: NEMA 250, Type 3R .

B. Indoors: Use the following wiring methods:

1. Exposed: EMT.

2. Concealed: EMT.

3. Underground, Single Run: RNC.
4. Underground, Grouped: RNC
5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC; except in wet or damp locations, use LFMC.
6. Damp or Wet Locations: Rigid steel conduit.
7. Boxes and Enclosures: NEMA 250, Type 1, except as follows:
    a. Damp or Wet Locations: NEMA 250, Type 4, stainless steel.

3.3 INSTALLATION

A. Install raceways, boxes, enclosures, and cabinets as indicated, according to manufacturer's written instructions.

B. Minimum Raceway Size: 3/4-inch trade size (DN21).

C. Conceal conduit and EMT, unless otherwise indicated, within finished walls, ceilings, and floors.

D. Keep raceways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

E. Install raceways level and square and at proper elevations. Provide adequate headroom.

F. Complete raceway installation before starting conductor installation.

G. Support raceways as specified in Division 16 Section "Basic Electrical Materials and Methods."

H. Use temporary closures to prevent foreign matter from entering raceways.

I. Protect stub-ups from damage where conduits rise through floor slabs. Arrange so curved portion of bends is not visible above the finished slab.

J. Make bends and offsets so ID is not reduced. Keep legs of bends in the same plane and straight legs of offsets parallel, unless otherwise indicated.

K. Use raceway fittings compatible with raceways and suitable for use and location. For intermediate steel conduit, use threaded rigid steel conduit fittings, unless otherwise indicated.

L. Run concealed raceways, with a minimum of bends, in the shortest practical distance considering the type of building construction and obstructions, unless otherwise indicated.

M. Raceways Embedded in Slabs (Must be indicated on drawings to be embedded. Please notify Engineer if required but not shown): Install in middle third of slab thickness where practical, and leave at least 1-inch (25-mm) concrete cover.

1. Secure raceways to reinforcing rods to prevent sagging or shifting during concrete placement.
2. Space raceways laterally to prevent voids in concrete.
3. Run conduit larger than 1-inch trade size (DN27) parallel to or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.
4. Transition from nonmetallic tubing to Schedule 80 nonmetallic conduit, rigid steel conduit, or IMC before rising above floor.

N. Install exposed raceways parallel to or at right angles to nearby surfaces or structural members, and follow the surface contours as much as practical.

1. Run parallel or banked raceways together, on common supports where practical.

2. Make bends in parallel or banked runs from same centerline to make bends parallel. Use factory elbows only where elbows can be installed parallel; otherwise, provide field bends for parallel raceways.

O. Join raceways with fittings designed and approved for the purpose and make joints tight.

1. Make raceway terminations tight. Use bonding bushings or wedges at connections subject to vibration. Use bonding jumpers where joints cannot be made tight.

2. Use insulating bushings to protect conductors.

P. Tighten set screws of threadless fittings with suitable tools.

Q. Terminations: Where raceways are terminated with locknuts and bushings, align raceways to enter squarely and install locknuts with dished part against the box. Where terminations are not secure with 1 locknut, use 2 locknuts: 1 inside and 1 outside the box.

R. Where raceways are terminated with threaded hubs, screw raceways or fittings tightly into the hub so the end bears against the wire protection shoulder. Where chase nipples are used, align raceways so the coupling is square to the box and tighten the chase nipple so no threads are exposed.

S. Install pull wires in empty raceways. Use No. 14 AWG zinc-coated steel or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of the pull wire.

T. Telephone and Signal System Raceways, 2-Inch Trade Size (DN53) and Smaller: In addition to the above requirements, install raceways in maximum lengths of 150 feet (45 m) and with a maximum of two 90-degree bends or equivalent. Separate lengths with pull or junction boxes where necessary to comply with these requirements.

