

Maze
Design , Inc.

**RANDOLPH CENTRAL
SCHOOL CORPORATION
PTECH INNOVATION CENTER
WINCHESTER, IN PROJECT #2275-1**

DECEMBER, 2023

PROJECT MANUAL

BIDDING REQUIREMENTS
CONDITIONS OF THE CONTRACT
SPECIFICATIONS

FOR

Randolph Central School Corporation

PTECH INNOVATION CENTER
700 N. Union Street
Winchester, IN 47394
PROJECT 2275-1

MAZE DESIGN, INC.
2601 National Road West
Richmond, Indiana 47374
Phone: (765)962-1300

Date: December, 2023

TABLE OF CONTENTS

BIDDING REQUIREMENTS

00020	Invitation to Bid
00100	Instructions to Bidders
00300	Bid Form 96 Supplement
00700	General Conditions

DIVISION 1: GENERAL REQUIREMENTS

01011	Summary of Work - Single Prime Contract
01020	Allowances
01035	Modification Procedures
01041	Project Coordination-Single Prime Contracts
01045	Cutting and Patching
01050	Field Engineering
01095	Reference Standards and Definitions
01200	Project Meetings
01300	Submittals
01400	Quality Control Services
01501	Temporary Facilities-Single Prime Contracts
01600	Materials and Equipment
01631	Product Substitutions
01700	Project Closeout
01720	Project Record Documents

DIVISION 2: SITEWORK

02110	Site Clearing
02200	Earthwork
02282	Termite Control
02730	Facility sanitary sewers
02740	Storm utility drainage piping
02930	Lawns & Grasses

DIVISION 3: CONCRETE

03300	Cast-in-Place Concrete
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DIVISION 4: MASONRY

04200 Unit Masonry

DIVISION 5: METALS

05120 Structural Steel
05220 Steel Joists
05310 Steel Deck
05500 Metal Fabrications

DIVISION 6: WOOD AND PLASTICS

06100 Rough Carpentry
06160 Sheathing

DIVISION 7: THERMAL AND MOISTURE PROTECTION

07210 Building Insulation
07411 Metal Roof Panels
07530 Single-Ply Membrane Roofing
07600 Flashing & Sheet Metal
07710 Roof Specialties
07901 Joint Sealants

DIVISION 8: DOORS AND WINDOWS

08114 Custom Steel Doors and Frames
08211 Flush Wood Doors
08360 Over head doors
08410 Aluminum Entrances
08710 Door Hardware
08800 Glass and Glazing

DIVISION 9: FINISHES

09511 Acoustical Panel Ceilings
09650 Vinyl Base
09760 Resilient Flake Polymeric Flooring system
09900 Painting

2275-1

DIVISION 10: SPECIALTIES

10800 Toilet Accessories

DIVISION 12: FURNISHINGS

12304 Laminate Clad Casework 1-11

INVITATION TO BID

Issued By:
MAZE DESIGN, INC.
2601 National Road West
Richmond, Indiana 47374
(765) 962-1300

1. You are invited to bid on a Prime Contract for the following project:

Addition and Renovation
PTECH INNOVATION CENTER
700 N. Union Street
Winchester, IN 47394

2. Bids will be received for a Single Prime Contract per plans and specifications.
3. Randolph Central School Corporation will receive Bids until **2:00 PM EST on Thursday, January 18th, 2024**, at the Administration Building, 103 N. East Street, Winchester Indiana 47394. Bids will be opened publicly and read aloud immediately after specified closing time. All interested parties are invited to attend. Bids received after the specified closing time will be logged in with time of receipt, opened, read aloud, and forwarded for appropriate action by the Board, with full reservation of the Board to reject any or all Bids due to the lateness.
4. A mandatory Pre-bid conference is scheduled for **Thursday January 4th, 2024 at 3:00 p.m. Located at the project site. Enter Door #2 Lobby to check in.**

5. Bidding Documents may be examined at the Administration office:

Administration office
Randolph Central School Corporation
103 N. East Street
Winchester, Indiana 47394

6. Bidding Documents may be obtained in Electronic PDF format online at Eastern Engineering Plan room
www.easternengineering.com 765-284-3119
7. Bid security in the amount of five percent (5%) of the bid, must accompany each Bid in accordance with the Instructions to Bidders.

2275-1

8. Guaranty Bonds in the form of a Performance Bond and a Labor and Material Payment Bond, in an amount equal to one hundred percent (100%) of the Contract Sum, will be required.

9. SUBMISSION OF BIDS

The Bid, bid security, and other documents required to be submitted with the Bid shall be enclosed in a sealed opaque envelope. The envelope shall be addressed to the party indicated below and shall be identified with the Project name, and the Bidder's name and address. If the Bid is sent by mail, the sealed envelope shall be enclosed in a separate mailing envelope with the notation "SEALED BID ENCLOSED" on the face thereof.

Rolland Abraham
Randolph Central School Corporation
103 N. East Street
Winchester, IN 47394

INSTRUCTIONS TO BIDDERS

ARTICLE 1
DEFINITIONS

1.1 Bidding Documents include the Bidding Requirements and the proposed Contract Documents. The Bidding Requirements consist of the Advertisement and Invitation to Bid, Instructions to Bidders, the bid forms, and other sample bidding and contract forms. The proposed Contract Documents consist of the form of Agreement between the Owner and Contractor, Conditions, of the Contract (General, Supplementary and other Conditions), Drawings, Specifications and all Addenda issued prior to execution of the Contract.

1.2 Definitions set forth in the General Conditions of the Contract for Construction, AIA Document A201, or in other Contract Documents are applicable to the Bidding Documents.

1.3 Addenda are written or graphic instruments issued by the Engineer prior to the execution of the Contract which modify or interpret the Bidding Documents by additions, deletions, clarifications or corrections.

1.4 A Bid is a complete and properly signed proposal to do the Work for the sums stipulated therein, submitted in accordance with the Bidding Documents.

1.5 The Base Bid is the sum stated in the Bid for which the Bidder offers to perform the Work described in the Bidding Documents as the base, to which Work may be added or from which Work may be deleted for sums stated in Alternate Bids.

1.6 An Alternate Bid (or Alternate) is an amount stated in the Bid to be added to or deducted from the amount of the Base Bid if the corresponding change in the Work, as described in the Bidding Documents, is accepted.

1.7 A Unit Price is an amount stated in the Bid as a price per unit of measurement for materials, equipment or services or a portion of the Work as described in the Bidding Documents.

1.8 A Bidder is person or entity who submits a Bid.

1.9 A Sub-bidder is a person or entity who submits a bid to a Bidder for materials, equipment or labor for a portion of the Work.

ARTICLE 2
BIDDER'S REPRESENTATIONS

2.1 The Bidder by making a Bid represents that:

2.1.1 The Bidder has read and understands the Bidding Documents and the Bid is made in accordance therewith.

2.1.2 The Bidder has read and understands the Bidding Documents or Contract Documents, to the extent that such documentation relates to the Work for which the Bid is submitted, for other portions of the Project, if any, being bid concurrently or presently under construction.

2.1.3 Bidders are requested to visit the site, compare the drawings and specifications with any work in place, and inform themselves of all conditions, including other work, if any, being performed. Failure to visit the site will in no way relieve the successful bidder from necessity of furnishing any materials or performing any work that may be required to complete work in accordance with drawings without additional cost to Owner.

2.1.4 By submitting a Bid, the Bidder agrees that he has examined the site, the Specifications and Drawings, all other bidding documents and, where the specifications require, a given result to be produced in any part of the work, that the specifications and drawings are adequate and the required result can be produced under the specifications and drawings.

2.1.5 No claim for any extra will be allowed because of alleged impossibilities in the production of the results specified or because of inadequate or improper drawings and specifications.

2.1.6 The Bid is based upon the materials, equipment and systems required by the Bidding Documents without exception.

ARTICLE 3
BIDDING DOCUMENTS

3.1 COPIES

3.1.1 Bidders may obtain complete sets of the Bidding Documents From Eastern Engineering Plan room www.easternengineering.com at contractors cost.

3.1.2 Bidders shall use complete sets of Bidding Documents in preparing Bids; neither the Owner nor Engineer assumes responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

3.1.3 In making copies of the Bidding Documents available on the above terms, the Owner and the Engineer do so only for the purpose of obtaining Bids on the Work and do not confer a license or grant permission for any other use of the Bidding Documents.

3.2 INTERPRETATION OR CORRECTION OF BIDDING DOCUMENTS

3.2.1 The Bidder shall carefully study and compare the Bidding Documents with each other, and with other work being bid concurrently or presently under construction to the extent that it relates to the Work for which the Bid is submitted, shall examine the site and local conditions, and shall at once report to the Engineer errors, inconsistencies or ambiguities discovered.

3.2.2 Interpretations, corrections and changes of the Bidding Documents will be made by Addendum. Interpretations, corrections and changes of the Bidding Documents made in any other manner will not be binding, and Bidders shall not rely upon them.

3.3 SUBSTITUTIONS

3.3.1 The materials, products and equipment described in the Bidding Documents establish a standard of required function, dimension, appearance and quality to be met by any proposed substitution.

3.3.2 No substitutions will be considered prior to receipt of Bids unless written request for approval has been received by the Engineer at least seven days prior to the date for receipt of Bids. Such requests shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitution including drawings, performance and test data, and other information necessary for an evaluation. A statement setting forth changes in other materials, equipment or other portions of the Work including changes in the work of other contracts that incorporation of the proposed substitution would require shall be included. The burden of proof of the merit of the proposed substitution is upon the proposer. The Engineer's decision of approval or disapproval of a proposed substitution shall be final.

3.3.3 If the Engineer approves a proposed substitution prior to receipt of Bids, such approval will be set forth in an Addendum. Bidders shall not rely upon approvals made in any other manner.

3.3.4 Substitutions will be considered after the Contract award when request for approval is submitted in accordance with Section 01631, Product Substitutions.

3.4 ADDENDA

3.4.1 Addenda will be mailed or delivered to all who are known by

the issuing office to have received a complete set of Bidding Documents.

3.4.2 Copies of Addenda will be made available for inspection wherever Bidding Documents are on file for that purpose.

3.4.3 Each Bidder shall ascertain prior to submitting a Bid that the Bidder has received all Addenda issued, and the Bidder shall acknowledge their receipt in the Bid.

ARTICLE 4
BIDDING PROCEDURE

4.1 FORM AND STYLE OF BIDS

4.1.1 Bids must be submitted on Indiana State Form No. 96 as prescribed by the State Board of Accounts of Indiana. This Form may be obtained on the internet at <http://www.in.gov/sboa/files/Form96.pdf>.

A separate financial statement is required by Indiana State Form No. 96 on contracts of \$150,000.00 or more. In addition to State Form No. 96, Bidders must also submit Bid Form 96 Supplement which is included with the Bidding Documents. In the space provided for the Bid amount on State Form No. 96, enter the following; "SEE BID FORM 96 SUPPLEMENT." Bidders are to provide Bid amounts on Bid Form 96 Supplement.

4.1.2 All blanks on the bid form shall be filled in by typewriter or manually in ink.

4.1.3 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 amount written in words shall govern.

4.1.4 Interlineations, alterations and erasures must be initialed by the signer of the Bid. 4.1.5 Materials supplied for this project are exempt from Indiana state sales tax.

4.1.6 All Bids submitted shall be based on the established minimum wage rates included with the Bidding Documents.

4.1.7 All respective Alternates shall be bid. If no change in the Base Bid is required, indicate no change.

4.1.8 Each Bid shall include the legal name of the Bidder and be signed by the person or persons legally authorized to bind the Bidder to a contract. A Bid submitted by an agent shall have a current power of attorney attached certifying the agent's authority to bind the Bidder.

4.2 BID SECURITY

4.2.1 Each Bid shall be accompanied by a bid security pledging that the Bidder will enter into a Contract with the Owner on the

terms stated in the Bid and will, if required, furnish bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder. Should the Bidder refuse to enter into such Contract or fail to furnish such bonds if required, the amount of the bid security shall be forfeited to the Owner as liquidated damages, not as a penalty.

4.2.2 Bid security shall be a satisfactory bid bond, certified check or bank draft for the amount of five percent of the Bid, including all add alternates. If a bid bond is used, it shall be written on AIA Document A310, Bid Bond, and the attorney-in-fact who executes the bond on behalf of the surety shall affix to the bond a certified and current copy of the power of attorney.

4.2.3 The Owner will have the right to retain the bid security of Bidders to whom an award is being considered until either (a) the Contract has been executed and bonds, if required have been furnished, or (b) the specified time has elapsed so that Bids may be withdrawn, or (c) all Bids have been rejected.

4.3 SUBMISSION OF BIDS

4.3.1 The Bid, bid security, and other documents required to be submitted with the Bid shall be enclosed in a sealed opaque envelope. The envelope shall be addressed to the party indicated below and shall be identified with the Project name, division of work and the Bidder's name and address. If the Bid is sent by mail, the sealed envelope shall be enclosed in a separate mailing envelope with the notation "SEALED BID ENCLOSED" on the face thereof.

Rolland Abraham
Randolph Central School Corporation
103 N. East Street
Winchester, IN 47394

4.3.2 Bids shall be deposited at the designated location prior to the time and date for receipt of Bids. Bids received after the specified closing time will be logged in with time of receipt, opened, read aloud, and forwarded for appropriate action by the Board, with full reservation of the Board to reject any or all Bids due to the lateness.

4.3.3 The Bidder shall assume full responsibility for timely delivery at the location designated for receipt of Bids.

4.3.4 Oral, telephonic or telegraphic Bids are invalid and will not receive consideration.

4.4 MODIFICATION OR WITHDRAWAL OF BID

4.4.1 A Bid may not be withdrawn or canceled by the Bidder for a period of sixty (60) days following the time and date designated

for the receipt of Bids and each Bidder so agrees in submitting a Bid.

4.4.2 Bids may be withdrawn prior to the time and date designated for receipt of Bids. Withdrawn Bids may not be resubmitted.

ARTICLE 5
CONSIDERATION OF BIDS

5.1 OPENING OF BIDS

5.1.1 Bids received on time will be opened publicly and will be read aloud. All interested parties are invited to attend.

5.2 REJECTION OF BIDS

5.2.1 The Owner shall have the right to reject any or all Bids, reject a Bid not accompanied by a required bid security or by other data required by the Bidding Documents, or reject a Bid which is in any way incomplete or irregular.

5.3 ACCEPTANCE OF BID (AWARD)

5.3.1 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 and does not exceed the funds available. The Owner shall have the right to waive informalities or irregularities in a Bid received and to accept the Bid which, in the Owner's judgement, is in the Owner's own best interests.

5.3.2 The Owner shall have the right to accept Alternates in any order or combination, and to determine the low Bidder on the basis of the sum of the Base Bid and Alternates accepted.

ARTICLE 6
POST-BID INFORMATION

6.1 SUBMITTALS

6.1.1 The Bidders shall complete and submit, to the Engineer, the Subcontractors and Materials List included with the Bidding Documents.

ARTICLE 7
PERFORMANCE BOND AND PAYMENT BOND

7.1 Performance and payment bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder will be required. Bonds may be secured through the Bidder's usual sources. Bonds shall be written on AIA Document A312, Performance Bond and Payment Bond. Both bonds shall be written in the amount of the Contract Sum.

7.2 The Bidder shall deliver the required bonds to the Owner prior to or with the submission of the executed Agreement, or if the Work is to be commenced prior thereto in response to a letter of intent, the Bidder shall, prior to commencement of the Work, submit evidence satisfactory to the Owner that such bonds will be furnished and delivered in accordance with this Paragraph 7.2.

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

7.4 Bonds shall remain in full force and effect for a period of one year after the date of final acceptance of the Work.

ARTICLE 8
PERMITS

8.1 The Contractors shall obtain all building and other permits and inspection by governing agencies.

ARTICLE 9
FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR

9.1 FORM TO BE USED

9.1.1 The Agreement for the Work will be written on AIA Document A101, Standard Form of Agreement Between Owner and Contractor Where the Basis of Payment Is a Stipulated Sum. Payment Terms shall be 45 days after pay request are submitted. Pay request shall be submitted Monthly.

ARTICLE 10
CONTRACTOR'S INSURANCE

10.1 Insurance requirements are specified in the General and Supplementary Conditions.

ARTICLE 11
OPEN COMPETITION

11.1 Where in these specifications, certain materials, trade names or articles of certain manufacture are mentioned, it is done for the express purpose of establishing a basis of durability and efficiency and not for the purpose of the limiting of competition. Other materials may be used, by following the procedures outlined in Section 1 of these specifications.

END OF SECTION

BID FORM 96 SUPPLEMENT

BID TO:
Randolph Central School Corporation
Administration Building
103 N. East Street
Winchester, Indiana 47394

BID FROM: _____

Address _____

City / State _____

Telephone No. _____

BID FOR:

PTECH Innovation Center
700 N. Union Street
Winchester, IN 47394
PROJECT 2257-2

The Undersigned, having visited the site of proposed construction of this project, and having familiarized himself with local conditions affecting the cost of the Work and with all requirements of the Contract Documents and Addenda thereto as prepared by Maze Design, Inc., hereby offers to furnish all labor and materials required by the Contract Documents and Addenda thereto for the completion of the Contracts below for which an amount is provided:

Base Bid

_____ Dollars (\$ _____)

Add Alternate #1 - Canopy

_____ Dollars (\$ _____)

Calendar Days needed to Complete Project. _____

ADDENDA RECEIVED

Receipt of Addendum Nos. _____, is hereby acknowledged.

BID ACCEPTANCE

If written notice of the acceptance of this Bid is received by the Undersigned within 60 days after the date for opening of Bids or any time thereafter before this Bid is withdrawn, the Undersigned will, execute the required Agreement and furnish Performance and Payment Bonds in accordance with the Contract Documents and Bid as accepted.

If Bidder is an individual complete the blanks in the following box.

IN TESTIMONY WHEREOF, the Bidder (an individual) has hereunto set his hand this _____ day of _____ 20____.
Individual _____

If Bidder is a partnership complete the blanks in the following box.

IN TESTIMONY WHEREOF, the Bidder (a Partnership) have hereunto set their hands this _____ day of _____ 20____.
Name of Partnership _____
Name of Partners _____

If Bidder is a Corporation complete the blanks in the following box.

IN TESTIMONY WHEREOF, the Bidder (a Corporation) has caused this Bid to be signed by its President and Secretary this _____ day of _____ 20____.
Name of Corporation _____
President _____
Secretary _____



CONTRACTOR'S BID FOR PUBLIC WORK - FORM 96

State Form 52414 (R2 / 2-13) / Form 96 (Revised 2013)

Prescribed by State Board of Accounts

PART I

(To be completed for all bids. Please type or print)

Date (month, day, year): _____

1. Governmental Unit (Owner): _____

2. County : _____

3. Bidder (Firm): _____

Address: _____

City/State/ZIPcode: _____

4. Telephone Number: _____

5. Agent of Bidder (if applicable): _____

Pursuant to notices given, the undersigned offers to furnish labor and/or material necessary to complete the public works project of _____

(Governmental Unit) in accordance with plans and specifications prepared by _____

_____ and dated _____ for the sum of

_____ \$ _____

The undersigned further agrees to furnish a bond or certified check with this bid for an amount specified in the notice of the letting. If alternative bids apply, the undersigned submits a proposal for each in accordance with the notice. Any addendums attached will be specifically referenced at the applicable page.

If additional units of material included in the contract are needed, the cost of units must be the same as that shown in the original contract if accepted by the governmental unit. If the bid is to be awarded on a unit basis, the itemization of the units shall be shown on a separate attachment.

The contractor and his subcontractors, if any, shall not discriminate against or intimidate any employee, or applicant for employment, to be employed in the performance of this contract, with respect to any matter directly or indirectly related to employment because of race, religion, color, sex, national origin or ancestry. Breach of this covenant may be regarded as a material breach of the contract.

CERTIFICATION OF USE OF UNITED STATES STEEL PRODUCTS

(If applicable)

I, the undersigned bidder or agent as a contractor on a public works project, understand my statutory obligation to use steel products made in the United States (I.C. 5-16-8-2). I hereby certify that I and all subcontractors employed by me for this project will use U.S. steel products on this project if awarded. I understand that violations hereunder may result in forfeiture of contractual payments.

ACCEPTANCE

The above bid is accepted this _____ day of _____, _____, subject to the following conditions: _____

Contracting Authority Members:

PART II

(For projects of \$110,000 or more – IC 36-1-12-4)

Governmental Unit: _____

Bidder (Firm) _____

Date (month, day, year): _____

These statements to be submitted under oath by each bidder with and as a part of his bid. Attach additional pages for each section as needed.

SECTION I EXPERIENCE QUESTIONNAIRE

1. What public works projects has your organization completed for the period of one (1) year prior to the date of the current bid?

Table with 4 columns: Contract Amount, Class of Work, Completion Date, Name and Address of Owner. Contains 4 empty rows.

2. What public works projects are now in process of construction by your organization?

Table with 4 columns: Contract Amount, Class of Work, Expected Completion Date, Name and Address of Owner. Contains 4 empty rows.

3. Have you ever failed to complete any work awarded to you? _____ If so, where and why?

4. List references from private firms for which you have performed work.

SECTION II PLAN AND EQUIPMENT QUESTIONNAIRE

1. Explain your plan or layout for performing proposed work. *(Examples could include a narrative of when you could begin work, complete the project, number of workers, etc. and any other information which you believe would enable the governmental unit to consider your bid.)*

2. Please list the names and addresses of all subcontractors *(i.e. persons or firms outside your own firm who have performed part of the work)* that you have used on public works projects during the past five (5) years along with a brief description of the work done by each subcontractor.

3. If you intend to sublet any portion of the work, state the name and address of each subcontractor, equipment to be used by the subcontractor, and whether you will require a bond. However, if you are unable to currently provide a listing, please understand a listing must be provided prior to contract approval. Until the completion of the proposed project, you are under a continuing obligation to immediately notify the governmental unit in the event that you subsequently determine that you will use a subcontractor on the proposed project.

4. What equipment do you have available to use for the proposed project? Any equipment to be used by subcontractors may also be required to be listed by the governmental unit.

5. Have you entered into contracts or received offers for all materials which substantiate the prices used in preparing your proposal? If not, please explain the rationale used which would corroborate the prices listed.

SECTION III CONTRACTOR'S FINANCIAL STATEMENT

Attachment of bidder's financial statement is mandatory. Any bid submitted without said financial statement as required by statute shall thereby be rendered invalid. The financial statement provided hereunder to the governing body awarding the contract must be specific enough in detail so that said governing body can make a proper determination of the bidder's capability for completing the project if awarded.

BID OF

_____ (Contractor)

_____ (Address)

**FOR
PUBLIC WORKS PROJECTS
OF**

Filed _____, _____

Action taken _____

GENERAL CONDITIONS

- 1.1 An AIA 101-2017 Contract shall be utilized for this project. A 5% retainage will be withheld from each pay application.
- 1.2 General Conditions shall be AIA Document A201, 2017 edition, entitled, "General Conditions of the Contract for Construction".

SECTION 01011 - SUMMARY OF WORK - PRIME CONTRACTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 PROJECT IDENTIFICATION

- A. The Project consists of an Addition & Renovation:

PTECH INNOVATION CENTER
700 N. Union Street
Winchester, IN 47394

For: The Randolph Central School Corporation, 103 N. East Street Winchester, IN 47394 as shown on contract documents prepared by Maze Design, Inc.

- B. Single Prime Contracts, Represents a contract that combines all construction activities performed on the project under one Single Prime Contract. The Single Prime Contract for this project includes

1. General Construction Contract.

- a. The General Construction Contract includes, site work, architectural, structural, plus other activities traditionally recognized as general construction. It also includes administrative and coordination responsibilities, plus full time superintendent.

2. Plumbing, Heating, Ventilating and Air Conditioning Contract.

- a. Plumbing, Heating, Ventilating and Air Conditioning Construction Contract includes, plumbing, heating, ventilating, air conditioning, temperature control construction, cutting and patching and painting of exposed piping where scheduled plus other activities traditionally recognized as mechanical construction.

3. Electrical Contract.

- a. Electrical Construction Contract includes electrical construction, cutting and patching plus other activities traditionally recognized as electrical construction.

1.3 WORK SEQUENCE

- A. Education takes highest priority, scheduling will be established to minimize any interruption in the educational process.

The Owner will work closely with the Contractors to move the project as expedient as possible. Required weekly project meetings will begin the first week of work. A detailed room by room schedule of all work activity will be prepared by the General Contractor and Emailed to all parties two days before each project meeting. this schedule must detail all work to occur during the next two weeks after the week of the meeting. All Contractors and Subs, the Owner, and the Engineers all need to officially approve the schedule at each meeting. Any contractor that is behind in his schedule at any project meeting will indicate in detail at the meeting how he will catch up before the next meeting.

- B. All contractors shall be responsible for taking all measures necessary to meet the stringent schedule and work sequencing requirements to this project. All such measures shall be included in the base bid price. No extra compensation will be approved for any of this work.

1.4 CONTRACTORS USE OF PREMISES

- A. General: The prime Contractors shall limit their use of the premises to construction activities in areas indicated.
 - 1. Confine operations to areas within Contract limits indicated. Portions of the site beyond areas in which construction operations are indicated are not to be disturbed.
 - 2. Keep driveways and entrances serving the premises clear and available to the Owner and the Owner's employees at all times. Coordinate areas available for parking or storage of materials with Owner's representative. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on

site.

- B. Use of the Existing Building: Maintain the existing building in a weather tight condition throughout the construction period. Repair damage caused by construction operations. Take all precautions necessary to protect the building and its occupants during the construction period. Contractor to provide dust barriers as required to prevent dirt and dust from entering existing building and HVAC systems. Cleaning of all existing areas that have construction debris, dust or other items.

1.5 OWNER OCCUPANCY

- A. Full Owner Occupancy: The Owner will occupy the site and existing building during the entire construction period. Cooperate with the Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with the Owner's operations.
- B. Partial Owner Occupancy: The Owner reserves the right to occupy and to place and install equipment in completed areas of the building prior to Substantial Completion, provided that such occupancy does not interfere with completion of the Work. Such placing of equipment and partial occupancy shall not constitute acceptance of the total Work.
 - 1. A Certificate of Substantial Completion will be executed for each specific portion of the Work to be occupied prior to Owner occupancy.
 - 2. Obtain a Certificate of Occupancy from local building officials prior to Owner occupancy.
 - 3. Prior to partial Owner occupancy, mechanical and electrical systems shall be fully operational. Required inspections and tests shall have been successfully completed. Upon occupancy the Owner will provide operation and maintenance of mechanical and electrical systems in occupied portions of the building.

END OF SECTION 01011

SECTION 01020 - ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements governing handling and processing allowances.
- B. Types of allowances required include the following:
 - 1. Contingency allowances.
- C. Procedures for submitting and handling Change Orders are included in Section "Change Order Procedures."

1.3 SELECTION AND PURCHASE

- A. At the earliest feasible date after Contract award, advise the Engineer of the date when the final selection and purchase of each product or system described by an allowance must be completed in order to avoid delay in performance of the Work.
 - 1. When requested by the Engineer, obtain proposals for each allowance for use in making final selections; include recommendations that are relevant to performance of the Work.
 - 2. Purchase products and systems as selected by the Engineer from the designated supplier.

1.4 SUBMITTALS

- A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.
- B. Submit invoices or delivery slips to indicate actual quantities of materials delivered to the site for use in fulfillment of each allowance.

1.5 CONTINGENCY ALLOWANCES

- A. Use the contingency allowance only as directed for the Owner's purposes, and only by Change Orders which designate amounts to be charged to the allowance.
 - 1. The Contractor's related costs for products or equipment ordered by the Owner under the contingency allowance, including delivery, installation, taxes, insurance, equipment rental, and similar costs are not part of the Contract Sum.
 - 2. Change Orders authorizing use of funds from the contingency allowance will include the Contractor's related costs and reasonable overhead and profit margins.
 - 3. At Project closeout, credit unused amounts remaining in the contingency allowance to Owner by Change Order.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 INSPECTION

- A. Inspect products covered by an allowance promptly upon delivery for damage or defects.

3.2 PREPARATION

- A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related construction activities.

3.3 SCHEDULE OF ALLOWANCES

Allowance No. 1: General Contractor shall include a Contingency Allowance of \$30,000.00 for use upon the Owner's instructions.

END OF SECTION 01020

SECTION 01035 - MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This section specifies administrative and procedural requirements for handling and processing Contract modifications.
 - 1. Single Prime Contracts: Provisions of this Section apply to the Work of prime contractor.
- B. Related Sections: The following sections contain requirements that relate to this section:
 - 1. Division 1 Section "Allowances" for procedural requirements governing the handling and processing of allowances.
 - 2. Division 1 Section "Submittals" for requirements for the Contractor's Construction Schedule.
 - 3. Division 1 Section "Application for Payment" for administrative procedures governing applications for payment.

1.3 MINOR CHANGES IN THE WORK

- A. Supplemental instructions authorizing minor changes in the Work, not involving an adjustment to the Contract Sum or Contract Time, will be issued by the Engineer on AIA form G710, Architect's Supplemental Instructions.

1.4 CHANGE ORDER PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Proposed changes in the Work that will require adjustment to the Contract Sum or Contract Time will be issued by the Engineer, with a detailed description of the proposed change and supplemental or revised Drawings and Specifications, if necessary.
 - 1. Proposal requests issued by the Engineer are for

information only. Do not consider them an instruction either to stop work in progress, or to execute the proposed change.

2. Unless otherwise indicated in the proposal request, within 20 days of receipt of the proposal request, submit to the Engineer for the Owner's review an estimate of cost necessary to execute the proposed change.
 - a. Include a list of quantities of products to be purchased and unit costs, along with the total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include a statement indicating the effect the proposed change in the Work will have on the Contract Time.
- B. Contractor-Initiated Change Order Proposal Requests: When latent or other unforeseen conditions require modifications to the Contract, the Contractor may propose changes by submitting a request for a change to the Engineer.
1. Include a statement outlining the reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and Contract Time.
 2. Include a list of quantities of products to be purchased and unit costs along with the total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities.
 3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 4. Comply with requirements in Section "Product Substitutions" if the proposed change in the Work requires the substitution of one product or system for a product or system specified.
- C. Proposal Request Form: Use AIA Document G 709 for Change Order Proposal Requests.

1.5 ALLOWANCES

- A. Allowance Adjustment: Base each Change Order Proposal Request for an allowance cost adjustment solely on the difference between the actual purchase amount and the allowance, multiplied by the final measurement of work-in-place, with reasonable allowances, where applicable, for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.

1. Include installation costs in the purchase amount only where indicated as part of the allowance.
 2. When requested, prepare explanations and documentation to substantiate the margins claimed.
- B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit, within 20 days of receipt of the change order or construction change directive authorizing work to proceed. Claims submitted later than 20 days will be rejected.
1. The Change Order cost amount shall not include the Contractor's or Subcontractor's indirect expense except when it is clearly demonstrated that either the nature or scope of work required was changed from that which could have been foreseen from the description of the allowance and other information in Contract Documents.
 2. No change to the Contractor's indirect expense is permitted for selection of higher or lower priced materials or systems of the same scope and nature as originally indicated.

1.6 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: When the Owner and Contractor are not in total agreement on the terms of a Change Order Proposal Request, the Engineer may issue a Construction Change Directive on AIA Form G714, instructing the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
1. The Construction Change Directive will contain a complete description of the change in the Work and designate the method to be followed to determine change in the Contract Sum or Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
1. After completion of the change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

1.7 CHANGE ORDER PROCEDURES

- A. Upon the Owner's approval of a Change Order Proposal Request, the Engineer will issue a Change Order for signatures of the Owner and Contractor on AIA Form G701, as provided in the Conditions of the Contract.

2275-1

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01035

SECTION 01041 - PROJECT COORDINATION - SINGLE PRIME CONTRACT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies minimum administrative and supervisory requirements necessary for coordination on the Project to be fulfilled by the single prime Contractor.
- B. Field engineering is included in Section "Field Engineering".
- C. Progress meetings, coordination meetings and pre-installation conferences are included in Section "Project Meetings".
- D. Requirement for the Contractor's Construction Schedule is included in Section "Submittals."

1.3 COORDINATION

- A. Coordination: The Single Prime Contractor shall be responsible for overall coordination and shall coordinate Subcontractor's construction activities with those of other Subcontractors and other entities involved to assure efficient and orderly installation of each part of the Work.

1. Where installation of one part of the Work is dependent on installation of other components, either before or after its own installation, Prime contractor shall schedule the construction activities in the sequence required to obtain the best results.
2. Where availability of space is limited, Prime contractor shall coordinate installation of different components with other Subcontractors to assure maximum accessibility for required maintenance, service, and repair.
3. Prime contractor shall make adequate provisions to accommodate items scheduled for later installation.

- B. Where necessary, prepare memoranda for distribution to each

party involved outlining special procedures required for coordination. Include items such as required notices, reports, and attendance at meetings.

1. Prepare similar memoranda for the Owner and separate Contractors where coordination of their Work is required.
- C. Administrative Procedures: Prime contractor shall coordinate scheduling and timing of its administrative procedures with other construction activities and activities of other Subcontractors to avoid conflicts and ensure orderly progress of the Work.
- D. Conservation: Prime contractor shall coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.
1. Salvage materials and equipment involved in performance of, but not actually incorporated in, the Work. Refer to other Sections for disposition of salvaged materials that are designated as Owner's property.

1.4 SUBMITTALS

- A. Coordination Drawings: Prepare and submit Coordination Drawings where close and careful coordination is required for installation of products and materials fabricated off-site by separate entities, and where limited space availability necessitates maximum utilization of space for efficient installation of different components.
1. Show the interrelationship of components shown on separate Shop Drawings.
 2. Indicate required installation sequences.
 3. Comply with requirements contained in Section "Submittals".
 4. Preparation Responsibility: Preparation of Coordination Drawings is the responsibility of the prime Contractor.

PART 2 - PRODUCTS (Not Applicable).

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION PROVISIONS

- A. Inspection of Conditions: The prime contractor shall require the installer of each major component to

inspect both the substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.

- B. Manufacturer's Instructions: Comply with manufacturer's installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in Contract Documents.
 - 1. Inspect materials or equipment immediately upon delivery and again prior to installation. Reject incorrect, damaged and defective items.
 - 2. Provide attachment and connection devices and methods necessary for securing Work. Secure Work true to line and level. Allow for expansion and building movement.
- C. Visual Effects: Provide uniform joint widths in exposed Work. Arrange joints in exposed Work to obtain the best visual effect. Refer questionable choices to the Engineer for final decision.
- D. Recheck measurements and dimensions, before starting each installation.
- E. Install each component during weather conditions and project status that will ensure the best possible results. Isolate each part of the completed construction from incompatible material as necessary to prevent deterioration.
- F. Enclosure of the Work: Coordinate temporary enclosures with required inspections and tests, to minimize the necessity of uncovering completed construction for that purpose.
- G. Mounting Heights: Where mounting heights are not indicated, install individual components at standard mounting heights recognized within the industry for the particular application indicated. Refer questionable mounting height decisions to the Engineer for final decision.

3.2 CLEANING AND PROTECTION

- A. During handling and installation, clean and protect construction in progress and adjoining materials in place. Apply protective covering where required to ensure freedom from damage or deterioration at Substantial Completion.
- B. Clean and maintain completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

C. Limiting Exposures: Prime contractor shall supervise its construction activities to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period. Where applicable, such exposures include, but are not limited to the following:

1. Excessive static or dynamic loading.
2. Excessive internal or external pressures.
3. Excessively high or low temperatures.
4. Thermal shock.
5. Excessively high or low humidity.
6. Air contamination or pollution.
7. Water or ice.
8. Solvents.
9. Chemicals.
10. Light.
11. Radiation.
12. Puncture.
13. Abrasion.
14. Heavy traffic.
15. Soiling, staining and corrosion.
16. Bacteria.
17. Rodent and insect infestation.
18. Combustion.
19. Electrical current.
20. High speed operation,
21. Improper lubrication,
22. Unusual wear or other misuse.
23. Contact between incompatible materials.
24. Destructive testing.
25. Misalignment.
26. Excessive weathering.
27. Unprotected storage.
28. Improper shipping or handling.
29. Theft.
30. Vandalism.

END OF SECTION 01041

SECTION 01045 - CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for cutting and patching.
- B. Refer to other Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.
 - 1. Requirements of this Section apply to mechanical and electrical installations. Refer to Division-15 and Division-16 Sections for other requirements and limitations applicable to cutting and patching mechanical and electrical installations.
- C. Demolition of selected portions of the building for alterations is included in Section "Selective Demolition."

1.3 QUALITY ASSURANCE

- A. Requirements for Structural Work: Do not cut and patch structural elements in a manner that would reduce their load-carrying capacity or load-deflection ratio.
- B. Operational and Safety Limitations: Do not cut and patch operating elements or safety related components in a manner that would result in reducing their capacity to perform as intended, or result in increased maintenance, or decreased operational life or safety.
- C. Visual Requirements: Do not cut and patch construction exposed on the exterior or in occupied spaces, in a manner that would, in the Engineer's opinion, reduce the building's aesthetic qualities, or result in visual evidence of cutting and patching. Remove and replace Work cut and patched in a visually unsatisfactory manner.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Use materials that match existing adjacent materials to the fullest extent possible with regard to visual effect. Notify Engineer of existing materials which cannot be matched prior to proceeding. Use materials whose installed performance will equal or surpass that of existing materials.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Before cutting existing surfaces, examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed. Take corrective action before proceeding, if unsafe or unsatisfactory conditions are encountered.

3.2 PREPARATION

- A. Temporary Support: Provide temporary support of Work to be cut.
- B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the Project that might be exposed during cutting and patching operations.
- C. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Take all precautions necessary to avoid cutting existing pipe, conduit or ductwork serving the building, but scheduled to be removed or relocated until provisions have been made to bypass them.

3.3 PERFORMANCE

- A. General: Employ skilled workmen to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay.
 - 1. Cut existing construction to provide for installation of other components or performance of other construction activities and the subsequent fitting and patching required to restore surfaces to their original condition.

- B. Cutting: Cut existing construction using methods least likely to damage elements to be retained or adjoining construction. Where possible review proposed procedures with the original installer; comply with the original installer's recommendations.
1. In general, where cutting is required use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots neatly to size required with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 2. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.
 3. Cut through concrete and masonry using a cutting machine such as a carborundum saw or diamond core drill.
 4. Comply with requirements of applicable Sections of Division-2 where cutting and patching requires excavating and backfilling.
 5. By-pass utility services such as pipe or conduit, before cutting, where services are shown or required to be removed, relocated or abandoned. Cut-off pipe or conduit in walls or partitions to be removed. Cap, valve or plug and seal the remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after by-passing and cutting.
- C. Patching: Patch with durable seams that are as invisible as possible. Comply with specified tolerances.
1. Where feasible, inspect and test patched areas to demonstrate integrity of the installation.
 2. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
 3. Where removal of walls or partitions extends one finished area into another, patch and repair floor and wall surfaces in the new space to provide an even surface of uniform color and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary to achieve uniform color and appearance.
 - a. Where patching occurs in a smooth painted surface, extend final paint coat over entire unbroken surface containing the patch, after the patched area has received primer and second coat.
 4. Patch, repair or rehang existing ceilings as necessary to provide an even plane surface of uniform appearance.