U. Install raceway sealing fittings according to manufacturer's written instructions. Locate fittings at suitable, approved, and accessible locations and fill them with UL-listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:

1. Where conduits pass from warm to cold locations, such as the boundaries of refrigerated spaces.

2. Where otherwise required by NFPA 70.

V. Stub-up Connections: Extend conduits through concrete floor for connection to freestanding equipment. Install with an adjustable top or coupling threaded inside for plugs set flush with the finished floor. Extend conductors to equipment with rigid steel conduit; FMC may be used 6 inches (150 mm) above the floor. Install screwdriver-operated, threaded flush plugs flush with floor for future equipment connections.

W. Flexible Connections: Use maximum of 6 feet (1830 mm) of flexible conduit for recessed and semirecessed lighting fixtures; for equipment subject to vibration, noise transmission, or movement; and for all motors. Use liquidtight flexible conduit in wet or damp locations. Install separate ground conductor across flexible connections.

X. Install nonferrous conduit or tubing for circuits operating above 60 Hz. Where aluminum raceways are installed for such circuits and pass through concrete, install in a nonmetallic sleeve.

Y. Do not install aluminum conduits embedded in or in contact with concrete.

Z. PVC Externally Coated, Rigid Steel Conduits: Use only fittings approved for use with that material. Patch all nicks and scrapes in PVC coating after installing conduits.

AA. Surface Raceways: Install a separate, green, ground conductor in raceways from junction box supplying the raceways to receptacle or fixture ground terminals.

1. Select each surface raceway outlet box, to which a lighting fixture is attached, of sufficient diameter to provide a seat for the fixture canopy.
2. Where a surface raceway is used to supply a fluorescent lighting fixture having central-stem suspension with a backplate and a canopy (with or without extension ring), no separate outlet box is required.
3. Provide surface metal raceway outlet box, and the backplate and canopy, at the feed-in location of each fluorescent lighting fixture having end-stem suspension.
4. Where a surface metal raceway extension is made from an existing outlet box on which a lighting fixture is installed, no additional surface-mounted outlet box is required. Provide a backplate slightly smaller than the fixture canopy.

BB. Set floor boxes level and adjust to finished floor surface.

CC. Set floor boxes level and trim after installation to fit flush to finished floor surface.

DD. Install hinged-cover enclosures and cabinets plumb. Support at each corner.

EE. NO PVC CONDUIT ALLOWED ABOVE THE CEILING OR IN THE A/C RETURN PLENUM. PROVIDE RIGID CONDUIT. Verify all MEP documents.

3.4 PROTECTION

A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure coatings, finishes, and cabinets are without damage or deterioration at the time of Substantial Completion.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

3.5 CLEANING

A. On completion of installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finish, including chips, scratches, and abrasions.

END OF SECTION

SECTION 16140

WIRING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes receptacles, connectors, switches, and finish plates.

1.3 DEFINITIONS

A. GFI: Ground-fault circuit interrupter.

B. TVSS: Transient voltage surge suppressor.

1.4 SUBMITTALS

A. Product Data: For each product specified.

B. Shop Drawings: Legends for receptacles and switch plates.

C. Samples: For devices and device plates for color selection and evaluation of technical features.

D. Maintenance Data: For materials and products to include in maintenance manuals specified in Division 1.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.

B. Comply with NEMA WD 1.

C. Comply with NFPA 70.

1.6 COORDINATION

A. Receptacles for Owner-Furnished Equipment: Match plug configurations.

B. Coordinate with pool contractor for special receptacles.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Wiring Devices:

a. Bryant Electric, Inc.

b. Eagle Electric Manufacturing Co., Inc.

c. GE Company; GE Wiring Devices.

d. Hubbell, Inc.; Wiring Devices Div.

e. Killark Electric Manufacturing Co.

f. Leviton Manufacturing Co., Inc.

g. Pass & Seymour/Legrand; Wiring Devices Div.

h. Pyle-National, Inc.; an Amphenol Co.

2.2 RECEPTACLES

A. Straight-Blade and Locking Receptacles: Heavy-Duty grade. The device shall be 20-ampere, 125-volts, Nema configuration 5-20R, back and side wired.