2275-1

3.4 CLEANING

- A. Thoroughly clean areas and spaces where cutting and patching is performed or used as access. Remove completely paint, mortar, oils, putty and items of similar nature. Thoroughly clean piping, conduit and similar features before painting or other finishing is applied. Restore damaged pipe covering to its original condition.

END OF SECTION 01045

SECTION 01050 - FIELD ENGINEERING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. General: This Section specifies administrative and procedural requirements for field engineering services.

1.3 SUBMITTALS

- A. Project Record Documents: Submit a record of Work performed as required under provisions of Sections "Submittals" and "Project Closeout".

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. The Drawings identify the existing building location and elevations.
- B. Verify layout information shown on the Drawings, in relation to existing benchmarks before proceeding to layout the Work. Locate and protect existing benchmarks and control points. Preserve permanent reference points during construction.
 - 1. Do not change or relocate benchmarks or control points without prior written approval. Promptly report lost or destroyed reference points, or requirements to relocate reference points because of necessary changes in grades or locations.
 - 2. Promptly replace lost or destroyed project control points. Base replacements on the original survey control points.
- C. Establish and maintain a minimum of two permanent benchmarks on the site, referenced to data established by survey

control points.

1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.

D. Existing utilities and equipment: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities and other construction.

1. Prior to construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer and water service piping.

3.2 PERFORMANCE

A. Working from existing building, establish benchmarks and markers to set lines and levels at each story of construction and elsewhere as needed to properly locate each element of the Project. Calculate and measure required dimensions within indicated or recognized tolerances. Do not scale Drawings to determine dimensions.

1. Advise entities engaged in construction activities, of marked lines and levels provided for their use.
2. As construction proceeds, check every major element for line, level and plumb.

B. Surveyor's Log: Maintain a surveyor's log of control and other survey Work. Make this log available for reference.

1. Record deviations from required lines and levels, and advise the Engineer when deviations that exceed indicated or recognized tolerances are detected. On Project Record Drawings, record deviations that are accepted and not corrected.

C. Site Improvements: Locate and lay out site improvements, including pavements, stakes for grading, fill and topsoil placement, utility slopes and invert elevations by instrumentation and similar appropriate means.

D. Building Lines and Levels: Locate and lay out batter boards for structures, building foundations, column grids and locations, floor levels and control lines and levels required for mechanical and electrical Work.

E. Existing Utilities: Furnish information necessary to adjust, move or relocate existing structures, utility poles, lines, services or other appurtenances located in, or affected by construction. Coordinate with local authorities having jurisdiction.

2275-1

3.3 Only qualified and competent workmen shall be used to set lines, elevations and measurement.

END OF SECTION 01050

SECTION 01095 - REFERENCE STANDARDS AND DEFINITIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. Indicated: The term indicated refers to graphic representations, notes, or schedules on the Drawings, or other Paragraphs or Schedules in the Specifications, and similar requirements in the Contract Documents. Terms such as shown, noted, scheduled, and specified are used to help the reader locate the reference. There is no limitation on location.
- C. Directed: Terms such as directed, requested, authorized, selected, approved, required, and permitted mean directed by the Engineer, requested by the Engineer, and similar phrases.
- D. Approved: The term approved, when used in conjunction with the Engineer's action on the Contractor's submittals, applications, and requests, is limited to the Engineer's duties and responsibilities as stated in the Conditions of the Contract.
- E. Regulations: The term regulations includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. Furnish: The term furnish means supply and deliver to the Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. Install: The term install describes operations at the Project site including the actual unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

- H. Provide: The term provide means to furnish and install, complete and ready for the intended use.

1.3 SPECIFICATION FORMAT AND CONTENT EXPLANATION

- A. Specification Format: These Specifications are organized into Divisions and Sections based on the Construction Specifications Institute's 16-Division format and MASTERFORMAT numbering system.
- B. Specification Content: This Specification uses certain conventions regarding the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations or circumstances. These conventions are explained as follows:
 - 1. Abbreviated Language: Language used in Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words that are implied, but not stated, shall be interpolated as the sense requires. Singular words will be interpreted as plural and plural words interpreted as singular where applicable as the context of the Contract Documents indicates.
 - 2. Imperative and streamlined language is used generally in the Specifications. Requirements expressed in the imperative mood are to be performed by the Contractor. At certain locations in the Text, subjective language is used for clarity to describe responsibilities that must be fulfilled indirectly by the Contractor, or by others when so noted.

1.4 INDUSTRY STANDARDS

- A. Applicability of Standards: Except where the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with the standards in effect as of the date of the Contract Documents.
- C. Conflicting Requirements: Where compliance with two or more standards is specified and where the standards may establish different or conflicting requirements for minimum quantities or quality levels, refer requirements that are different but apparently equal and other uncertainties to the Engineer for a decision before proceeding.
 - 1. Minimum Quantity or Quality Levels: The quantity or

quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of the requirements. Refer uncertainties to the Engineer for a decision before proceeding.

- D. Copies of Standards: Each entity engaged in construction on the Project is required to be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, the Contractor shall obtain copies directly from the publication source.

- E. Abbreviations and Names: Trade association names and titles of general standards are frequently abbreviated. Where such acronyms or abbreviations are used in the Specifications or other Contract Documents, they mean the recognized name of the trade association, standards-generating organization, authority having jurisdiction, or other entity applicable to the context of the Text provision. Refer to the "Encyclopedia of Associations," published by Gale Research Co., available in most libraries.

1.5 SUBMITTALS

- A. Permits, Licenses, and Certificates: For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, and similar documents, correspondence, and records established in conjunction with compliance with standards and regulations bearing upon performance of the Work.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01095

SECTION 01200 - PROJECT MEETINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for project meetings.
- B. Construction schedules are specified in other Division-1 Sections.

1.3 PRE-CONSTRUCTION CONFERENCE

- A. Contractor for General Construction to schedule a pre-construction conference and organizational meeting at the Project site or other convenient location no later than 15 days after execution of the Agreement and prior to commencement of construction activities. Conduct the meeting to review responsibilities and personnel assignments.
- B. Attendees: The Owner, Engineer and their consultants, all Prime Contractors and their superintendents, major subcontractors, manufacturers, suppliers and other concerned parties shall each be represented at the conference by persons familiar with and authorized to conclude matters relating to the Work.
- C. Agenda: Discuss items of significance that could affect progress including such topics as:
 - 1. Tentative construction schedule.
 - 2. Critical Work sequencing.
 - 3. Designation of responsible personnel.
 - 4. Procedures for processing field decisions and Change Orders.
 - 5. Procedures for processing Applications for Payment.
 - 6. Distribution of Contract Documents.
 - 7. Submittal of Shop Drawings, Product Data and Samples.
 - 8. Preparation of record documents.
 - 9. Use of the premises.
 - 10. Office, Work and storage areas.

11. Equipment deliveries and priorities.
12. Safety procedures.
13. First aid.
14. Security.
15. Housekeeping.
16. Working hours.

1.4 PRE-INSTALLATION CONFERENCES

- A. Conduct a pre-installation conference at the site before each of the following construction activity:
 1. Site work, Concrete, Masonry.
 2. Framing, Building enclosure.
 3. Finish, MEP
1. Review the progress of other construction activities and preparations for the particular activity under consideration at each pre-installation conference, including requirements for:
 - a. Contract Documents.
 - b. Options.
 - c. Related Change Orders.
 - d. Purchases
 - e. Deliveries.
 - f. Shop Drawings, Product Data and quality control Samples.
 - g. Possible conflicts.
 - h. Compatibility problems.
 - i. Time schedules.
 - j. Weather limitations.
 - k. Manufacturer's recommendations.
 - l. Compatibility of materials.
 - m. Acceptability of substrates.
 - n. Temporary facilities.
 - o. Space and access limitations.
 - p. Governing regulations.
 - q. Safety.
 - r. Inspection and testing requirements.
 - s. Required performance results.
 - t. Recording requirements.
 - u. Protection.
2. Record significant discussions and agreements and disagreements of each conference, along with the approved schedule. Distribute the record of the meeting to everyone concerned, promptly, including the Owner and Engineer.
3. Do not proceed if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of Work and reconvene the conference at the earliest feasible date.

1.5 COORDINATION MEETINGS

- A. Conduct Project coordination meetings at regularly scheduled times convenient for all parties involved. Project coordination meetings are in addition to specific meetings held for other purposes, such as regular progress meetings and special pre-installation meetings.
- B. Request representation at each meeting by every party currently involved in coordination or planning for the construction activities involved.
- C. Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

1.6 PROGRESS MEETINGS

- A. Conduct weekly progress meetings at the Project site. Notify the Owner and Engineer of scheduled meeting times. Coordinate dates of meetings with preparation of the payment request. The Contractor for General Construction is responsible for coordinating the meetings and taking minutes.
- B. Attendees: In addition to representatives of the Owner and Engineer, each contractor, each major subcontractor, supplier or other entity concerned with current progress or involved in planning, coordination or performance of future activities shall be represented at these meetings by persons familiar with the Project and authorized to conclude matters relating to progress.
- C. Agenda: Review and correct or approve minutes of the previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to the current status of the Project.
 - 1. Contractor's Construction Schedule: Review progress since the last meeting. Determine where each activity is in relation to the Contractor's Construction Schedule, whether on time or ahead or behind schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - 2. Review the present and future needs of each entity present, including such items as:
 - a. Interface requirements.
 - b. Time.

- c. Sequences.
- d. Deliveries.
- e. Off-site fabrication problems.
- f. Access.
- g. Site utilization.
- h. Temporary facilities and services.
- i. Hours of Work.
- j. Hazards and risks.
- k. Housekeeping.
- l. Quality and Work standards.
- m. Change Orders.
- n. Documentation of information for payment requests.

D. Reporting: No later than 5 days after each progress meeting date, the Contractor for General Construction will have distributed copies of minutes of the meeting to each party present and to other parties who should have been present. Include a brief summary, in narrative form, of progress since the previous meeting and report.

- 1. Schedule Updating: Revise the construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue the revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01200

SECTION 01300 - SUBMITTALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for submittals required for performance of the Work, including;
 - 1. Contractor's construction schedule.
 - 2. Submittal schedule.
 - 3. Daily construction reports.
 - 4. Shop Drawings.
 - 5. Product Data.
 - 6. Samples.
- B. Administrative Submittals: Refer to other Division-1 Sections and other Contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to:
 - 1. Permits.
 - 2. Applications for payment.
 - 3. Performance and payment bonds.
 - 4. Insurance certificates.
 - 5. List of Subcontractors.
- C. The Schedule of Values submittal is included in Section "Applications for Payment."
- D. Inspection and test reports are included in Section "Quality Control Services."

1.3 SUBMITTAL PROCEDURES

- A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals and related

activities that require sequential activity.

2. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.
 - a. The Engineer reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
 3. Processing: Allow sufficient review time so that installation will not be delayed as a result of the time required to process submittals, including time for resubmittals.
 - a. Allow two weeks for initial review. Allow additional time if processing must be delayed to permit coordination with subsequent submittals.
 - b. If an intermediate submittal is necessary, process the same as the initial submittal.
 - c. Allow two weeks for reprocessing each submittal.
 - d. No extension of Contract Time will be authorized because of failure to transmit submittals to the Engineer sufficiently in advance of the Work to permit processing.
- B. Submittal Preparation: Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block.
1. Provide a space approximately 4" x 5" on the label or beside the title block on Shop Drawings to record the Contractor's review and approval markings and the action taken.
 2. Include the following information on the label for processing and recording action taken.
 - a. Project name.
 - b. Date.
 - c. Name and address of Engineer.
 - d. Name and address of Contractor.
 - e. Name and address of subcontractor.
 - f. Name and address of supplier.
 - g. Name of manufacturer.
 - h. Number and title of appropriate Specification Section.
 - i. Drawing number and detail references, as appropriate.
- C. Submittal Transmittal: Package each submittal appropriately for transmittal and handling. Transmit each submittal from Contractor to Engineer using a transmittal form. Submittals

received from sources other than the Contractor will be returned without action.

- D. All submittals shall be submitted to the Engineer by Email in PDF Format. Material Samples shall be submitted and delivered to the Engineers office as specified. PDF File Names Shall have the Specification section number and name in it.

- 1. On the transmittal Record relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document requirements, including minor variations and limitations. Include Contractor's certification that information complies with Contract Document requirements.

1.4 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. See Section 01315 for required CPM Schedule.

1.5 SUBMITTAL SCHEDULE

- A. After development and acceptance of the Contractor's construction schedule, prepare a complete schedule of submittals. Submit the schedule no later than 10 days after the date required for establishment of the Contractor's construction schedule.

- 1. Coordinate submittal schedule with the list of subcontracts, schedule of values and the list of products as well as the Contractor's construction schedule.
- 2. Prepare the schedule in chronological order; include submittals required during the first 90 days of construction. Provide the following information:
 - a. Scheduled date for the first submittal.
 - b. Related Section number.
 - c. Submittal category.
 - d. Name of subcontractor.
 - e. Description of the part of the Work covered.
 - f. Scheduled date for Engineer's final release or approval.

- B. Distribution: Following response to initial submittal, print and distribute copies to the Engineer, Owner, subcontractors, and other parties required to comply with submittal dates indicated. Post copies in the Project meeting room and field office.

- 1. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned

portion of the Work and are no longer involved in construction activities.

- C. Schedule Updating: Revise the schedule after each meeting or activity, where revisions have been recognized or made. Issue the updated schedule concurrently with report of each meeting.

1.6 DAILY CONSTRUCTION REPORTS

- A. Prepare a daily construction report, recording the following information concerning events at the site; and submit one copy to the Engineer at weekly intervals:
 1. List of subcontractors at the site.
 2. Approximate count of personnel at the site.
 3. High and low temperatures, general weather conditions.
 4. Accidents and unusual events.
 5. Meetings and significant decisions.
 6. Stoppages, delays, shortages, losses.
 7. Meter readings and similar recordings.
 8. Emergency procedures.
 9. Orders and requests of governing authorities.
 10. Change Orders received, implemented.
 11. Services connected, disconnected.
 12. Equipment or system tests and start-ups.
 13. Partial Completions, occupancies.
 14. Substantial Completions authorized.

1.7 SHOP DRAWINGS

- A. Submit newly prepared information, drawn to accurate scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not considered Shop Drawings.
- B. Shop Drawings include fabrication and installation drawings, setting diagrams, schedules, patterns, templates and similar drawings. Include the following information:
 1. Dimensions.
 2. Identification of products and materials included.
 3. Compliance with specified standards.
 4. Notation of coordination requirements.
 5. Notation of dimensions established by field measurement.
 6. Sheet Size: Except for templates, patterns and similar full-size Drawings, submit Shop Drawings on sheets at least 8-1/2" x 11" but no larger than 36" x 48".
 7. Initial Submittal and Resubmittals: Submit one correctable translucent reproducible and one blue- or

black-line print if possible, or seven blue or black-line prints for the Engineer's review; the reproducible print will be returned.

8. Do not use Shop Drawings without an appropriate final stamp indicating action taken in connection with construction.
- C. Coordination drawings are a special type of Shop Drawing that show the relationship and integration of different construction elements that require careful coordination during fabrication or installation to fit in the space provided or function as intended.
1. Preparation of coordination Drawings is specified in section "Project Coordination" and may include components previously shown in detail on Shop Drawings or Product Data.
 2. Submit coordination Drawings for integration of different construction elements. Show sequences and relationships of separate components to avoid conflicts in use of space.

1.8 PRODUCT DATA

- A. Collect Product Data into a single submittal for each element of construction or system. Product Data includes printed information such as manufacturer's installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams and performance curves. Where Product Data must be specially prepared because standard printed data is not suitable for use, submit as "Shop Drawings."
1. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products, some of which are not required, mark copies to indicate the applicable information. Include the following information:
 - a. Manufacturer's printed recommendations.
 - b. Compliance with recognized trade association standards.
 - c. Compliance with recognized testing agency standards.
 - d. Application of testing agency labels and seals.
 - e. Notation of dimensions verified by field measurement.
 - f. Notation of coordination requirements.
 2. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.
 3. Preliminary Submittal: Submit a preliminary single-copy

- of Product Data where selection of options is required.
4. Submittals:
 - a. Submit 7 copies of each required submittal.
 - b. All submittals shall also be submitted to the Engineer by Email in PDF Format. Material Samples shall be submitted and delivered to the Engineers office as specified.
 - c. Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.
 5. Distribution: Furnish copies of final submittal to installers, subcontractors, suppliers, manufacturers, fabricators, and others required for performance of construction activities. Show distribution on transmittal forms.
 - a. Do not proceed with installation until an approved copy of Product Data is in the installer's possession.
 - b. Do not permit use of unmarked copies of Product Data in connection with construction.

1.9 SAMPLES

- A. Submit full-size, fully fabricated Samples cured and finished as specified and physically identical with the material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture and pattern.
 1. Mount, display, or package Samples in the manner specified to facilitate review of qualities indicated. Prepare Samples to match the Engineer's Sample. Include the following:
 - a. Generic description of the Sample.
 - b. Sample source.
 - c. Product name or name of manufacturer.
 - d. Compliance with recognized standards.
 - e. Availability and delivery time.
 2. Submit Samples for review of kind, color, pattern, and texture, for a final check of these characteristics with other elements, and for a comparison of these characteristics between the final submittal and the actual component as delivered and installed.
 - a. Where variation in color, pattern, texture or other characteristics are inherent in the material or product represented, submit multiple units (not

- less than 3), that show approximate limits of the variations.
- b. Refer to other Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation and similar construction characteristics.
 - c. Refer to other Sections for Samples to be returned to the Contractor for incorporation in the Work. Such Samples must be undamaged at time of use. On the transmittal, indicate special requests regarding disposition of Sample submittals.
3. Preliminary submittals: Where Samples are for selection of color, pattern, texture or similar characteristics from a range of standard choices, submit a full set of choices for the material or product.
 - a. Preliminary submittals will be reviewed and retained by the Engineer. The Engineer will return written response of selections and other actions.
 4. Submittals: Except for Samples illustrating assembly details, workmanship, fabrication techniques, connections, operation and similar characteristics, submit 3 sets; one will be returned marked with the action taken.
 5. Maintain sets of Samples, as returned, at the Project site, for quality comparisons throughout the course of construction.
 - a. Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.
 - b. Sample sets may be used to obtain final acceptance of the construction associated with each set.
- B. Distribution of Samples: Prepare and distribute additional sets to subcontractors, manufacturers, fabricators, suppliers, installers, and others as required for performance of the Work. Show distribution on transmittal forms.
1. Field Samples specified in individual Sections are special types of Samples. Field Samples are full-size examples erected on site to illustrate finishes, coatings, or finish materials and to establish the standard by which the Work will be judged.
 - a. Comply with submittal requirements to the fullest extent possible. Process transmittal forms to provide a record of activity.

1.10 ENGINEER'S ACTION

- A. Except for submittals for record, information or similar purposes, where action and return is required or requested, the Engineer will review each submittal, mark to indicate action taken, and return promptly.
 - 1. Compliance with specified characteristics is the Contractor's responsibility.

- B. Action Stamp: The Engineer will stamp each submittal with a uniform, self-explanatory action stamp. The stamp will be appropriately marked, as follows, to indicate the action taken:
 - 1. Final Unrestricted Release: Where submittals are marked "No Exceptions Taken," that part of the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents; final acceptance will depend upon that compliance.
 - 2. Final-But-Restricted Release: When submittals are marked "Make Corrections Noted," that part of the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents; final acceptance will depend on that compliance.
 - 3. Returned for Resubmittal: When submittal is marked "Amend & Resubmit or Rejected - See Remarks," do not proceed with that part of the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal in accordance with the notations; resubmit without delay. Repeat if necessary to obtain a different action mark.
 - a. Do not permit submittals marked "Not Approved, Revise and Resubmit" to be used at the Project site, or elsewhere where Work is in progress.
 - 4. Other Action: Where a submittal is primarily for information or record purposes, special processing or other activity, the submittal will be returned, marked "Action Not Required".

PART 2 - PRODUCTS (Not Applicable).

PART 3 - EXECUTION (Not Applicable).

END OF SECTION 01300

SECTION 01400 - QUALITY CONTROL SERVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for quality control services.
- B. Quality control services include inspections and tests and related actions including reports, performed by independent agencies, governing authorities, and the Contractor. They do not include Contract enforcement activities performed by the Engineer.
- C. Inspection and testing services are required to verify compliance with requirements specified or indicated. These services do not relieve the Contractor of responsibility for compliance with Contract Document requirements.
- D. Requirements of this Section relate to customized fabrication and installation procedures, not production of standard products.
 - 1. Specific quality control requirements for individual construction activities are specified in the Sections that specify those activities. Those requirements, including inspections and tests, cover production of standard products as well as customized fabrication and installation procedures.
 - 2. Inspections, test and related actions specified are not intended to limit the Contractor's quality control procedures that facilitate compliance with Contract Document requirements.
 - 3. Requirements for the Contractor to provide quality control services required by the Engineer, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

1.3 RESPONSIBILITIES

- A. Contractor Responsibilities: The Contractor shall provide inspections, tests and similar quality control services,

specified in individual Specification Sections and required by governing authorities, except where they are specifically indicated to be the Owner's responsibility, or are provided by another identified entity; these services include those specified to be performed by an independent agency and not by the Contractor. Costs for these services shall be included in the Contract Sum.

1. The Contractor shall employ and pay an independent agency, to perform specified quality control services.
2. The Owner will engage and pay for the services of an independent agency to perform inspections and tests specified as the Owner's responsibility.
 - a. Where the Owner has engaged a testing agency or other entity for testing and inspection of a part of the Work, and the Contractor is also required to engage an entity for the same or related element, the Contractor shall not employ the entity engaged by the Owner, unless otherwise agreed in writing with the Owner.
3. Retesting: The Contractor is responsible for retesting where results of required inspections, tests or similar services prove unsatisfactory and do not indicate compliance with Contract Document requirements, regardless of whether the original test was the Contractor's responsibility.
 - a. Cost of retesting construction revised or replaced by the Contractor is the Contractor's responsibility, where required tests were performed on original construction.
4. Associated Services: The Contractor shall cooperate with agencies performing required inspections, tests and similar services and provide reasonable auxiliary services as requested. Notify the agency sufficiently in advance of operations to permit assignment of personnel. Auxiliary services required include but are not limited to:
 - a. Providing access to the Work and furnishing incidental labor and facilities necessary to facilitate inspections and tests.
 - b. Taking adequate quantities of representative samples of materials that require testing or assisting the agency in taking samples.
 - c. Providing facilities for storage and curing of test samples, and delivery of samples to testing laboratories.
 - d. Providing the agency with a preliminary design mix proposed for use for materials mixes that require

- control by the testing agency.
- e. Security and protection of samples and test equipment at the Project site.
- B. Duties of the Testing Agency: The independent testing agency engaged to perform inspections, sampling and testing of materials and construction specified in individual Specification Sections shall cooperate with the Engineer and Contractor in performance of its duties, and shall provide qualified personnel to perform required inspections and tests.
1. The agency shall notify the Engineer and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 2. The agency is not authorized to release, revoke, alter or enlarge requirements of the Contract Documents, or approve or accept any portion of the Work.
 3. The agency shall not perform any duties of the Contractor.
- C. Coordination: The Contractor and each agency engaged to perform inspections, tests and similar services shall coordinate the sequence of activities to accommodate required services with a minimum of delay. In addition the Contractor and each agency shall coordinate activities to avoid the necessity of removing and replacing construction to accommodate inspections and tests.
1. The Contractor is responsible for scheduling times for inspections, tests, taking samples and similar activities.

1.4 SUBMITTALS

- A. The independent testing agency shall submit a certified written report of each inspection, test or similar service, to the Engineer, in duplicate, unless the Contractor is responsible for the service. If the Contractor is responsible for the service, submit a certified written report of each inspection, test or similar service through the Contractor, in duplicate.
1. Submit additional copies of each written report directly to the governing authority, when the authority so directs.
 2. Report Data: Written reports of each inspection, test or similar service shall include, but not be limited to:
 - a. Date of issue.
 - b. Project title and number.
 - c. Name, address and telephone number of testing agency.
 - d. Dates and locations of samples and tests or

- inspections.
- e. Names of individuals making the inspection or test.
- f. Designation of the Work and test method.
- g. Identification of product and Specification Section.
- h. Complete inspection or test data.
- i. Test results and an interpretations of test results.
- j. Ambient conditions at the time of sample-taking and testing.
- k. Comments or professional opinion as to whether inspected or tested Work complies with Contract Document requirements.
- l. Name and signature of laboratory inspector.
- m. Recommendations on retesting.

1.5 QUALITY ASSURANCE

- A. Qualification for Service Agencies: Engage inspection and testing service agencies, including independent testing laboratories, which are prequalified as complying with "Recommended Requirements for Independent Laboratory Qualification" by the American Council of Independent Laboratories, and which specialize in the types of inspections and tests to be performed.
 - 1. Each independent inspection and testing agency engaged on the Project shall be authorized by authorities having jurisdiction to operate in the State in which the Project is located.

PART 2 - PRODUCTS (Not Applicable).

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION

- A. General: Upon completion of inspection, testing, sample-taking and similar services, repair damaged construction and restore substrates and finishes to eliminate deficiencies, including deficiencies in visual qualities of exposed finishes. Comply with Contract Document requirements for "Cutting and Patching."
- B. Protect construction exposed by or for quality control service activities, and protect repaired construction.
- C. Repair and protection is the Contractor's responsibility, regardless of the assignment of responsibility for inspection, testing or similar services.

END OF SECTION 01400

SECTION 01501 - TEMPORARY FACILITIES - SINGLE PRIME CONTRACTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies requirements for temporary services and facilities, including utilities, construction and support facilities, security and protection.
- B. Temporary utilities may include but are not limited to:
 - 1. Water service and distribution.
 - 2. Temporary electric power and light.
 - 3. Storm and sanitary sewer.
- C. Temporary construction and support facilities may include but are not limited to:
 - 1. Temporary heat.
 - 2. Field offices and storage sheds.
 - 3. Sanitary facilities, including drinking water.
 - 4. Temporary enclosures.
 - 5. Temporary project identification signs and bulletin boards.
 - 6. Waste disposal services.
 - 7. Rodent and pest control.
 - 8. Construction aids and miscellaneous services and facilities.
- D. Security and protection facilities may include but are not limited to:
 - 1. Temporary fire protection.
 - 2. Barricades, warning signs, lights.
 - 3. Environmental protection.

1.3 DIVISION OF RESPONSIBILITIES

- A. General: Prime contractor is assigned all responsibilities for certain temporary services and facilities used by other Subcontractors, and other entities at the site. The Contractor for General Construction is responsible for providing temporary services

and facilities that are not normal construction activities of other Contractors and are not specifically assigned otherwise by the Engineer.

B. Contractor is responsible for:

1. Installation, operation, maintenance and removal of each temporary service or facility usually considered as its own normal construction activity, as well as the costs and use charges associated with each such service or facility.
2. Plug-in electric power cords and extension cords, and supplementary plug-in task lighting and special lighting necessary exclusively for its own activities.
3. Its own field office, complete with necessary furniture, utilities and telephone service.
4. Its own storage and fabrication sheds.
5. Temporary heat, ventilation, humidity control and enclosure of the building where these utilities are necessary for its construction activity, but where these utilities have not yet been installed by the responsible prime Contractor.
6. All of their own hoisting requirements, including hoisting material or equipment into spaces below grade, and hoisting requirements outside the building enclosure.
7. Collection and disposal of its own hazardous, dangerous, unsanitary or other harmful waste material.
8. Secure lockup of its own tools, materials and equipment.
9. Construction aids and miscellaneous services and facilities necessary exclusively for its own construction activities.
10. Temporary telephone service.

C. The Single Prime Contractor is responsible for:

1. Temporary toilets, including disposable supplies.
2. Temporary wash facilities, including disposable supplies.
3. Containerized bottled-water type drinking water units.
4. Temporary enclosure of the building.
5. Project identification and temporary signs.
6. General collection and disposal of wastes.
7. Rodent and pest control.
8. Barricades, warning signs and lights.
9. Security enclosure and lockup.
10. Environmental protection.
11. Temporary heat, upon enclosure of the building.
12. Temporary ventilation, upon enclosure of the building.

D. The Mechanical Subcontractor is responsible for:

1. Piped temporary water service.

- E. The Electrical Subcontractor is responsible for:
 - 1. Temporary electric power service and distribution.
 - 2. Temporary lighting.

1.4 USE CHARGES

- A. General: Cost or use charges for temporary facilities are not chargeable to the Owner or Engineer; Prime Contractor's cost or use charges for temporary services or facilities will not be accepted as a basis of claim for an adjustment in the Contract Sum or Contract Time.
- B. Water Service: The Owner shall pay water service use charges.
- C. Electric Power Service: The Owner shall pay electric power service use charges.
- D. Except for those mentioned above the cost of providing and using any additional temporary services and facilities, including use charges, is solely to be borne by the Contractor for General Construction and shall be totally included in the Contract Sum.
- E. Other entities using temporary services and facilities include, but are not limited to:
 - 1. Other Subcontractors.
 - 2. The Owner's work forces.
 - 3. Occupants of the Project.
 - 4. The Engineer.
 - 5. Testing agencies.
 - 6. Personnel of government agencies.

1.5 SUBMITTALS

- A. Temporary Utilities: Each contractor shall submit reports of tests, inspections, meter readings and similar procedures performed on temporary utilities.

1.6 QUALITY ASSURANCE

- A. Regulations: Each Subcontractor shall comply with industry standards and with applicable laws and regulations of authorities having jurisdiction, including but not limited to:
 - 1. Building code requirements.
 - 2. Health and safety regulations.
 - 3. Utility company regulations.

4. Police, Fire Department and Rescue Squad rules.
 5. Environmental protection regulations.
- B. Standards: Each contractor shall comply with NFPA Code 241, "Building Construction and Demolition Operations", ANSI-A10 Series standards for "Safety Requirements for Construction and Demolition", and NECA Electrical Design Library "Temporary Electrical Facilities."
1. Refer to "Guidelines for Bid Conditions for Temporary Job Utilities and Services", prepared jointly by AGC and ASC for industry recommendations.
 2. Trade Jurisdictions: Assigned responsibilities for installation and operation of temporary utilities are not intended to interfere with the normal application of trade regulations and union jurisdictions.
 3. Electrical Service: Comply with NEMA, NECA and UL standards and regulations for temporary electric service. Install service in compliance with National Electric Code (NFPA 70).
- C. Inspections: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

1.7 PROJECT CONDITIONS

- A. Temporary Utilities: At the earliest feasible time, when acceptable to the Owner, change over from use of the temporary service to use of the permanent service.
1. Temporary use of permanent facilities: The Installer of each permanent service or facility shall assume responsibility for its operation, maintenance and protection during its use as a construction service or facility prior to the Owner's acceptance, regardless of previously assigned responsibilities.
- B. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Take necessary fire prevention measures. Do not overload facilities, or permit them to interfere with progress. Do not allow hazardous, dangerous or unsanitary conditions, or public nuisances to develop or persist on the site.

1.8 PROVISIONS FOR CONTRACTORS EMPLOYEES

- A. It is required that all construction employees comply with The following rules.
1. Construction employees are to use their own toilet

facilities.

2. There is to be no smoking on the property.
3. Areas inside and out including streets and sidewalks surrounding construction, in which construction personnel are working or otherwise using, shall be policed daily to keep same free from debris, dust, mud, etc.
4. All construction personnel will conduct themselves in an unimpeachable manner while on the construction site, including proper language, etc.
5. All requirements of Occupational Safety and Health Act will be followed implicitly.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Each Subcontractor shall provide new materials; if acceptable to the Engineer, undamaged previously used materials in serviceable condition may be used. Provide materials suitable for the use intended.
- B. Lumber and Plywood: Comply with requirements in Division-6 Section "Rough Carpentry."
 1. For signs and directory boards, provide exterior type, Grade B-B High Density Concrete Form Overlay Plywood conforming to PS-1, of sizes and thickness indicated.
 2. For fences and vision barriers, provide exterior type, minimum 3/8" thick plywood.
 3. For safety barriers, similar uses, provide minimum 5/8" thick exterior plywood.
- C. Water: Provide potable water approved by local health authorities.
- D. Open-Mesh Fencing: Provide 11-gage, galvanized 2-inch, chain link fabric fencing 6 feet high with galvanized barbed wire top strand and galvanized steel pipe posts, 1-1/2" I.D. for line posts, and 2-1/2" I.D. for corner posts.

2.2 EQUIPMENT

- A. General: Each Subcontractor shall provide new equipment; if acceptable to the Engineer, undamaged, previously used equipment in serviceable condition may be used. Provide equipment suitable for the use intended.
- B. Water Hoses: Provide 3/4" heavy-duty, abrasion-resistant, flexible rubber hoses 100 ft. long, with pressure rating greater than the maximum pressure of the water distribution system; provide adjustable shut-off nozzles at hose

discharge.

- C. Electrical Outlets: Provide properly configured NEMA polarized outlets to prevent insertion of 125 volt AC plugs into higher voltage outlets. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button and pilot light, for connection of power tools and equipment.
- D. Electrical Power Cords: Provide grounded extension cords, no less than 50 feet long; use "hard-service" cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords, if single lengths will not reach areas where construction activities are in progress.
- E. Lamps and Light Fixtures: Provide general service incandescent lamps of wattage required for adequate illumination. Provide guard cages or tempered glass enclosures, where exposed to breakage. Provide exterior fixtures where exposed to moisture.
- F. Heating Units: Provide temporary heating units that have been tested and labeled by UL, FM or another recognized trade association related to the type of fuel being consumed.
- G. Temporary Offices: Contractor shall provide its own prefabricated or mobile units with lockable entrances, operable windows and serviceable finishes. Provide heated and air-conditioned units on foundations adequate for normal loading.
- H. Temporary Toilet Units: Provide self-contained single-occupant toilet units of the chemical, aerated recirculation, or combustion type, properly vented and fully enclosed with a glass fiber reinforced polyester shell or similar nonabsorbent material.
- I. First Aid Supplies: Comply with regulations of authorities having jurisdiction.
- J. Fire Extinguishers: Provide hand-carried, portable, UL-rated, class A" fire extinguishers for temporary offices and similar spaces. In other locations provide hand-carried, portable, class "ABC" dry chemical extinguishers, or a combination of extinguishers of NFPA recommended types for the exposures.
 - 1. Comply with NFPA 10 and 241 for classification, extinguishing agent and size required by location and class of fire exposure.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Use qualified personnel for installation of temporary facilities. Locate facilities where they serve the project adequately and result in minimum interference with performance of construction activities. Relocate and modify facilities as required.
- B. Each Subcontractor shall provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed, or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Engage the appropriate local utility company to install temporary service or connect to existing service. Where the company provides only part of the service, provide the remainder with matching, compatible materials and equipment; comply with the company's recommendations.
 - 1. Arrange with the company and existing users for a time when service can be interrupted, where necessary, to make connections for temporary services.
 - 2. Provide adequate capacity at each stage of construction. Prior to temporary utility availability, provide trucked-in services.
- B. Water Service: Install water service distribution piping of sizes and pressures adequate for construction until permanent water service is in use. The Owner will provide the source for the required construction water.
 - 1. Sterilization: Sterilize temporary water piping prior to use.
- C. Temporary Electric Power Service: The Owner will provide the source for temporary electrical service for power and lights. The Electrical Contractor will have the responsibility of installing all temporary wiring, panels, and devices for this system in compliance with all applicable safety regulations, and the National Electric Code.
 - 1. Receptacles for power supply shall be provided within 100 feet of any point of the new building. Each Contractor or Trade in need thereof shall furnish any necessary extension cords to reach from the nearest outlet/s to his construction activity.

2. Adequate temporary lighting shall be continuously provided in all work areas for all contractors on the Project when conditions of enclosure merit this illumination.
 3. The Electrical Contractor shall also provide, as needed: Area floor lights, guard lights at barricades, lighted drives and walks at all locations of hazard to the public and the construction personnel.
 4. The Electrical Contractor shall be ultimately responsible for removal of all other temporary electric power system wiring and equipment related thereto at such time when turnover to permanent system is available.
- D. Temporary Telephones: Provide temporary telephone service for all personnel engaged in construction activities, throughout the construction period. Install telephone on a separate line for each temporary office and first aid station. Where an office has more than two occupants, install a telephone for each additional occupant or pair of occupants.
1. At each telephone, post a list of important telephone numbers.
- E. Sewers and Drainage: If sewers are available, provide temporary connections to remove effluent that can be discharged lawfully. If sewers are not available or cannot be used, provide drainage ditches, dry wells, stabilization ponds and similar facilities. If neither sewers nor drainage facilities can be lawfully used for discharge of effluent, provide containers to remove and dispose of effluent off the site in a lawful manner.
1. Filter out excessive amounts of soil, construction debris, chemicals, oils and similar contaminants that might clog sewers or pollute waterways before discharge.
 2. Connect temporary sewers to the municipal system as directed by the sewer department officials.
 3. Maintain temporary sewers and drainage facilities in a clean, sanitary condition. Following heavy use, restore normal conditions promptly.
- F. Provide earthen embankments and similar barriers in and around excavations and subgrade construction, sufficient to prevent flooding by runoff of storm water from heavy rains.
- 3.3 TEMPORARY CONSTRUCTION AND SUPPORT FACILITIES INSTALLATION
- A. Locate field offices, storage sheds, sanitary facilities and other temporary construction and support facilities in locations as directed by Owner and Engineer.

1. Maintain temporary construction and support facilities until near Substantial Completion. Remove prior to Substantial Completion.
- B. Provide incombustible construction for offices, shops and sheds located within the construction area, or within 30 feet of building lines. Comply with requirements of NFPA 241.
- C. Temporary Heat: Provide temporary heat required by construction activities, for curing or drying of completed installations, or protection of installed construction from adverse effects of low temperatures or high humidity. Select safe equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce the ambient condition required and minimize consumption of energy.
- D. Heating Facilities: Except where use of the permanent system is authorized, provide properly vented self-contained LP gas or fuel oil heaters with individual space thermostatic control.
 1. Use of gasoline-burning space heaters, or open burning or salamander type heating units is prohibited.
- E. Field Offices: The Prime Contractor for General Construction shall provide an insulated, weathertight temporary office of sufficient size to accommodate required office personnel at the Project site. Keep the office clean and orderly for use for small progress meetings.
 1. The Contractor for General Construction shall provide, either as a part of its field office, or as a separate facility, a conference area for project meetings. Furnish the room with a conference table, 8 folding chairs and a tackboard.
- F. Sanitary facilities include temporary toilets, wash facilities and drinking water fixtures. Comply with regulations and health codes for the type, number, location, operation and maintenance of fixtures and facilities. Install where facilities will best serve the Project's needs.
 1. The Contractor for General Construction shall provide toilet tissue, paper towels, paper cups and similar disposable materials for each facility. Provide covered waste containers for used material.
- G. Toilets: Install self-contained toilet units. Shield toilets to ensure privacy. Use of pit-type privies will not be permitted.