B. Special Receptacles for NEMA configuration refer to Manufacturer specs.

C. GFI Receptacles: Feed-through type, with integral NEMA WD 6, Configuration 5-20R duplex receptacle arranged to protect connected downstream receptacles on same circuit. Design units for installation in a 2-3/4-inch- (70-mm-) deep outlet box without an adapter. Device shall have an indicator light.

D. Isolated-Ground Receptacles: Equipment grounding contacts connected only to the green grounding screw terminal of the device with inherent electrical isolation from mounting strap. Device shall be white finish with the orange symbol.

1. Devices: Listed and labeled as isolated-ground receptacles.

2. Isolation Method: Integral to receptacle construction and not dependent on removable parts.

2.3 SWITCHES

A. General

1. Switches shall be toggle or decorative rocker type as indicated herein.. The body of the switch shall be made of an arc-resistant thermoset material. All toggle switch handles shall be constructed of a thermoplastic material. All rocker switch handles shall be constructed of a thermoset material. All wall switches shall be of the quiet AC type.

1. Switches shall be SPST, DPST, 3-way or 4-way as indicated on the Drawings.

2. Switch color shall be white unless noted otherwise. Coordinate with Architect.

B. Specification Grade

1. Specification Grade switches shall be toggle type. The contact arms shall be made of one-piece copper alloy material. The switch shall include a green ground screw attached to the mounting strap. The switch shall be 20-ampere, 120/277-volts AC, horsepower rated, back and side-wired.

C. Dimmer Switches: Modular, full-wave, solid-state units with integral, quiet on/off switches and audible and electromagnetic noise filters.

1. Control: Continuously adjustable slide, toggle, or rotary knob. Single-pole or three-way switch to suit connections.

2. Incandescent Lamp Dimmers: Modular, 120 V, 60 Hz with continuously adjustable slide with “on/off” switch; single pole with soft tap or other quiet switch; electromagnetic filter to eliminate

noise, RF, and TV interference; and 5-inch (130-mm) wire connecting leads. Dimmer to be sized per circuit load.

2.4 WALL PLATES(All wall plates)

A. For all single and combination types match corresponding wiring devices.
   1. Plate-Securing Screws: Metal with head color to match plate finish.
   2. Material for Finished Spaces: 0.04-inch- (1-mm-) thick, Type 302, satin-finished stainless steel.
   3. Material for Unfinished Spaces: stainless steel.

2.5 FLOOR SERVICE FITTINGS

A. Power Receptacle: NEMA WD 6, Configuration 5-20R, gray finish, unless otherwise indicated.

B. Signal Outlet: Blank cover with bushed cable opening, unless otherwise indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install devices and assemblies plumb and secure.

B. Install wall plates when painting is complete.

C. Install wall dimmers to achieve indicated rating after derating for ganging as instructed by manufacturer.

D. Do not share neutral conductor on load side of dimmers.

E. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical, and grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.

F. Protect devices and assemblies during painting.

G. Adjust locations at which floor service outlets and telephone/power service poles are installed to suit arrangement of partitions and furnishings.

3.2 IDENTIFICATION

A. Comply with Division 16 Section "Electrical Identification."

B. Comply with Division 16 Section "Basic Electrical Materials and Methods."
   1. Switches: Where three or more switches are ganged, and elsewhere as indicated, identify each switch with approved legend engraved on wall plate.
   2. Receptacles: Identify panelboard and circuit number from which served. Use machine-printed, pressure-sensitive, abrasion-resistant label tape on face of plate and durable wire markers or tags within outlet boxes.

3.3 CONNECTIONS

A. Connect wiring device grounding terminal to branch-circuit equipment grounding conductor.

B. Isolated-Ground Receptacles: Connect to isolated-ground conductor routed to designated isolated equipment ground terminal of electrical system.

C. Tighten electrical connectors and terminals according to manufacturers published torque-tightening values. If manufacturers torque values are not indicated, use those specified in UL 486A and UL 486B.