- H. Drinking Water Facilities: The Contractor for General Construction shall provide containerized tap-dispenser bottled-water type drinking water units, including paper supply.
- I. Temporary Enclosures: Provide temporary enclosure for protection of construction in progress and completed, from exposure, foul weather, other construction operations and similar activities.
1. Where heat is needed and the permanent building enclosure is not complete, provide temporary enclosures where there is no other provision for containment of heat. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.
 2. Install tarpaulins securely, with incombustible wood framing and other materials. Close openings of 25 square feet or less with plywood or similar materials.
 3. Close openings through floor or roof decks and horizontal surfaces with load-bearing wood-framed construction.
- J. Project Identification and Temporary Signs: Prepare project identification and other signs as required; install in a location to inform the public and persons seeking entrance to the Project. Support on posts or framing of preservative treated wood or steel. Do not permit installation of unauthorized signs.
1. Project Identification Signs: Engage an experienced sign painter to apply graphics.
 2. Temporary Signs: Prepare signs to provide directional information to construction personnel and visitors.
- K. Building and Project Area Clean-up: Debris clean-up in connection with the work being done under the requirements of all Contracts shall be an administrative responsibility of the Contractor for General Construction; subject to the conditions stated in Paragraph 2 below.

The intent of clean-up assigned to the Contractor for General Construction is both interior and exterior area policing of the project done under the supervision of the Engineer. The clean-up and disposal by each Contractor and Subcontractor of boxes, wrappings, scraps of wall board, plaster, and masonry materials, metal waste, etc., shall be the responsibility of the relevant contractor or subcontractor involved. The project must be kept clean on a daily basis. Do not hold materials more than 7 days during normal weather or 3 days when the temperature is expected to rise above 80 deg F (27

deg C). The frequency of clean-up will be strictly enforced by the Engineer.

If the Engineer and the Owner are in agreement that the project is not being kept sufficiently clean and that debris and/or other discarded materials impede the construction process or the completion of occupancy, the Engineer shall have the authority under this Contract to take means necessary to remedy this situation; such as hiring others to clean-up or move debris and/or materials whereby the entire cost of the above is to be charged against that Contractor whom in the Engineer's opinion is derelict.

Demolition debris and other bulky solid waste material shall be legally disposed of off the premises by the responsible Contractor. Comply with the requirements of NFPA 241 for removal of combustible waste material and debris.

- L. Rodent and Pest Control: Before deep foundation Work has been completed, retain a local exterminator or pest control company to recommend practices to minimize attraction and harboring of rodents, roaches and other pests. Employ this service to perform extermination and control procedures at regular intervals so the Project will be relatively free of pests and their residues at Substantial Completion. Perform control operations in a lawful manner using environmentally safe materials.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. General: Do not change over from use of temporary security and protection facilities to permanent facilities until Substantial Completion, or longer as requested by the Engineer.
- B. Temporary Fire Protection: Until fire protection needs are supplied by permanent facilities, install and maintain temporary fire protection facilities of the types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 10 "Standard for Portable Fire Extinguishers," and NFPA 241 "Standard for Safeguarding Construction, Alterations and Demolition Operations."
 1. Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one extinguisher on each floor at or near each usable stairwell.
 2. Store combustible materials in containers in fire-safe locations.
 3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, stairways and other access routes for fighting fires. Prohibit smoking in hazardous fire exposure areas.

4. Provide supervision of welding operations, combustion type temporary heating units, and similar sources of fire ignition.
- C. Barricades, Warning Signs and Lights: Comply with standards and code requirements for erection of structurally adequate barricades. Paint with appropriate colors, graphics and warning signs to inform personnel and the public, of the hazard being protected against. Where appropriate and needed provide lighting, including flashing red or amber lights.
 - D. Security Enclosure and Lockup: Install substantial temporary enclosure of partially completed areas of construction. Provide locking entrances to prevent unauthorized entrance, vandalism, theft and similar violations of security.
 1. Storage: Where materials and equipment must be stored, and are of value or attractive for theft, provide a secure lockup. Enforce discipline in connection with the installation and release of material to minimize the opportunity for theft and vandalism.
 - E. Environmental Protection: Provide protection, operate temporary facilities and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways and subsoil might be contaminated or polluted, or that other undesirable effects might result. Avoid use of tools and equipment which produce harmful noise. Restrict use of noise making tools and equipment to hours that will minimize complaints from persons or firms near the site.

3.5 OPERATION, TERMINATION AND REMOVAL

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

it be maintained longer, remove each temporary facility when the need has ended, or when replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with the temporary facility. Repair damaged Work, clean exposed surfaces and replace Work which cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of each Contractor. The Owner reserves the right to take possession of project identification signs.
2. At Substantial Completion, clean and renovate permanent facilities that have been used during the construction period, including but not limited to:
3. Replace air filters and clean inside of ductwork and housings.
 - a. Replace significantly worn parts and parts that have been subject to unusual operating conditions.
 - b. Replace lamps that are burned out or noticeably dimmed by substantial hours of use.

END OF SECTION 01501

SECTION 01600 - MATERIALS AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements governing each Prime Contractor's selection of products for use in the Project.
- B. Standards: Refer to Section "Definitions and Standards" for applicability of industry standards to products specified.
- C. Administrative procedures for handling requests for substitutions made after award of the Contract are included under Section "Product Substitutions."

1.3 DEFINITIONS

- A. Definitions used in this Article are not intended to change the meaning of other terms used in the Contract Documents, such as "specialties," "systems," "structure," "finishes," "accessories," and similar terms. Such terms such are self-explanatory and have well recognized meanings in the construction industry.
 - 1. "Products" are items purchased for incorporation in the Work, whether purchased for the Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - a. "Named Products" are items identified by manufacturer's product name, including make or model designation, indicated in the manufacturer's published product literature, that is current as of the date of the Contract Documents.
 - 2. "Materials" are products that are substantially shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form a part of the Work.
 - 3. "Equipment" is a product with operational parts, whether

motorized or manually operated, that requires service connections such as wiring or piping.

1.4 QUALITY ASSURANCE

- A. Source Limitations: To the fullest extent possible, provide products of the same kind, from a single source.
- B. Compatibility of Options: When the Contractor is given the option of selecting between two or more products for use on the Project, the product selected shall be compatible with products previously selected, even if previously selected products were also options.
 - 1. Each prime Contractor is responsible for providing products and construction methods that are compatible with products and construction methods of other prime or separate Contractors.
 - 2. If a dispute arises between prime Contractors over concurrently selectable, but incompatible products, the Engineer will determine which products shall be retained and which are incompatible and must be replaced.
- C. Nameplates: Except for required labels and operating data, do not attach or imprint manufacturer's or producer's nameplates or trademarks on exposed surfaces of products which will be exposed to view in occupied spaces or on the exterior.
 - 1. Labels: Locate required product labels and stamps on a concealed surface or, where required for observation after installation, on an accessible surface that is not conspicuous.
 - 2. Equipment Nameplates: Provide a permanent nameplate on each item of service-connected or power-operated equipment. Locate on an easily accessible surface which is inconspicuous in occupied spaces. The nameplate shall contain the following information and other essential operating data:
 - a. Name of product and manufacturer.
 - b. Model and serial number.
 - c. Capacity.
 - d. Speed.
 - e. Ratings.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store and handle products in accordance with the manufacturer's recommendations, using means and methods that will prevent damage, deterioration and loss, including theft.

1. Schedule delivery to minimize long-term storage at the site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft and other losses.
3. Deliver products to the site in the manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting and installing.
4. Inspect products upon delivery to ensure compliance with the Contract Documents, and to ensure that products are undamaged and properly protected.
5. Store products at the site in a manner that will facilitate inspection and measurement of quantity or counting of units.
6. Store products subject to damage by the elements above ground, under cover in a weathertight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION

- A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, unused at the time of installation.
 1. Provide products complete with all accessories, trim, finish, safety guards and other devices and details needed for a complete installation and for the intended use and effect.
- B. Product Selection Procedures: Product selection is governed by the Contract Documents and governing regulations, not by previous Project experience. Procedures governing product selection include the following:
 1. Proprietary Specification Requirements: Where only a single product or manufacturer is named, provide the product indicated. No substitutions will be permitted.
 2. Semiproprietary Specification Requirements: Where two or more products or manufacturers are named, provide one of the products indicated. No substitutions will be permitted.
 - a. Where products or manufacturers are specified by name, accompanied by the term "or equal," or "or approved equal" comply with the Contract Document

provisions concerning "substitutions" to obtain approval for use of an unnamed product.

3. Non-Proprietary Specifications: When the Specifications list products or manufacturers that are available and may be incorporated in the Work, but do not restrict the Contractor to use of these products only, the Contractor may propose any available product that complies with Contract requirements. Comply with Contract Document provisions concerning "substitutions" to obtain approval for use of an unnamed product.
4. Descriptive Specification Requirements: Where Specifications describe a product or assembly, listing exact characteristics required, with or without use of a brand or trade name, provide a product or assembly that provides the characteristics and otherwise complies with Contract requirements.
5. Performance Specification Requirements: Where Specifications require compliance with performance requirements, provide products that comply with these requirements, and are recommended by the manufacturer for the application indicated. General overall performance of a product is implied where the product is specified for a specific application.
 - a. Manufacturer's recommendations may be contained in published product literature, or by the manufacturer's certification of performance.
6. Compliance with Standards, Codes and Regulations: Where the Specifications only require compliance with an imposed code, standard or regulation, select a product that complies with the standards, codes or regulations specified.
7. Visual Matching: Where Specifications require matching an established Sample, the Engineer's decision will be final on whether a proposed product matches satisfactorily.
 - a. Where no product available within the specified category matches satisfactorily and also complies with other specified requirements, comply with provisions of the Contract Documents concerning "substitutions" for selection of a matching product in another product category, or for noncompliance with specified requirements.
8. Visual Selection: Where specified product requirements include the phrase "...as selected from manufacturer's standard colors, patterns, textures..." or a similar phrase, select a product and manufacturer that complies with other specified requirements. The Engineer will select the color, pattern and texture from the product line selected.

9. Allowances: Refer to individual Specification Sections and "Allowance" provisions in Division-1 for allowances that control product selection, and for procedures required for processing such selections.

PART 3 - EXECUTION

3.1 INSTALLATION OF PRODUCTS:

- A. Comply with manufacturer's instructions and recommendations for installation of products in the applications indicated. Anchor each product securely in place, accurately located and aligned with other Work.
 1. Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

END OF SECTION 01600

SECTION 01631 - PRODUCT SUBSTITUTIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for handling requests for substitutions made after award of the Contract.
 - 1. Single Prime Contracts: Provisions of this Section apply to the construction activities of prime Contractor.
- B. Standards: Refer to Section "Definitions and Standards" for applicability of industry standards to products specified.
- C. Procedural requirements governing the Contractor's selection of products and product options are included under Section "Materials and Equipment."

1.3 DEFINITIONS

- A. Definitions used in this Article are not intended to change or modify the meaning of other terms used in the Contract Documents.
- B. Substitutions: Requests for changes in products, materials, equipment, and methods of construction required by Contract Documents proposed by the Contractor after award of the Contract are considered requests for "substitutions." The following are not considered substitutions:
 - 1. Substitutions requested by Bidders during the bidding period, and accepted prior to award of Contract, are considered as included in the Contract Documents and are not subject to requirements specified in this Section for substitutions.
 - 2. Revisions to Contract Documents requested by the Owner or Engineer.
 - 3. Specified options of products and construction methods included in Contract Documents.
 - 4. The Contractor's determination of and compliance with

governing regulations and orders issued by governing authorities.

1.4 SUBMITTALS

- A. Substitution Request Submittal: Requests for substitution will be considered if received the first application for payment. Requests received after this time may be considered or rejected at the discretion of the Engineer.
1. Submit 3 copies of each request for substitution for consideration. Submit requests in the form and in accordance with procedures required for Change Order proposals.
 2. Identify the product, or the fabrication or installation method to be replaced in each request. Include related Specification Section and Drawing numbers. Provide complete documentation showing compliance with the requirements for substitutions, and the following information, as appropriate:
 - a. Product Data, including Drawings and descriptions of products, fabrication and installation procedures.
 - b. Samples, where applicable or requested.
 - c. A detailed comparison of significant qualities of the proposed substitution with those of the Work specified. Significant qualities may include elements such as size, weight, durability, performance and visual effect.
 - d. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by the Owner and separate Contractors, that will become necessary to accommodate the proposed substitution.
 - e. A statement indicating the substitution's effect on the Contractor's Construction Schedule compared to the schedule without approval of the substitution. Indicate the effect of the proposed substitution on overall Contract Time.
 - f. Cost information, including a proposal of the net change, if any in the Contract Sum.
 - g. Certification by the Contractor that the substitution proposed is equal-to or better in every significant respect to that required by the Contract Documents, and that it will perform adequately in the application indicated. Include the Contractor's waiver of rights to additional payment or time, that may subsequently become necessary because of the failure of the substitution to perform adequately.
 3. Engineer's Action: Within one week of receipt of the

request for substitution, the Engineer will request additional information or documentation necessary for evaluation of the request. Within 2 weeks of receipt of the request, or one week of receipt of the additional information or documentation, whichever is later, the Engineer will notify the Contractor of acceptance or rejection of the proposed substitution. If a decision on use of a proposed substitute cannot be made or obtained within the time allocated, use the product specified by name. Acceptance will be in the form of a Change Order.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. Conditions: The Contractor's substitution request will be received and considered by the Engineer when one or more of the following conditions are satisfied, as determined by the Engineer; otherwise requests will be returned without action except to record noncompliance with these requirements.

1. Extensive revisions to Contract Documents are not required.
2. Proposed changes are in keeping with the general intent of Contract Documents.
3. The request is timely, fully documented and properly submitted.
4. The request is directly related to an "or equal" clause or similar language in the Contract Documents.
5. The specified product or method of construction cannot be provided within the Contract Time. The request will not be considered if the product or method cannot be provided as a result of failure to pursue the Work promptly or coordinate activities properly.
6. The specified product or method of construction cannot receive necessary approval by a governing authority, and the requested substitution can be approved.
7. A substantial advantage is offered the Owner, in terms of cost, time, energy conservation or other considerations of merit, after deducting offsetting responsibilities the Owner may be required to bear. Additional responsibilities for the Owner may include additional compensation to the Engineer for redesign and evaluation services, increased cost of other construction by the Owner or separate Contractors, and similar considerations.
8. The specified product or method of construction cannot be provided in a manner that is compatible with other materials, and where the Contractor certifies that the substitution will overcome the incompatibility.
9. The specified product or method of construction cannot

be coordinated with other materials, and where the Contractor certifies that the proposed substitution can be coordinated.

10. The specified product or method of construction cannot provide a warranty required by the Contract Documents and where the Contractor certifies that the proposed substitution provide the required warranty.
 11. Where a proposed substitution involves more than one prime Contractor, each Contractor shall cooperate with the other Contractors involved to coordinate the Work, provide uniformity and consistency, and to assure compatibility of products.
- B. The Contractor's submittal and Engineer's acceptance of Shop Drawings, Product Data or Samples that relate to construction activities not complying with the Contract Documents does not constitute an acceptable or valid request for substitution, nor does it constitute approval.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01631

SECTION 01700 - PROJECT CLOSEOUT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for project closeout, including but not limited to:
 - 1. Inspection procedures.
 - 2. Submittal of warranties.
 - 3. Final cleaning.
- B. Closeout requirements for specific construction activities are included in the appropriate Sections in Divisions-2 through -16.

1.3 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before requesting inspection for certification of Substantial Completion, complete the following. List exceptions in the request.
 - 1. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent completion for the portion of the Work claimed as substantially complete. Include supporting documentation for completion as indicated in these Contract Documents and a statement showing an accounting of changes to the Contract Sum.
 - a. If 100 percent completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the Work is not complete.
 - 2. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications and similar documents.
 - 3. Obtain and submit releases enabling the Owner unrestricted use of the Work and access to services and utilities; include occupancy permits, operating certificates and similar releases.

4. Submit record drawings, maintenance manuals and similar final record information.
 5. Deliver tools, spare parts, extra stock, and similar items.
 6. Make final change-over of permanent locks and transmit keys to the Owner. Advise the Owner's personnel of change-over in security provisions.
 7. Complete start-up testing of systems, and instruction of the Owner's operating and maintenance personnel. Discontinue or change over and remove temporary facilities from the site, along with construction tools, mock-ups, and similar elements.
 8. Complete final clean up requirements, including touch-up painting. Touch-up and otherwise repair and restore marred exposed finishes.
- B. Inspection Procedures: On receipt of a request for inspection, the Engineer will either proceed with inspection or advise the Contractor of unfilled requirements. The Engineer will prepare the Certificate of Substantial Completion following inspection, or advise the Contractor of construction that must be completed or corrected before the certificate will be issued.
1. The Engineer will repeat inspection when assured that the Work has been substantially completed.
 2. Results of the completed inspection will form the basis of requirements for final acceptance.

1.4 FINAL ACCEPTANCE

- A. Preliminary Procedures: Before requesting final inspection for certification of final acceptance and final payment, complete the following. List exceptions in the request.
1. Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.
 2. Submit an updated final statement, accounting for final additional changes to the Contract Sum.
 3. Submit a certified copy of the Engineer's final inspection list of items to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance, and the list has been endorsed and dated by the Engineer.
 4. Submit final meter readings for utilities, a measured record of stored fuel, and similar data as of the date of Substantial Completion, or when the Owner took possession of and responsibility for corresponding elements of the Work.
 5. Submit consent of surety to final payment.
 6. Submit evidence of final, continuing insurance coverage

- complying with insurance requirements.
- B. Reinspection Procedure: The Engineer will reinspect the Work upon receipt of notice that the Work, including inspection list items from earlier inspections, has been completed, except items whose completion has been delayed because of circumstances acceptable to the Engineer.
1. Upon completion of reinspection, the Engineer will prepare a certificate of final acceptance, or advise the Contractor of Work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.
 2. If necessary, reinspection will be repeated.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 OPERATING AND MAINTENANCE INSTRUCTIONS

- A. Arrange for each installer of equipment that requires regular maintenance to meet with the Owner's personnel to provide instruction in proper operation and maintenance. If installers are not experienced in procedures, provide instruction by manufacturer's representatives. Include a detailed review of the following items:
1. Maintenance manuals.
 2. Record documents.
 3. Spare parts and materials.
 4. Tools.
 5. Lubricants.
 6. Fuels.
 7. Identification systems.
 8. Control sequences.
 9. Hazards.
 10. Cleaning.
 11. Warranties and bonds.
 12. Maintenance agreements and similar continuing commitments.
- B. As part of instruction for operating equipment, demonstrate the following procedures:
1. Start-up.
 2. Shutdown.
 3. Emergency operations.
 4. Noise and vibration adjustments.
 5. Safety procedures.
 6. Economy and efficiency adjustments.
 7. Effective energy utilization.

3.2 FINAL CLEANING

- A. General: General cleaning during construction is required by the General Conditions and included in Section "Temporary Facilities".
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Comply with manufacturer's instructions.
 - 1. Complete the following cleaning operations before requesting inspection for Certification of Substantial Completion.
 - a. Remove labels that are not permanent labels.
 - b. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compound and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.
 - c. Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, films and similar foreign substances. Restore reflective surfaces to their original reflective condition. Leave concrete floors broom clean. Vacuum carpeted surfaces.
 - d. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps.
 - e. Clean the site, including landscape development areas, of rubbish, litter and other foreign substances. Sweep paved areas broom clean; remove stains, spills and other foreign deposits. Rake grounds that are neither paved nor planted, to a smooth even-textured surface.
- C. Removal of Protection: Remove temporary protection and facilities installed for protection of the Work during construction.
- D. Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Owner's property. Do not discharge volatile, harmful or dangerous materials into drainage systems. Remove waste materials from the site and dispose of in a lawful manner.
 - 1. Where extra materials of value remaining after

2275-1

completion of associated Work have become the Owner's property, arrange for disposition of these materials as directed.