3.4 FIELD QUALITY CONTROL

A. Test wiring devices for proper polarity and ground continuity. Operate each device at least six times.

B. Test GFCI operation with both local and remote fault simulations according to manufacturer's written instructions.

C. Replace damaged or defective components.

3.5 CLEANING

A. Internally clean devices, device outlet boxes, and enclosures. Replace stained or improperly painted wall plates or devices.

END OF SECTION

SECTION 16190

SUPPORTING DEVICES

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

A. The General Provisions, Supplemental General Provisions, Special Provisions and Division 1 Specification sections, apply to work covered by this Section.

B. Comply with Division 16 Sections, as applicable. Refer to other Division for coordination of work.

1.2 SCOPE OF WORK

A. Provide labor, material, equipment, tools and services, and perform operations required for, and reasonably incidental to, the providing of supporting devices, including related systems and accessories.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

B. Unistrut Corp.

C. B-Line Systems, Inc.

D. Midland Ross-Kindorf

2.2 MATERIALS

A. Suspension Hangers

1.1 Suspension hangers for individual conduit runs shall be zinc plated formed steel type.

B. Vertical Supports

1.1 Malleable iron one hole pipe straps shall be used for vertical runs.

C. Clamps

1.1 Beam clamps shall be used for bar joists and beams.

D. Anti-Vibration Hangers

1.1 Anti-vibration hangers shall be combination type having a double deflection neoprene element in series with a steel coil spring; double deflection of 0.30"; steel coil spring shall be selected from a 1" static deflection series with a minimum additional travel to solid of ½"; spring diameters shall be large enough to permit 15 degree angular misalignment of the rod connecting the hanger to the ceiling support without rubbing the hanger box.

2.3 LIGHT FIXTURE HANGERS

A. Refer to Section 16500

Corrosive Areas: PVC; at factory apply a minimum of 10-mil-thick PVC coating, bonded to metal, inside and outside.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Hangers

1 Approved hangers and stiff leg supports shall be installed in quantity and size as required to

carry the weight of raceway and contents and shall be arranged to prevent vibration transmission to the building and allow for raceway movement.

2 Hangers shall be supported by means of uncoated solid steel rods which are threaded to allow vertical adjustments. Lock nuts shall be provided in sufficient number and location to lock all rod adjustments permanently at the adjusted height. Two lock nuts shall be used unless the nut tightens against a threaded socket. Minimum rod diameters shall be as follows:

NOMINAL CONDUIT SIZE	ROD DIAMETER
1/2" through 2"	1/4"
2-1/2" through 3"	3/8"
4" and 5"	1/2"

3 Hanger spacing shall be as required for proper and adequate support raceway, but in no case shall be less than one hanger per 8'-0" of raceway length except that conduit less than 1" diameter shall be supported at least every 6'-0".

4 Where numerous conduits are run parallel to one another, they may be supported from a trapeze type hanger arrangement with strut bottom.

5 Anti-vibration type hangers shall be provided for equipment as required to minimize vibration and/or as directed by the Architect/Engineer.

B. Supports

1 Support of hangers shall be by means of sufficient quantities of individual after set steel expansion shields, or beam clamps attached to structural steel.

2 Stiff-legs shall be furnished and installed in cases where support from overhead structure is not possible.

3 Ceiling mounted lighting fixtures shall be supported from the building structure at two opposite corners. The Contractor shall provide fixture hangers to properly interface with the ceiling system.

4 Furnish and install complete any additional structural support steel, brackets, fasteners, etc., as required to adequately support all raceway and equipment.

5 Support of hangers from concrete slabs shall be by means of sufficient quantity of "U" brackets attached with after set expansion shields and bolts.

6 Support of hangers from concrete tees shall be by means of sufficient quantity of angle iron brackets attached with after set expansion shields and bolts.

END OF SECTION

SECTION 16521

EXTERIOR LIGHTING

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies the furnishing, installation, and connection of exterior fixtures, poles, and supports. The terms "lighting fixtures", "fixture" and "luminaire" are used interchangeably.

1.2 RELATED WORK

A. Section CAST-IN-PLACE CONCRETE.

B. Section SCHEDULE FOR FINISHES: Finishes for exterior light poles and luminaires.

C. Section REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General electrical requirements and items that are common to more than one section of Division 26.

D. Section LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW): Low voltage power and lighting wiring.

E. Section GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.

F. Section RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduits, fittings, and boxes for raceway systems.

G. Section UNDERGROUND ELECTRICAL CONSTRUCTION: Underground handholes and conduits.

H. SectionLIGHTING CONTROLS: Controls for exterior lighting.

1.3 QUALITY ASSURANCE

A. Refer to Paragraph, QUALIFICATIONS (PRODUCTS AND SERVICES), in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.4 SUBMITTALS

A. Submit six copies of the following in accordance with Section REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1. Shop Drawings:

a. Submit the following information for each type of lighting fixture designated on the LIGHTING FIXTURE SCHEDULE, arranged in order of lighting fixture designation.

b. Material and construction details, include information on housing and optics system.

c. Physical dimensions and description.

d. Wiring schematic and connection diagram.

e. Installation details.

f. Energy efficiency data.

g. Photometric data based on laboratory tests complying with IES Lighting Measurements testing and calculation guides.

h. For LED lighting fixtures, submit US DOE LED Lighting Facts label, and IES L70 rated life.

i. Submit site plan showing all exterior lighting fixtures with fixture tags consistent with Lighting Fixture Schedule as shown on drawings. Site plan shall show computer generated point–by-point illumination calculations. Include lamp lumen and light loss factors used in calculations.

2. Manuals:

a. Submit, simultaneously with the shop drawings, complete maintenance and operating manuals, including technical data sheets, wiring diagrams, and information for ordering replacement parts.

b. If changes have been made to the maintenance and operating manuals originally submitted, submit updated maintenance and operating manuals two weeks prior to the final inspection.

3. Certifications: Two weeks prior to final inspection, submit the following.

a. Certification by the Contractor that the exterior lighting systems have been properly installed and tested.

1.5 APPLICABLE PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.

B. Aluminum Association Inc. (AA):

AAH35.1-06 ..... Alloy and Temper Designation Systems for Aluminum

C. American Association of State Highway and Transportation Officials (AASHTO):

32-LTS-6..... Structural Supports for Highway Signs, Luminaires and Traffic Signals

D. American Concrete Institute (ACI):

318-05 ..... Building Code Requirements for Structural Concrete

E. American National Standards Institute (ANSI):

C81.61-09 ..... Electrical Lamp Bases – Specifications for Bases (Caps) for Electric Lamps

F. American Society for Testing and Materials (ASTM):

A123/A123M-12 ..... Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

A153/A153M-09..... Zinc Coating (Hot-Dip) on Iron and Steel Hardware

B108-03a-08 ..... Aluminum-Alloy Permanent Mold Castings

C1089-13 ..... Spun Cast Prestressed Concrete Poles

G. Federal Aviation Administration (FAA):

AC 70/7460-IK-07..... Obstruction Lighting and Marking

AC 150/5345-43F-06..... Obstruction Lighting Equipment

H. Illuminating Engineering Society of North America (IESNA):

HB-9-00..... Lighting Handbook

RP-8-05..... Roadway Lighting

LM-52-03..... Photometric Measurements of Roadway Sign Installations

LM-72-10..... Directional Positioning of Photometric Data

LM-79-08.....Approved Method for the Electrical and Photometric Measurements of Solid-Sate Lighting Products

LM-80-08.....Approved Method for Measuring Lumen Maintenance of LED Light Sources

TM-15-07.....Backlight, Uplight and Glare (BUG) Ratings

I. National Electrical Manufacturers Association (NEMA):

C78.41-06 .....Electric Lamps – Guidelines for Low-Pressure Sodium Lamps

C78.42-07 .....Electric Lamps – Guidelines for High-Pressure Sodium Lamps

C78.43-07 .....Electric Lamps – Single-Ended Metal-Halide Lamps

C78.1381-98 .....Electric Lamps – 70-Watt M85 Double-Ended Metal-Halide Lamps

C82.4-02 .....Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps (Multiple-Supply Type)