END OF SECTION 01700

SECTION 01720 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for Project Record Documents.
- B. Project Record Documents required include:
 - 1. Marked-up copies of Contract Drawings.
 - 2. Marked-up copies of Shop Drawings.
 - 3. Maintenance Manuals.
 - 4. Scan PDF set of As-Built Record Drawings
- C. Specific record copy requirements that expand requirements of this Section are included in the individual Sections of Specifications.
- D. General project closeout requirements are included in Section "Project Closeout."
- E. General requirements for submittal of Project Record Documents are included in Section "Submittals."
- F. Each Contractor is responsible for obtaining, maintaining, and recording Project Record Document information for its own part of the Work. The Contractor for General Construction is responsible for coordination of Project Record Document information, where information from more than one prime Contractor is indicated to be integrated to form one combined record of the Work.

1.3 RECORD DOCUMENTS

- A. General: Do not use record documents for construction purposes; protect from deterioration and loss in a secure location; provide access to record documents for the Engineer's reference during normal working hours.

1.4 RECORD DRAWINGS

- A. Mark-up Procedure: During the construction period, maintain a set of blue- or black-line white-prints of Contract Drawings and Shop Drawings for Project Record Document purposes.
1. Mark these Drawings to indicate the actual installation where the installation varies appreciably from the installation shown originally. Give particular attention to information on concealed elements which would be difficult to identify or measure and record later. Items required to be marked include but are not limited to:
 - a. Dimensional changes to the Drawings.
 - b. Revisions to details shown on the Drawings.
 - c. Depths of foundations below the first floor.
 - d. Locations and depths of underground utilities.
 - e. Revisions to routing of piping and conduits.
 - f. Revisions to electrical circuitry.
 - g. Actual equipment locations.
 - h. Duct size and routing.
 - i. Locations of concealed internal utilities.
 - j. Changes made by Change Order.
 - k. Details not on original Contract Drawings.
 2. Mark completely and accurately record prints of Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions. Where Shop Drawings are marked, show cross-reference on Contract Drawings location.
 3. Mark record sets with red erasable colored pencil; use other colors to distinguish between changes for different categories of the Work at the same location.
 4. Mark important additional information which was either shown schematically or omitted from original Drawings.
 5. Note construction change directive numbers, alternate numbers, Change Order numbers and similar identification.
 6. Submit the marked-up record set to the Engineer for Owner's records.
 7. Submit CD containing electronic PDF as-built record prints at original full scale size.

1.5 MAINTENANCE MANUAL SUBMITTAL

- A. When each construction activity that requires submittal of maintenance manuals is nominally complete, but before Substantial Completion, submit 3 copies of maintenance manuals specified.

1. Organize operating and maintenance manuals into suitable sets of manageable size.
2. Bind data into individual binders for each manual, properly identified on front and spine. For large manuals, provide an index sheet and thumb tabs for separate information categories.
3. Provide vinyl-covered, heavy-duty back cover mounted 3-ring slant type binders, 1" to 2" thick as required to contain information, sized for 8-1/2" x 11" paper with inside pockets or pocket folders for folded sheets.
4. In each maintenance manual include information specified in individual Specification Sections and the following:
 - a. Emergency instructions.
 - b. Spare parts list.
 - c. Copies of specific warranties.
 - d. Wiring diagrams.
 - e. Recommended maintenance procedures and turn-around times.
 - f. Inspection and system-test procedures.
 - g. Copies of applicable Shop Drawings and Product Data.
 - h. Listing of required maintenance materials and services.
 - i. Names and addresses of sources of maintenance materials.
 - j. Maintenance Drawings and diagrams.
 - k. Precautions against improper maintenance and exposure.
5. Manuals for mechanical and electrical equipment items shall include the following additional information:
 - a. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.
 - b. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operation instructions.
 - c. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
 - d. Servicing instructions and lubrication charts and schedules.

PART 2 - PRODUCTS (not applicable)

2275-1

PART 3 - EXECUTION

3.1 RECORDING

- A. Post changes and modifications to the Documents as they occur. Do not wait until the end of the Project. The Engineer may periodically review record documents to assure compliance with this requirement.

END OF SECTION 01720

SECTION 02110 - SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes but is not limited to the following:
 - 1. Protection of existing trees.
 - 2. Removal of trees and other vegetation.
 - 3. Topsoil stripping.
 - 4. Clearing and grubbing.
 - 5. Removing above-grade improvements.
 - 6. Removing below-grade improvements.

1.3 PROJECT CONDITIONS

- A. Traffic: Conduct site clearing operations to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities. Do not close or obstruct streets, walks or other occupied or used facilities without permission from authorities having jurisdiction.
- B. Protection of Existing Improvements: Provide protections necessary to prevent damage to existing improvements indicated to remain in place.
 - 1. Protect improvements on adjoining properties and on Owner's property.
 - 2. Restore damaged improvements to their original condition, as acceptable to property owners.
- C. Protection of Existing Trees and Vegetation: Protect existing trees and other vegetation indicated to remain in place, against unnecessary cutting, breaking or skinning of roots, skinning or bruising of bark, smothering of trees by stockpiling construction materials or excavated materials within drip line, excess foot or vehicular traffic, or parking of vehicles within drip line. Provide temporary guards to protect trees and vegetation to be left standing.
 - 1. Water trees and other vegetation to remain within limits of contract work as required to maintain their health

- during course of construction operations.
2. Provide protection for roots over 1-1/2 inch diameter that are cut during construction operations. Coat cut faces with an emulsified asphalt, or other acceptable coating, formulated for use on damaged plant tissues. Temporarily cover exposed roots with wet burlap to prevent roots from drying out; cover with earth as soon as possible.
 3. Repair or replace trees and vegetation indicated to remain which are damaged by construction operations, in a manner acceptable to Engineer.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

2.1 SITE CLEARING

- A. General: Remove trees, shrubs, grass and other vegetation, improvements, or obstructions as required to permit installation of new construction. Remove similar items elsewhere on site or premises as specifically indicated. "Removal" includes digging out and off-site disposing of stumps and roots.
 1. Cut minor roots and branches of trees indicated to remain in a clean and careful manner, where such roots and branches obstruct installation of new construction.
- B. Topsoil: Topsoil is defined as friable clay loam surface soil found in a depth of not less than 4 inches. Satisfactory topsoil is reasonably free of subsoil, clay lumps, stones, and other objects over 2 inches in diameter, and without weeds, roots, and other objectionable material.
 1. Strip topsoil to whatever depths encountered in a manner to prevent intermingling with underlying subsoil or other objectionable material.
 - a. Remove heavy growths of grass from areas before stripping.
 - b. Where existing trees are indicated to remain, leave existing topsoil in place within drip lines to prevent damage to root system.
 2. Stockpile topsoil in storage piles in areas indicated or directed. Construct storage piles to provide free drainage of surface water. Cover storage piles, if required, to prevent wind erosion.
- C. Clearing and Grubbing: Clear site of trees, shrubs and other

vegetation, except for those indicated to be left standing.

1. Completely remove stumps, roots, and other debris protruding through ground surface.
 2. Use only hand methods for grubbing inside drip line of trees indicated to remain.
 3. Fill depressions caused by clearing and grubbing operations with satisfactory soil material, unless further excavation or earthwork is indicated.
 - a. Place fill material in horizontal layers not exceeding 6 inches loose depth, and thoroughly compact to a density equal to adjacent original ground.
- D. Removal of Improvements: Remove existing above-grade and below-grade improvements as indicated and as necessary to facilitate new construction.
1. Abandonment or removal of certain underground pipe or conduits may be indicated on mechanical or electrical drawings, and is included under work of related Division 15 and 16 sections. Removal of abandoned underground piping or conduit interfering with construction is included under this Section.
 2. Removal of the existing adjacent building shall be completed in compliance with all applicable codes and government regulatory requirements. Contractor to obtain all approvals and pay for all permits and application fees required.

2.2 DISPOSAL OF WASTE MATERIALS

- A. Burning on Owner's Property: Burning is not permitted on Owner's property.
- B. Removal from Owner's Property: Remove waste materials and unsuitable or excess topsoil from Owner's property.

END OF SECTION 02110

SECTION 02200 - EARTHWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes Earthwork as shown on the Drawings and specified herein.
- B. Related Sections: The following Sections contain requirements that relate to this Section.
 - 1. Division 2 Section "Site Clearing" for site stripping, grubbing, topsoil removal, and tree protection.

1.3 DEFINITIONS

- A. Excavation consists of the removal of material encountered to subgrade elevations and the reuse or disposal of materials removed.
- B. Subgrade: The uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, or topsoil materials.
- C. Borrow: Soil material obtained off-site when sufficient approved soil material is not available from excavations.
- D. Backfill and Fill: The soil material used to raise subgrades or excavations to required elevations prior to placing subbase or topsoil material.
- E. Subbase Course: The layer of material placed upon the subgrade to support a structure.
- F. Unauthorized excavation consists of removing materials beyond indicated subgrade elevations or dimensions without direction by the Engineer. Unauthorized excavation, as well as remedial work directed by the Engineer, shall be at the Contractor's expense.
- G. Structures: Buildings, footings, foundations, retaining walls, slabs, pavements, tanks, curbs, mechanical and

electrical appurtenances, or other man-made stationary features constructed above or below ground surface.

- H. Utilities include on-site underground pipes, conduits, ducts, and cables, as well as underground services within building lines.

1.4 QUALITY ASSURANCE

- A. Codes and Standards: Perform earthwork complying with requirements of authorities having jurisdiction.
- B. Testing and Inspection Service: Owner will employ at his discretion a qualified independent geotechnical engineering testing agency to classify proposed on-site and borrow soils to verify that soils comply with specified requirements and to perform required field and laboratory testing.

1.5 PROJECT CONDITIONS

- A. Existing Utilities: Do not interrupt existing utilities serving facilities occupied by the Owner or others except when permitted in writing by the Engineer and then only after acceptable temporary utility services have been provided.
 - 1. Provide a minimum 48-hours' notice to the Engineer and receive written notice to proceed before interrupting any utility.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. General: Provide approved borrow soil materials from off-site when sufficient approved soil materials are not available from excavations.
- B. Satisfactory Soil Materials: ASTM D 2487 soil classification groups CL, GC, GW, GM, ML, SC, SM, and SW; free of rock or gravel larger than 1 inch in any dimension, debris, waste, frozen materials, vegetation and other deleterious matter.
- C. Unsatisfactory Soil Materials: ASTM D 2487 soil classification groups GP, SP, MH, CH, OL, OH, and PT.
- D. Backfill and Fill Materials: As indicated on Drawings or specified under "Part 3 - Execution" of this Section. If not indicated or specified use satisfactory soil materials.

E. Subbase Material:

1. Under Slabs-on-grade: Washed, evenly graded mixture of crushed stone, or crushed or uncrushed gravel, ASTM D 448, coarse aggregate grading size 57, with 100 percent passing a 1-1/2 inch sieve and not more than 5 percent passing a No. 8 sieve.
2. Under Walks: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand, ASTM D 2940, with at least 98 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve.

- F. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand, ASTM D 2940, with at least 98 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
- B. Provide erosion control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
- C. Tree protection is specified in the Division 2 Section "Site Clearing."

3.2 DEWATERING

- A. Prevent surface water and subsurface or ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- B. Protect subgrades and foundation soils from softening and damage by rain or water accumulation.

3.3 EXCAVATION

- A. Excavation is unclassified and includes excavation to required subgrade elevations regardless of the character of materials and obstructions encountered.

- B. Explosives: Do not use explosives.

3.4 STABILITY OF EXCAVATIONS

- A. Comply with local codes, ordinances, and requirements of authorities having jurisdiction to maintain stable excavations.

3.5 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 0.10 foot. Extend excavations a sufficient distance from structures for placing and removing concrete formwork, installing services and other construction, and for inspections.

- 1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.

3.6 EXCAVATION FOR WALKS AND PAVEMENTS

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

3.7 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated slopes, lines, depths, and invert elevations.
 - 1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.
- B. Excavate trenches to uniform widths to provide a working clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit, unless otherwise indicated.
 - 1. Clearance: 12 inches each side of pipe or conduit unless otherwise indicated.
- C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove stones and sharp objects to avoid point loading.

3.8 APPROVAL OF SUBGRADE

- A. Notify Engineer when excavations have reached required subgrade.
- B. When Engineer determines that unforeseen unsatisfactory soil is present, continue excavation and replace with compacted engineered fill or lean concrete fill (2000 psi) as directed.
 - 1. Unforeseen additional excavation and replacement material will be paid according to the Contract provisions for changes in Work.
- C. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by the Engineer.

3.9 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending indicated bottom elevation of concrete foundation or footing to excavation bottom, without altering required top elevation. Lean concrete fill (2000 psi) may be used to bring elevations to proper position when acceptable to the Engineer.
 - 1. Fill unauthorized excavations under other construction as directed by the Engineer.

3.10 STORAGE OF SOIL MATERIALS

- A. Stockpile excavated materials acceptable for backfill and fill soil materials, including acceptable borrow materials. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent wind-blown dust.
 - 1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.11 BACKFILL

- A. Backfill excavations promptly, but not before completing the following:
 - 1. Acceptance of construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.

2. Surveying locations of underground utilities for record documents.
3. Testing, inspecting, and approval of underground utilities.
4. Concrete formwork removal.
5. Removal of trash and debris from excavation.
6. Removal of temporary shoring and bracing, and sheeting.
7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

3.12 UTILITY TRENCH BACKFILL

- A. Place and compact bedding course on rock and other unyielding bearing surfaces and to fill unauthorized excavations. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- B. Concrete backfill trenches that carry below or pass under footings and that are excavated within 18 inches of footings. Place concrete to level of bottom of footings.
- C. Place and compact initial backfill of satisfactory soil material or subbase material, free of particles larger than 1 inch, to a height of 12 inches over the utility pipe or conduit.
 1. Carefully compact material under pipe haunches and bring backfill evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of utility system.
- D. Coordinate backfilling with utilities testing.
- E. Place and compact final backfill of satisfactory soil material to final subgrade.

3.13 FILL

- A. Preparation: Remove vegetation, topsoil, debris, wet, and unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placing fills.
 1. Plow strip, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing surface.
- B. When subgrade or existing ground surface to receive fill has a density less than that required for fill, break up ground surface to depth required, pulverize, moisture-condition or aerate soil and recompact to required density.

- C. Place fill material in layers to required elevations for each location listed below.
 - 1. Under grass, use satisfactory excavated or borrow soil material.
 - 2. Under building slabs and walks use satisfactory excavated or borrow soil material to establish subgrade elevation, then place subbase course of thickness indicated.
 - 3. Under footings and foundations, use engineered fill.

3.14 MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill layer before compaction to within 2 percent of optimum moisture content.
 - 1. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
 - 2. Remove and replace, or scarify and air-dry satisfactory soil material that is too wet to compact to specified density.
 - a. Stockpile or spread and dry removed wet satisfactory soil material.

3.15 COMPACTION

- A. Place backfill and fill materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill materials evenly on all sides of structures to required elevations. Place backfill and fill uniformly along the full length of each structure.
- C. Percentage of Maximum Dry Density Requirements: Compact soil to not less than the following percentages of maximum dry density according to ASTM D 698:
 - 1. Under structures, building slabs, steps, and pavements, compact the top 12 inches below subgrade and each layer of backfill or fill material at 100 percent maximum dry density.
 - 2. Under walkways, compact the top 6 inches below subgrade and each layer of backfill or fill material at 98 percent maximum dry density.
 - 3. Under lawn or unpaved areas, compact each layer of backfill or fill material at 90 percent maximum dry density.

3.16 GRADING

- A. General: Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
 - 1. Provide a smooth transition between existing adjacent grades and new grades.
 - 2. Cut out soft spots, fill low spots, and trim high spots to conform to required surface tolerances.

- B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
 - 1. Lawn or Unpaved Areas: Plus or minus 0.10 foot.
 - 2. Walks: Plus or minus 0.10 foot.
 - 3. Pavements: Plus or minus 1/2 inch.

- C. Grading Inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

3.17 SUBBASE COURSES

- A. Place subbase course material on prepared subgrades.
 - 1. Compact subbase and base courses at optimum moisture content to required grades, lines, cross sections and thickness.
 - 2. When thickness of compacted subbase course is 6 inches or less, place materials in a single layer.
 - 3. When thickness of compacted subbase course exceeds 6 inches, place materials in equal layers, with no layer more than 6 inches thick or less than 3 inches thick when compacted.

3.18 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

- B. Repair and re-establish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or lose compaction due to subsequent construction operations or weather conditions.
 - 1. Scarify or remove and replace material to depth directed by the Engineer; reshape and recompact at optimum

moisture content to the required density.

- C. Settling: Where settling occurs during the Project correction period, remove finished surfacing, backfill with additional approved material, compact, and reconstruct surfacing.
 - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.

3.19 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off the Owner's property.

END OF SECTION 02200

SECTION 02282 - TERMITE CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 SUBMITTALS

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

1.4 QUALITY ASSURANCE

- A. In addition to requirements of these specifications, comply with manufacturer's instructions and recommendations for work, including preparation of substrate and application.
- B. Engage a professional pest control operator, licensed in accordance with regulations of governing authorities for application of soil treatment solution.
- C. Use only termiticides which bear a Federal registration number of the U.S. Environmental Protection Agency.

1.5 JOB CONDITIONS

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

1.6 SPECIFIC PRODUCT WARRANTY

- A. Furnish written warranty certifying that applied soil termiticide treatment will prevent infestation of subterranean termites and, that if subterranean termite activity is discovered during warranty period, Contractor will re-treat soil and repair or replace damage caused by termite infestation.
 - 1. Provide warranty for a period of 5 years from date of treatment, signed by Applicator and Contractor.

PART 2 - PRODUCTS

2.1 SOIL TREATMENT SOLUTION

- A. Termiticide: Provide an EPA-registered termiticide complying with requirements of authorities having jurisdiction, in a soluble or emulsible, concentrated formulation that dilutes with water or foaming agent, and formulated to prevent termite infestation. Use only soil treatment solutions that are not harmful to plants. Provide quantity required for application at the label volume and rate for the maximum termiticide concentration allowed for each specific use, according to the product's EPA-Registered Label.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. AgrEvo Environmental Health, Inc.; a Company of Hoechst and Schering, Berlin.
 - 2. American Cyanamid Co.; Agricultural Products Group; Specialty Products Department.
 - 3. Bayer Corp.; Garden & Professional Care.
 - 4. DowElanco.
 - 5. FMC Corp.; Pest Control Specialties.
 - 6. Zeneca Professional Products.

PART 3 - EXECUTION

3.1 APPLICATION

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

- C. Under new slab-on-grade structures, treat soil before concrete slabs are placed, using the following rates of application:
 - 1. Apply 4 gallons of chemical solution per 10 lin. ft. to soil in critical areas under slab, including entire inside perimeter inside of foundation walls, along both sides of interior partition walls, around plumbing pipes and electric conduit penetrating slab, and around interior column footers.
 - 2. Apply one gallon of chemical solution per 10 sq. ft. as an overall treatment under slab and attached slab areas where fill is soil or unwashed gravel. Apply 1-1/2 gallons of chemical solution to areas where fill is washed gravel or other coarse absorbent material.
 - 3. Apply 4 gallons of chemical solution per 10 lin. ft. of trench, for each foot of depth from grade to footing, along outside edge of building. Dig a trench 6" to 8" wide along outside of foundation to a depth of not less than 12". Punch holes to top of footing at not more than 12" o.c. and apply chemical solution. Mix chemical solution with the soil as it is being replaced in trench.

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

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

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

END OF SECTION 02282

SECTION 02730 - FACILITY SANITARY SEWERS

PART 1 - GENERAL

1.1 PERFORMANCE REQUIREMENTS

- A. Gravity-Flow, Nonpressure, Drainage-Piping Pressure Rating: 10-foot head of water.