C136.3-05 .....For Roadway and Area Lighting Equipment – Luminaire Attachments

C136.17-05 .....Roadway and Area Lighting Equipment – Enclosed Side-Mounted Luminaires for Horizontal-Burning High-Intensity-Discharge Lamps – Mechanical Interchangeability of Refractors

ICS 2-00 (R2005) .....Controllers, Contactors and Overload Relays Rated 600 Volts

ICS 6-93 (R2006) .....Enclosures

J. National Fire Protection Association (NFPA):

70-11 .....National Electrical Code (NEC)

K. Underwriters Laboratories, Inc. (UL):

496-08 .....Lampholders

773-95.....Plug-In, Locking Type Photocontrols for Use with Area Lighting

773A-06 .....Nonindustrial Photoelectric Switches for Lighting Control

1029-94.....High-Intensity-Discharge Lamp Ballasts

1598-08 .....Luminaires

8750-09.....Light Emitting Diode (LED) Equipment for Use in Lighting Products

1.6 DELIVERY, STORAGE, AND HANDLING

Provide manufacturer's standard provisions for protecting pole finishes during transport, storage, and installation. Do not store poles on ground. Store poles so they are at least 305 mm (12 inches) above ground level and growing vegetation. Do not remove factory-applied pole wrappings until just before installing pole.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

Luminaires, materials and equipment shall be in accordance with NEC, UL, ANSI, and as shown on the drawings and specified.

2.2 POLES

A. General:

1. Poles shall be as shown on the drawings, and as specified. Finish shall be as specified on the drawings.

2. The pole and arm assembly shall be designed for wind loading of110 mph) minimum, as required by wind loading conditions at project site, with an additional 30% gust factor and supporting luminaire(s) and accessories such as shields, banner arms, and banners that have the effective projected areas indicated. The effective projected area of the pole shall be applied at the height of the pole base, as shown on the drawings.
3. Poles shall be //embedded// //anchor-bolt// type designed for use with underground supply conductors. Poles shall have handhole having a minimum clear opening of 65 x 125 mm (2.5 x 5 inches). Handhole covers shall be secured by stainless steel captive screws.
4. Provide a steel-grounding stud opposite handhole openings, designed to prevent electrolysis when used with copper wire.
5. Provide a base cover that matches the pole in material and color to conceal the mounting hardware pole-base welds and anchor bolts.
6. Hardware and Accessories: All necessary hardware and specified accessories shall be the product of the pole manufacturer.
7. Provide manufacturer's standard finish, as scheduled on the drawings. Where indicated on drawings, provide finishes as indicated in Section 09 06 00, SCHEDULE FOR FINISHES.

B. Types:

1. Pole – refer to light fixture schedule.

2.3 FOUNDATIONS FOR POLES

A. Foundations shall be cast-in-place concrete, having 3000 psi minimum 28-day compressive strength.

B. Foundations shall support the effective projected area of the specified pole, arm(s), luminaire(s), and accessories, such as shields, banner arms, and banners, under wind conditions previously specified in this section.

C. Place concrete in spirally-wrapped treated paper forms for round foundations, and construct forms for square foundations.

D. Rub-finish and round all above-grade concrete edges to approximately 6 mm (0.25-inch) radius.

E. Anchor bolt assemblies and reinforcing of concrete foundations shall be as shown on the drawings. Anchor bolts shall be in a welded cage or properly positioned by the tiewire to stirrups.

F. Prior to concrete pour, install electrode per Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.

2.4 LUMINAIRES

A. Luminaires shall be weatherproof, heavy duty, outdoor types designed for efficient light utilization, adequate dissipation of lamp and ballast heat, and safe cleaning and relamping.

B. Illumination distribution patterns, BUG ratings and cutoff types as defined by the IESNA shall be as shown on the drawings.

C. Incorporate ballasts in the luminaire housing, except where otherwise shown on the drawings.

D. Lenses shall be frame-mounted, heat-resistant, borosilicate glass, with prismatic refractors, unless otherwise shown on the drawings. Attach the frame to the luminaire housing by hinges or chain. Use heat and aging-resistant, resilient gaskets to seal and cushion lenses and refractors in luminaire doors.

E. Lamp sockets for high intensity discharge (H.I.D) fixture shall have locking-type porcelain enclosures in conformance to the applicable requirements of ANSI C81.61-09 and UL 496-08.

F. Pre-wire internal components to terminal strips at the factory.

G. Bracket-mounted luminaires shall have leveling provisions and clamp-type adjustable slip-fitters with locking screws.

H. Materials shall be rustproof. Latches and fittings shall be non-ferrous metal.

I. Provide manufacturer's standard finish, as scheduled on the drawings. Where indicated on drawings, match finish process and color of pole or support materials. Where indicated on drawings, provide finishes as indicated in Section 09 06 00, SCHEDULE FOR FINISHES.

J. Luminaires shall carry factory labels, showing complete, specific lamp and ballast information.

2.5 LAMPS

F. LED sources shall meet the following requirements:

1. Operating temperature rating shall be between -40 degrees C (-40 degrees F) and 50 degrees C (120 degrees F).
2. Correlated Color Temperature (CCT)://4000K//.
3. Color Rendering Index (CRI): ≥ 85.
4. The manufacturer shall have performed reliability tests on the LEDs luminaires complying with Illuminating Engineering Society (IES) LM79 for photometric performance and LM80 for lumen maintenance and L70 life.//

G. Mercury vapor lamps shall not be used.

2.6 LED DRIVERS

A. LED drivers shall meet the following requirements:

1. Drivers shall have a minimum efficiency of 85%.
2. Starting Temperature: -40 degrees C (-40 degrees F).
3. Input Voltage: 120 to 480 (±10%) volt.
4. Power Supplies: Class I or II output.

5. Surge Protection: The system must survive 250 repetitive strikes of "C Low" (C Low: 6kV/1.2 x 50 μs, 10kA/8 x 20 μs) waveforms at 1-minute intervals with less than 10% degradation in clamping voltage. "C Low" waveforms are as defined in IEEE/ASNI C62.41.2-2002, Scenario 1 Location Category C.
6. Power Factor (PF): ≥ 0.90.
7. Total Harmonic Distortion (THD): $\leq 20\%$.
8. Comply with FCC Title 47 CFR Part 18 Non-consumer RFI/EMI Standards.
9. Drivers shall be reduction of hazardous substances (ROHS)-compliant.//

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install lighting in accordance with the NEC, as shown on the drawings, and in accordance with manufacturer's recommendations.
B. Pole Foundations:
   1. Excavate only as necessary to provide sufficient working clearance for installation of forms and proper use of tamper to the full depth of the excavation. Prevent surface water from flowing into the excavation. Thoroughly compact backfill with compacting arranged to prevent pressure between conductor, jacket, or sheath, and the end of conduit.
   2. Set anchor bolts according to anchor-bolt templates furnished by the pole manufacturer.
   3. Install poles as necessary to provide a permanent vertical position with the bracket arm in proper position for luminaire location.
   4. After the poles have been installed, shimmed, and plumbed, grout the spaces between the pole bases and the concrete base with non-shrink concrete grout material. Provide a plastic or copper tube, of not less than 9 mm (0.375-inch) inside diameter through the grout, tight to the top of the concrete base to prevent moisture weeping from the interior of the pole.
C. Install lamps in each luminaire.
D. Adjust luminaires that require field adjustment or aiming.

3.2 GROUNDING

Ground noncurrent-carrying parts of equipment, including metal poles, luminaires, mounting arms, brackets, and metallic enclosures, as specified in Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS. Where copper grounding conductor is connected to a metal other than copper, provide specially-treated or lined connectors suitable and listed for this purpose.

3.3 ACCEPTANCE CHECKS AND TESTS

Verify operation after installing luminaires and energizing circuits.

END OF SECTION