1.2 SUBMITTALS

- A. Product Data: For the following:
 - 1. Pipe fittings.
 - 2. Backwater valves.
- B. Shop Drawings: For the following:

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Do not store plastic pipe, and fittings in direct sunlight.
- B. Protect pipe, pipe fittings, and seals from dirt and damage.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 PVC PIPE AND FITTINGS

- A. PVC Sewer Pipe and Fittings, NPS 15 and Smaller: ASTM D 3034, SDR 35, with bell-and-spigot ends for gasketed joints with ASTM F 477, elastomeric seals.

2.3 NONPRESSURE-TYPE PIPE COUPLINGS

- A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined and corrosion-resistant-metal tension band and tightening mechanism on each end.

B. Sleeve Materials:

1. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
2. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

2.4 BACKWATER VALVES

A. Gray-Iron Backwater Valves: ASME A112.14.1, gray-iron body and bolted cover, with bronze seat.

1. Manufacturers:
 - a. Josam Company.
 - b. Smith, Jay R. Mfg. Co.
 - c. Wade Div.; Tyler Pipe.
 - d. Watts Industries, Inc.
 - e. Watts Industries, Inc.; Enpoco, Inc. Div.
 - f. Zurn Specification Drainage Operation; Zurn Plumbing Products Group.
2. Horizontal Type: With swing check valve and hub-and-spigot ends.
3. Combination Horizontal and Manual Gate-Valve Type: With swing check valve, integral gate valve, and hub-and-spigot ends.
4. Terminal Type: With bronze seat, swing check valve, and hub inlet. Similar to Zurn Z-1091.

2.5 CLEANOUTS

A. Gray-Iron Cleanouts: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug. Similar to Zurn Z-1440-BP-PW. Provide two (2) plug wrenches to Owner.

1. Manufacturers:
 - a. Josam Company.
 - b. MIFAB Manufacturing Inc.
 - c. Smith, Jay R. Mfg. Co.
 - d. Wade Div.; Tyler Pipe.
 - e. Watts Industries, Inc.
 - f. Watts Industries, Inc.; Enpoco, Inc. Div.
 - g. Zurn Specification Drainage Operation; Zurn Plumbing Products Group.
2. Top-Loading Classifications:
 - a. Light Duty: In earth or grass foot-traffic areas.
 - b. Medium Duty: In paved foot-traffic areas.

- c. Heavy Duty: In vehicle-traffic service areas.
 - d. Extra-Heavy Duty: In roads.
3. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

- A. Gravity-Flow, Nonpressure Sewer Piping: Use the following pipe materials for each size range:
- 1. PVC sewer pipe and fittings, gaskets, and gasketed joints.

3.2 PIPING INSTALLATION

- A. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements.
- B. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- C. Install gravity-flow, nonpressure, drainage piping according to the following:
- 1. Install piping pitched down in direction of flow, at minimum slope of 1 percent, unless otherwise indicated.
 - 2. Install piping with 36-inch minimum cover, unless otherwise indicated.
 - 3. Install PVC sewer piping according to ASTM D 2321 and ASTM F 1668.

3.3 PIPE JOINT CONSTRUCTION

- A. Where specific joint construction is not indicated, follow piping manufacturer's written instructions.
- B. Join gravity-flow, nonpressure, drainage piping according to the following:
- 1. Join PVC sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints or ASTM D 3034 for elastomeric-gasket joints.
 - 2. Join PVC profile gravity sewer piping according to ASTM D 2321 for elastomeric-seal joints or ASTM F 794 for gasketed joints.
 - 3. Join dissimilar pipe materials with nonpressure-type, flexible couplings.

3.4 BACKWATER VALVE INSTALLATION

- A. Install horizontal-type backwater valves in piping where indicated.
- B. Install combination horizontal and manual gate valve type in piping and in manholes where indicated.
- C. Install terminal-type backwater valves on end of piping and in manholes where indicated. Secure units to sidewalls.

3.5 CLEANOUT INSTALLATION

- A. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts and cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.
 - 1. Use light-duty, top-loading classification cleanouts in earth or unpaved foot-traffic areas.
 - 2. Use medium-duty, top-loading classification cleanouts in paved foot-traffic areas.
 - 3. Use heavy-duty, top-loading classification cleanouts in vehicle-traffic service areas.
 - 4. Use extra-heavy-duty, top-loading classification cleanouts in roads.
- B. Set cleanout frames and covers in earth in cast-in-place-concrete, 24 by 24 by 12 inches deep. Set with tops 1 inch above surrounding grade.
- C. Set cleanout frames and covers in concrete pavement with tops flush with pavement surface.

3.6 CONNECTIONS

- A. Make connections to existing piping and underground manholes.
 - 1. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye fitting, plus 6-inch overlap, with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
 - 2. Make branch connections from side into existing piping, NPS 4 to NPS 20. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
 - 3. Protect existing piping and manholes to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.
- B. Connect to interceptors, as indicated.

3.7 FIELD QUALITY CONTROL

- A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.
 - 1. Submit separate report for each system inspection.
 - 2. Defects requiring correction include the following:
 - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
 - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
 - c. Crushed, broken, cracked, or otherwise damaged piping.
 - d. Infiltration: Water leakage into piping.
 - e. Exfiltration: Water leakage from or around piping.

- B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
 - 1. Do not enclose, cover, or put into service before inspection and approval.
 - 2. Test completed piping systems according to requirements of authorities having jurisdiction.
 - 3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
 - 4. Submit separate report for each test.
 - 5. Hydrostatic Tests: Test sanitary sewerage according to requirements of authorities having jurisdiction and the following:
 - a. Allowable leakage is maximum of 50 gal./inch of nominal pipe size per mile of pipe, during 24-hour period.
 - b. Close openings in system and fill with water.
 - c. Purge air and refill with water.
 - d. Disconnect water supply.
 - e. Test and inspect joints for leaks.
 - f. Option: Test ductile-iron piping according to AWWA C600, "Hydrostatic Testing" Section. Use test pressure of at least 10 psig.

- C. Leaks and loss in test pressure constitute defects that must be repaired.

3.8 CLEANING

- A. Clean interior of piping of dirt and superfluous material.

END OF SECTION 331313

SECTION 02740 - STORM UTILITY DRAINAGE PIPING

PART 1 - GENERAL

1.1 PERFORMANCE REQUIREMENTS

- A. Gravity-Flow, Nonpressure, Drainage-Piping Pressure Rating: 10-foot head of water. Pipe joints shall be at least silttight, unless otherwise indicated.

1.2 SUBMITTALS

- A. Product Data: For the following:
 - 1. Pipe and Fittings.
- B. Shop Drawings: For the following:
 - 1. Catch Basins and Stormwater Inlets.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Do not store plastic pipe, and fittings in direct sunlight.
- B. Protect pipe, pipe fittings, and seals from dirt and damage.
- C. Handle manholes according to manufacturer's written rigging instructions.
- D. Handle catch basins and stormwater inlets according to manufacturer's written rigging instructions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.
 - 2.

2.2 PVC PIPE AND FITTINGS

- A. PVC Sewer Pipe and Fittings, NPS 15 and Smaller: ASTM D 3034, SDR 35, with bell-and-spigot ends for gasketed joints with ASTM F 477, elastomeric seals.

2.3 CONCRETE PIPE AND FITTINGS

- A. Reinforced-Concrete Sewer Pipe and Fittings: ASTM C 76, with bell-and-spigot or groove and tongue ends and gasketed joints with ASTM C 443, rubber gaskets.

- 1. Class III, Wall B.

2.4 NONPRESSURE-TYPE PIPE COUPLINGS

- A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined, and corrosion-resistant-metal tension band and tightening mechanism on each end.

- B. Sleeve Materials:

- 1. For Concrete Pipes: ASTM C 443, rubber.
- 2. For Cast-Iron Soil Pipes: ASTM C 564, rubber.
- 3. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
- 4. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

- C. Unshielded Flexible Couplings: Elastomeric sleeve with stainless-steel shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.

- 1. Manufacturers:

- a. Dallas Specialty & Mfg. Co.
- b. Fernco Inc.
- c. Logan Clay Products Company (The).
- d. Mission Rubber Company; a division of MCP Industries, Inc.
- e. NDS Inc.
- f. Plastic Oddities, Inc.
- g. Material: ASTM A 536, Grade 60-40-18 ductile iron, unless otherwise indicated.

2.5 PIPE OUTLETS

- A. Head Walls: Cast-in-place reinforced concrete, with apron and tapered sides.

- B. Riprap Basins: Broken, irregular size and shape, graded stone according to NSSGA's "Quarried Stone for Erosion and Sediment Control."

- 1. Average Size: 8" - 12" minimum 12" thick.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

- A. Pipe couplings and special pipe fittings with pressure ratings at least equal to piping rating may be used in applications below, unless otherwise indicated.
 - 1. Use nonpressure-type flexible couplings where required to join gravity-flow, nonpressure sewer piping, unless otherwise indicated.
 - a. Unshielded flexible couplings for same or minor difference OD pipes.
 - b. Unshielded, increaser/reducer-pattern, flexible couplings for pipes with different OD.

3.2 PIPING INSTALLATION

- A. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.
- B. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.
- C. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- D. Tunneling: Install pipe under streets or other obstructions that cannot be disturbed by tunneling, jacking, or a combination of both.
- E. Install gravity-flow, nonpressure drainage piping according to the following:
 - 1. Install piping pitched down in direction of flow, at minimum slope of 1 percent, unless otherwise indicated.
 - 2. Install piping with 24-inch minimum cover, unless otherwise indicated.
 - 3. Install ductile-iron culvert piping according to ASTM A 716.
 - 4. Install corrugated steel piping according to ASTM A 798/A 798M.
 - 5. Install PE corrugated sewer piping according to CPPA's "Recommended Installation Practices for Corrugated Polyethylene Pipe and Fittings."
 - 6. Install PVC sewer piping according to ASTM D 2321 and ASTM F 1668.
 - 7. Install reinforced-concrete sewer piping according to ASTM C 1479 and ACPA's "Concrete Pipe Installation Manual."

3.3 PIPE JOINT CONSTRUCTION

- A. Where specific joint construction is not indicated, follow piping manufacturer's written instructions.
- B. Join gravity-flow, nonpressure drainage piping according to the following:
 - 1. Join ductile-iron culvert piping according to AWWA C600 for push-on joints.
 - 2. Join corrugated steel sewer piping according to ASTM A 798/A 798M.
 - 3. Join corrugated PE piping according to CPPA 100 and the following:
 - a. Use silttight couplings.
 - 4. Join PVC sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints or ASTM D 3034 for elastomeric gasket joints.
 - 5. Join reinforced-concrete sewer piping according to ACPA's "Concrete Pipe Installation Manual" for rubber-gasket joints.
 - 6. Join dissimilar pipe materials with nonpressure-type flexible couplings.

3.4 CLEANOUT INSTALLATION

- A. Install cleanouts and riser extension from sewer pipe to cleanout at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts and cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.
 - 1. Use light-duty, top-loading classification cleanouts in earth or unpaved foot-traffic areas.
 - 2. Use medium-duty, top-loading classification cleanouts in paved foot-traffic areas.
 - 3. Use heavy-duty, top-loading classification cleanouts in vehicle-traffic service areas.
 - 4. Use extra-heavy-duty, top-loading classification cleanouts in roads areas.
- B. Set cleanout frames and covers in earth in cast-in-place concrete, 24 by 24 by 12 inches deep. Set with tops 1 inch above surrounding earth grade.
- C. Set cleanout frames and covers in concrete pavement with tops flush with pavement surface.

3.5 CATCH BASIN INSTALLATION

- A. Construct catch basins to sizes and shapes indicated.
- B. Set frames and grates to elevations indicated.

3.6 STORMWATER INLET AND OUTLET INSTALLATION

- A. Construct inlet head walls, aprons, and sides of reinforced concrete, as indicated.
- B. Construct riprap of broken stone, as indicated.

3.7 CONNECTIONS

- A. Connect nonpressure, gravity-flow drainage piping in building's storm building drains.

3.8 IDENTIFICATION

- A. Materials and their installation are specified in Division 31 Section "Earth Moving." Arrange for installation of green warning tape directly over piping and at outside edge of underground structures.
 - 1. Use warning tape over ferrous piping.
 - 2. Use detectable warning tape over nonferrous piping and over edges of underground structures.

3.9 FIELD QUALITY CONTROL

- A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.
 - 1. Submit separate reports for each system inspection.
 - 2. Defects requiring correction include the following:
 - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
 - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
 - c. Crushed, broken, cracked, or otherwise damaged piping.
 - d. Infiltration: Water leakage into piping.
 - e. Exfiltration: Water leakage from or around piping.
- B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
 - 1. Do not enclose, cover, or put into service before inspection and approval.
 - 2. Test completed piping systems according to authorities having jurisdiction.
 - 3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
 - 4. Submit separate report for each test.

5. Gravity-Flow Storm Drainage Piping: Test according to requirements of authorities having jurisdiction, UNI-B-6, and the following:
 - a. Exception: Piping with soiltight joints unless required by authorities having jurisdiction.
 - b. Option: Test plastic piping according to ASTM F 1417.
 - c. Option: Test concrete piping according to ASTM C 924.
- C. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

3.10 CLEANING

- A. Clean interior of piping of dirt and superfluous materials.

END OF SECTION 334100

SECTION 02930 - LAWNS AND GRASSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Extent of lawns and grasses is shown on drawings.
- B. Types of work required include following:
 - 1. Fine grading and preparing of lawn areas.
 - 2. Furnishing and applying new topsoil.
 - 3. Furnishing and applying fertilizers.
 - 4. Seeding new lawn areas.
 - 5. Replanting unsatisfactory or damaged lawns.
- C. Refer to earthwork sections in this Division for requirements of general excavation, filling, and grading in areas to receive lawns and grasses.
- D. Topsoil shall be stockpiled for reuse in lawns and grasses. Amount of existing topsoil is insufficient, provide additional topsoil to complete lawns and grasses.

1.3 SUBMITTALS

- A. Certification of Grass Seed: Submit seed vendor's certified statement for each grass seed mixture required, stating botanical and common name, percentage by weight, and percentages of purity, germination, and weed seed for each grass seed species.

1.4 JOB CONDITIONS

- A. Planting Time: Sow lawn seed only during normal planting seasons for each type of lawn work required. Correlate planting with specified maintenance periods to provide required maintenance from date of substantial completion.

1.5 SPECIAL PROJECT WARRANTY

- A. Warranty lawns and grasses through specified maintenance period and until final acceptance.

PART 2 - PRODUCTS

2.1 ADDITIONAL TOPSOIL

- A. Provide topsoil that is fertile, friable, naturally loamy, surface soil; reasonably free of subsoil, clay lumps, brush, weeds, and other litter; and free of roots, stumps, stones larger than 1-1/2 inches in any dimension, and other extraneous or toxic matter harmful to plant growth.
- B. Obtain topsoil from local sources, or from areas having similar soil characteristics to that found at site of work. Obtain topsoil from naturally well-drained sites where topsoil occurs at least 4 inches deep; do not obtain from bogs or marshes.

2.2 FERTILIZER

- A. Commercial Fertilizer: Complete fertilizer of neutral character, 12% Nitrogen, 12% Phosphorous, and 12% potash. Apply at a rate of 7 pounds per 1000SF.

2.3 GRASS MATERIALS

- A. Grass Seed: Provide fresh, clean, new-crop seed complying with tolerance for purity and germination established by Official Seed Analysts of North America. Provide seed of grass species, proportions and minimum percentages of purity, germination, and maximum percentage of weed seed as specified.

Seed mixture shall be applied at a rate of 10#/1000 SF which consists of 60% rye, 30% fescue, and 10% bluegrass.

- B. Antierosion Mulch: Provide clean, seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.

PART 3 - EXECUTION

3.1 SOIL PREPARATION

- A. Limit preparation to areas that will be planted in immediate future.
- B. Loosen subgrade to a minimum depth of 4 inches. Remove stones bigger than 1-1/2 inches in any dimension and sticks, roots, rubbish, and other extraneous matter.

- C. Clean topsoil of roots, plants, sods, stones, clay lumps, and other extraneous materials harmful or toxic to plant growth.
- D. Mix soil amendments and fertilizers with topsoil at rates specified. Delay mixing of fertilizer if planting will not follow placing of topsoil mixture within a few days. Either mix soil before spreading or apply soil amendments on surface of spread topsoil and mix thoroughly into top 4 inches of topsoil before planting.
 - 1. Mix lime with dry soil before mixing in fertilizer.
 - 2. Apply phosphoric acid fertilizer (other than that constituting a portion of complete fertilizers) directly to subgrade before tilling.
- E. Spread topsoil mixture to depth required to meet thickness, grades, and elevations shown, after light rolling and natural settlement. Do not spread if material or subgrade is frozen.
 - 1. Place approximately 1/2 of total amount of topsoil mixture required. Work into top of loosened subgrade to create a transition layer, and then place remainder of topsoil mixture.
- F. Preparation of Unchanged Grades: Where lawns are to be planted in areas that have not been altered or disturbed by excavating, grading, or stripping operations, prepare soil for lawn and grass planting as follows: Till to a depth of at least 6 inches. Apply soil amendments and initial fertilizers as specified and mix thoroughly into top 4 inches of soil. Remove high areas and fill in depressions; till soil to a homogenous mixture of fine texture, free of lumps, clods, stones, roots, and other extraneous matter.
 - 1. Before preparing of unchanged areas, remove existing grass, vegetation, and turf. Dispose of such material outside of Owner's property; do not turn over into soil being prepared for lawns.
- G. Grade lawn and grass areas to a smooth, even surface with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit fine grading to areas that can be planted within immediate future. Remove trash, debris, stones larger than 1-1/2 inches diameter, and other objects that may interfere with planting or maintenance operations.
- H. Moisten prepared lawn areas before planting if soil is dry. Water thoroughly and allow surface to dry off before planting lawns. Do not create muddy soil.

- I. Restore prepared areas to specified condition if eroded or otherwise disturbed after fine grading and before planting.

3.2 SEEDING NEW LAWNS

- A. Sow seed with a spreader or a seeding machine. Do not seed when wind velocity exceeds 5 miles per hour. Distribute seed evenly over entire area by sowing equal quantity in 2 directions at right angles to each other.
 1. Do not use wet seed or seed that is moldy or otherwise damaged in transit or storage.
 2. Sow no less than the quantity of seed specified.
- B. Rake seed lightly into top 1/8 inch of soil, roll lightly, and water with fine spray.
- C. Protect seeded areas against erosion by spreading specified lawn mulch after completion of seeding operations. Spread uniformly to form a continuous blanket at least 1-1/2 inches loose measurement over seeded areas. Spread by hand, blower, or other suitable equipment.
 1. Anchor mulch by spraying with asphalt emulsion at the rate of 10 to 13 gallons per 1,000 sq. ft. Take precautions to prevent damage or staining of structures or other plantings adjacent to mulched areas. Immediately clean such areas where damage occurs.

3.3 RECONDITIONING LAWNS

- A. Recondition existing lawn areas damaged by Contractor's operations including storage of materials or equipment and movement of vehicles. Also recondition lawn areas where settlement or washouts occur or where minor regrading is required.
 1. Recondition other existing lawn areas where indicated.
- B. Provide fertilizer, seed or sod, and soil amendments as specified for new lawns and as required to provide satisfactorily reconditioned lawn. Provide new planting soil as required to fill low spots and meet new finish grades.
- C. Cultivate bare and compacted areas thoroughly to provide a good, deep planting bed.
- D. Remove diseased or unsatisfactory lawn areas; do not bury into soil. Remove topsoil containing foreign materials resulting from Contractor's operations including oil drippings, stone, gravel, and other construction materials;

replace with new topsoil.

- E. Where substantial lawn remains (but is thin), mow, rake, aerate if compacted, fill low spots, remove humps, cultivate soil, fertilize, and seed. Remove weeds before seeding. If weeds are extensive, apply selective chemical weed killers as required. Apply a seedbed mulch, if required, to maintain moist condition.
- F. Water newly planted areas and keep moist until new grass is established.

3.4 PROTECTION

- A. Erect barricades and warning signs as required to protect newly planted areas from traffic. Maintain barricades throughout maintenance period until lawn is established.

3.5 MAINTENANCE

- A. Begin maintenance of lawns immediately after each area is planted and continue for the periods required to establish acceptable lawn.
- B. Maintain lawns by watering, fertilizing, weeding, mowing, trimming, and other operations such as rolling, regrading, replanting as required to establish a smooth, acceptable lawn, free of eroded or bare areas.
- C. Remulch with new mulch in areas where mulch has been disturbed by wind or maintenance operations sufficiently to nullify its purpose. Anchor as required to prevent displacement.
- D. Replant bare areas with same materials specified for lawns.
- E. Watering: Provide and maintain temporary piping, hoses and lawn watering equipment to convey water from sources and to keep lawn areas uniformly moist as required for proper growth.
 - 1. Mow grass from 1-1/2 inches to 2 inches high. Do not mow to less than 1-1/2 inches.

3.6 ACCEPTANCE

- A. When work is substantially completed, including maintenance, Engineer will, upon request, make an inspection to determine acceptability.
 - 1. Lawn work may be inspected for acceptance in parts

agreeable to Engineer, provided work offered for inspection is complete, including maintenance.

- B. Replant rejected work and continue specified maintenance until reinspected by Engineer and found to be acceptable.
- C. Seeded lawns will be acceptable provided requirements, including maintenance, have been met and healthy, uniform close stand of specified grass is established free of weeds, bare spots, and surface irregularities.

3.7 CLEANUP

- A. Promptly remove soil and debris created by lawn work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto surface of roads, walks, or other paved areas.

END OF SECTION 02930

SECTION 03300 - CAST-IN-PLACE CONCRETE

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 specifies cast-in place concrete, including formwork, reinforcing, mix design, placement procedures, and finishes.
- B. Cast-in-place concrete includes, but is not limited to the following:
 - 1. Foundations and footings.
 - 2. Slabs-on-grade.
 - 3. Foundation walls.
 - 4. Equipment pads and bases.
- C. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 2 Section "Portland Cement Concrete Paving" for concrete paving and walks.
 - 2. Section 09670 Resilient Flake Polymeric Flooring System

1.3 SUBMITTALS

- A. General: Submit the following according to Conditions of the Contract and Division 1 Specification Sections.
- B. Product data for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, waterstops, joint systems, curing compounds, and others if requested by Engineer.
- C. Shop drawings for reinforcement detailing fabricating, bending, and placing concrete reinforcement. Comply with ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures" showing bar schedules, stirrup spacing, bent bar diagrams, and arrangement of concrete reinforcement. Include special reinforcing required for openings through concrete structures.

- D. Samples of materials as requested by Engineer, including names, sources, and descriptions, as follows:
 - 1. Fiber reinforcement.
 - 2. Reglets.
 - 3. Waterstops.
 - 4. Vapor retarder/barrier.
- E. Laboratory test reports for concrete materials and mix design test.
- F. Material certificates in lieu of material laboratory test reports when permitted by Engineer. Material certificates shall be signed by manufacturer and Contractor, certifying that each material item complies with or exceeds specified requirements. Provide certification from admixture manufacturers that chloride content complies with specification requirements.

1.4 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of the following codes, specifications, and standards, except where more stringent requirements are shown or specified:
 - 1. American Concrete Institute (ACI) 301, "Specifications for Structural Concrete for Buildings."
 - 2. ACI 318, "Building Code Requirements for Reinforced Concrete."
 - 3. Concrete Reinforcing Steel Institute (CRSI) "Manual of Standard Practice."
- B. Concrete Testing Service: Engage a testing agency acceptable to Engineer to perform material evaluation tests and to design concrete mixes.
- C. Materials and installed work may require testing and retesting at any time during progress of Work. Tests, including retesting of rejected materials for installed Work, shall be done at Contractor's expense.

PART 2 - PRODUCTS

2.1 FORM MATERIALS

- A. Forms for Exposed Finish Concrete: Plywood, metal, metal-framed plywood faced, or other acceptable panel-type materials to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on

drawings.

1. Use overlaid plywood complying with U.S. Product Standard PS-1 "A-C or B-B High Density Overlaid Concrete Form," Class I.
 2. Use plywood complying with U.S. Product Standard PS-1 "B-B (Concrete Form) Plywood," Class I, Exterior Grade or better, mill-oiled and edge-sealed, with each piece bearing legible inspection trademark.
- B. Forms for Unexposed Finish Concrete: Plywood, lumber, metal, or another acceptable material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Form Release Agent: Provide commercial formulation form release agent with a maximum of 350 mg/l volatile organic compounds (VOCs) that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
- D. Form Ties: Factory-fabricated, adjustable-length, removable or snap-off metal form ties designed to prevent form deflection and to prevent spalling of concrete upon removal. Provide units that will leave no metal closer than 1-1/2 inches to the plane of the exposed concrete surface.
1. Provide ties that, when removed, will leave holes not larger than 1 inch in diameter in the concrete surface.

2.2 REINFORCING MATERIALS

- A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.
- B. Steel Wire: ASTM A 82, plain, cold-drawn steel.
- C. Welded Wire Fabric: ASTM A 185, welded steel wire fabric.
- D. Supports for Reinforcement: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Use wire bar-type supports complying with CRSI specifications.
1. For slabs-on-grade, use supports with sand plates or horizontal runners.
 2. For exposed-to-view concrete surfaces where legs of supports are in contact with forms, provide supports with legs that are protected by plastic (CRSI, Class 1) or stainless steel (CRSI, Class 2).

2.3 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150, Type I.

1. Use one brand of cement throughout Project unless otherwise acceptable to Engineer.
- B. Fly Ash: ASTM C 618, Type F.
- C. Normal-Weight Aggregates: ASTM C 33 and as specified. Provide aggregates from a single source for exposed concrete.
1. For exposed exterior surfaces, use limestone aggregates.
 2. Local aggregates not complying with ASTM C 33 that have been shown to produce concrete of adequate strength and durability by special tests or actual service may be used when acceptable to Engineer.
- D. Water: Potable.
- E. Fiber Reinforcement: Polypropylene fibers engineered and designed for secondary reinforcement of concrete slabs, complying with ASTM C 1116, Type III.
- F. Admixtures, General: Provide concrete admixtures that contain not more than 0.1 percent chloride ions.
- G. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.
- H. Water-Reducing Admixture: ASTM C 494, Type A.
- I. High-Range Water-Reducing Admixture: ASTM C 494, Type F or Type G.
- J. Water-Reducing, Accelerating Admixture: ASTM C 494, Type E.
- K. Water-Reducing, Retarding Admixture: ASTM C 494, Type D.

2.4 RELATED MATERIALS

- A. Reglets: Where sheet flashing or bituminous membranes are terminated in reglets, provide reglets of not less than 0.0217-inch-thick (26-gage) galvanized sheet steel. Fill reglet or cover face opening to prevent intrusion of concrete or debris.
- B. Dovetail Anchor Slots: Hot-dip galvanized sheet steel, not less than 0.0336 inch thick (22 gage) with bent tab anchors. Fill slot with temporary filler or cover face opening to prevent intrusion of concrete or debris.
- C. Waterstops: Provide flat, dumbbell-type or centerbulb-type

waterstops at construction joints and other joints as indicated. Size to suit joints.

- D. Polyvinyl Chloride Waterstops: Corps of Engineers CRD-C 572.
- E. Vapor Retarder: Provide vapor retarder that is resistant to deterioration when tested according to ASTM E 154, as follows:
 - 1. Polyethylene sheet not less than 8 mils thick.
- F. Liquid Membrane-Forming Curing Compound: Liquid-type membrane-forming curing compound complying with ASTM C 309, Type I, Class A. Moisture loss not more than 0.55 kg/sq. meter when applied at 200 sq. ft./gal.
 - 1. Provide material that has a maximum volatile organic compound (VOC) rating of 350 mg per liter.
- G. Water-Based Acrylic Membrane Curing Compound: ASTM C 309, Type I, Class B.
- H. Evaporation Control: Monomolecular film-forming compound applied to exposed concrete slab surfaces for temporary protection from rapid moisture loss.
- I. Underlayment Compound: Free-flowing, self-leveling, pumpable, cement-based compound for applications from 1 inch thick to feathered edges.
- J. Bonding Agent: Polyvinyl acetate or acrylic base.
- K. Epoxy Adhesive: ASTM C 881, two-component material suitable for use on dry or damp surfaces. Provide material type, grade, and class to suit Project requirements.

2.5 PROPORTIONING AND DESIGNING MIXES

- A. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301. For the trial batch method, use an independent testing agency acceptable to Engineer for preparing and reporting proposed mix designs.
 - 1. Do not use the same testing agency for field quality control testing.
 - 2. Limit use of fly ash to not exceed 25 percent of cement content by weight.
- B. Submit written reports to Engineer of each proposed mix for each class of concrete at least 15 days prior to start of Work. Do not begin concrete production until proposed mix

designs have been reviewed by Engineer.

- C. Design mixes to provide normal weight concrete with the following properties as indicated on drawings and schedules:
 - 1. 4000-psi, 28-day compressive strength; water-cement ratio, 0.44 maximum (non-air-entrained), 0.35 maximum (air-entrained).
 - 2. 3000-psi, 28-day compressive strength; water-cement ratio, 0.58 maximum (non-air-entrained), 0.46 maximum (air-entrained).
- D. Slump Limits: Proportion and design mixes to result in concrete slump at point of placement as follows:
 - 1. Ramps, slabs, and sloping surfaces: Not more than 3 inches.
 - 2. Reinforced foundation systems: Not less than 1 inch and not more than 3 inches.
 - 3. Concrete containing high-range water-reducing admixture (superplasticizer): Not more than 8 inches after adding admixture to site-verified 2-to-3-inch slump concrete.
 - 4. Other concrete: Not more than 4 inches.
- E. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, as accepted by Engineer. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Engineer before using in Work.
- F. Fiber Reinforcement: Add to mix at rate of 1.5 lb per cu. yd. unless otherwise recommended by manufacturer.

2.6 ADMIXTURES

- A. Use water-reducing admixture or high-range water-reducing admixture (superplasticizer) in concrete, as required, for placement and workability.
- B. Use accelerating admixture in concrete slabs placed at ambient temperatures below 50 deg F (10 deg C).
- C. Use high-range water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs, architectural concrete, parking structure slabs, concrete required to be watertight, and concrete with water-cement ratios below 0.50.
- D. Use air-entraining admixture in exterior exposed concrete unless otherwise indicated. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at

point of placement having total air content with a tolerance of plus or minus 1-1/2 percent within the following limits:

1. Concrete structures and slabs exposed to freezing and thawing, deicer chemicals, or hydraulic pressure:
 - a. 5.5 percent (severe exposure) for 1-1/2-inch maximum aggregate.
 - b. 6.0 percent (severe exposure) for 1-inch maximum aggregate.
 - c. 6.0 percent (severe exposure) for 3/4-inch maximum aggregate.
 - d. 7.0 percent (severe exposure) for 1/2-inch maximum aggregate.

- E. Use admixtures for water reduction and set accelerating or retarding in strict compliance with manufacturer's directions.

2.7 CONCRETE MIXING

- A. Ready-Mixed Concrete: Comply with requirements of ASTM C 94, and as specified.
 1. When air temperature is between 85 deg F (30 deg C) and 90 deg F (32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes, and when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 GENERAL

- A. Coordinate the installation of joint materials, vapor retarder/barrier, and other related materials with placement of forms and reinforcing steel.

3.2 FORMS

- A. General: Design, erect, support, brace, and maintain formwork to support vertical, lateral, static, and dynamic loads that might be applied until concrete structure can support such loads. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation, and position. Maintain formwork construction tolerances and surface irregularities complying with the following ACI 347 limits:
 1. Provide Class A tolerances for concrete surfaces exposed

to view.

2. Provide Class C tolerances for other concrete surfaces.
 - B. Construct forms to sizes, shapes, lines, and dimensions shown and to obtain accurate alignment, location, grades, level, and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in the Work. Use selected materials to obtain required finishes. Solidly butt joints and provide backup at joints to prevent cement paste from leaking.
 - C. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like for easy removal.
 - D. Provide temporary openings for clean-outs and inspections where interior area of formwork is inaccessible before and during concrete placement. Securely brace temporary openings and set tightly to forms to prevent losing concrete mortar. Locate temporary openings in forms at inconspicuous locations.
 - E. Chamfer exposed corners and edges as indicated, using wood, metal, PVC, or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.
 - F. Provisions for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses, and chases from trades providing such items. Accurately place and securely support items built into forms.
 - G. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before placing concrete. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

3.3 VAPOR RETARDER/BARRIER INSTALLATION

- A. General: Place vapor retarder/barrier sheeting in position with longest dimension parallel with direction of pour.
- B. Lap joints 6 inches.

3.4 PLACING REINFORCEMENT

- A. General: Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars," for details and methods of reinforcement placement and supports and as specified.
 - 1. Avoiding cutting or puncturing vapor retarder/barrier during reinforcement placement and concreting operations. Repair damages before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials that reduce or destroy bond with concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as approved by Engineer.
- D. Place reinforcement to maintain minimum coverages as indicated for concrete protection. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

3.5 JOINTS

- A. Construction Joints: Locate and install construction joints so they do not impair strength or appearance of the structure, as acceptable to Engineer.
- B. Provide keyways at least 1-1/2 inches deep in construction joints in walls and slabs and between walls and footings. Bulkheads designed and accepted for this purpose may be used for slabs.
- C. Place construction joints perpendicular to main reinforcement. Continue reinforcement across construction joints except as indicated otherwise.
- D. Use bonding agent on existing concrete surfaces that will be joined with fresh concrete.
- E. Waterstops: Provide waterstops in construction joints as indicated. Install waterstops to form continuous diaphragm in each joint. Support and protect exposed waterstops

during progress of Work. Field-fabricate joints in waterstops according to manufacturer's printed instructions.

- F. Isolation Joints in Slabs-on-Grade: Construct isolation joints in slabs-on-grade at points of contact between slabs-on-grade and vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
 - 1. Joint fillers and sealants are specified in Division 7 Section "Joint Sealants."
- G. Contraction (Control) Joints in Slabs-on-Grade: Construct contraction joints in slabs-on-grade to form panels of patterns as shown. Use saw cuts 1/8 inch wide by one-fourth of slab depth or inserts 1/4 inch wide by one-fourth of slab depth, unless otherwise indicated.
 - 1. Form contraction joints by inserting premolded plastic, hardboard, or fiberboard strip into fresh concrete until top surface of strip is flush with slab surface. Tool slab edges round on each side of insert. After concrete has cured, remove inserts and clean groove of loose debris.
 - 2. Contraction joints in unexposed floor slabs may be formed by saw cuts as soon as possible after slab finishing as may be safely done without dislodging aggregate.
 - 3. If joint pattern is not shown, provide joints not exceeding 15 feet in either direction and located to conform to bay spacing wherever possible (at column centerlines, half bays, third bays).
 - 4. Joint fillers and sealants are specified in Division 7 Section "Joint Sealants."

3.6 INSTALLING EMBEDDED ITEMS

- A. General: Set and build into formwork anchorage devices and other embedded items required for other work that is attached to or supported by cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached.
- B. Install reglets to receive top edge of foundation sheet waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, relieving angles, and other conditions.
- C. Install dovetail anchor slots in concrete structures as indicated on drawings.
- D. Forms for Slabs: Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required

elevations and contours in finished surfaces. Provide and secure units to support screed strips using strike-off templates or compacting-type screeds.

3.7 PREPARING FORM SURFACES

- A. General: Coat contact surfaces of forms with an approved, nonresidual, low-VOC, form-coating compound before placing reinforcement.
- B. Do not allow excess form-coating material to accumulate in forms or come into contact with in-place concrete surfaces against which fresh concrete will be placed. Apply according to manufacturer's instructions.
 - 1. Coat steel forms with a nonstaining, rust-preventative material. Rust-stained steel formwork is not acceptable.

3.8 CONCRETE PLACEMENT

- A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast in. Notify other trades to permit installation of their work.
- B. General: Comply with ACI 304, "Guide for Measuring, Mixing, Transporting, and Placing Concrete," and as specified.
- C. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened sufficiently to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation at its final location.
- D. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers no deeper than 24 inches and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.
 - 1. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures for consolidation of concrete complying with ACI 309.
 - 2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations no farther than the visible effectiveness of the machine. Place vibrators to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into

lower layers of concrete that have begun to set. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mix to segregate.

- E. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until completing placement of a panel or section.
1. Consolidate concrete during placement operations so that concrete is thoroughly worked around reinforcement, other embedded items and into corners.
 2. Bring slab surfaces to correct level with a straightedge and strike off. Use bull floats or darbies to smooth surface free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.
 3. Maintain reinforcing in proper position on chairs during concrete placement.
- F. Cold-Weather Placement: Comply with provisions of ACI 306 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
- G. When air temperature has fallen to or is expected to fall below 40 deg F (4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.
1. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 2. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise accepted in mix designs.
- H. Hot-Weather Placement: When hot weather conditions exist that would impair quality and strength of concrete, place concrete complying with ACI 305 and as specified.
1. Cool ingredients before mixing to maintain concrete temperature at time of placement to below 90 deg F (32 deg C). Mixing water may be chilled or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedding in concrete.

3. Fog spray forms, reinforcing steel, and subgrade just before placing concrete. Keep subgrade moisture uniform without puddles or dry areas.
4. Use water-reducing retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions, as acceptable to Engineer.

3.9 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: Provide a rough-formed finish on formed concrete surfaces not exposed to view in the finished Work or concealed by other construction. This is the concrete surface having texture imparted by form-facing material used, with tie holes and defective areas repaired and patched, and fins and other projections exceeding 1/4 inch in height rubbed down or chipped off.
- B. Smooth-Formed Finish: Provide a smooth-formed finish on formed concrete surfaces exposed to view or to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, painting, or another similar system. This is an as-cast concrete surface obtained with selected form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch defective areas with fins and other projections completely removed and smoothed.
- C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike-off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.10 MONOLITHIC SLAB FINISHES

- A. Scratch Finish: Apply scratch finish to monolithic slab surfaces to receive concrete floor topping or mortar setting beds for tile, portland cement terrazzo, and other bonded applied cementitious finish flooring material, and where indicated.
 1. After placing slabs, finish surface to tolerances of F(F) 15 (floor flatness) and F(L) 13 (floor levelness) measured according to ASTM E 1155. Slope surfaces uniformly to drains where required. After leveling, roughen surface before final set with stiff brushes, brooms, or rakes.
- B. Float Finish: Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as

specified; slab surfaces to be covered with membrane or elastic waterproofing, membrane or elastic roofing, or sand-bed terrazzo; and where indicated.

1. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating, using float blades or float shoes only, when surface water has disappeared, or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats or by hand-floating if area is small or inaccessible to power units. Finish surfaces to tolerances of F(F) 18 (floor flatness) and F(L) 15 (floor levelness) measured according to ASTM E 1155. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.
- C. Trowel Finish: Apply a trowel finish to monolithic slab surfaces exposed to view and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint, or another thin film-finish coating system.
1. After floating, begin first trowel-finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and finish surfaces to tolerances of F(F) 20 (floor flatness) and F(L) 17 (floor levelness) measured according to ASTM E 1155. Grind smooth any surface defects that would telegraph through applied floor covering system.
- D. Trowel and Fine Broom Finish: Where ceramic or quarry tile is to be installed with thin-set mortar, apply a trowel finish as specified, then immediately follow by slightly scarifying the surface with a fine broom.
- E. Nonslip Broom Finish: Apply a nonslip broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.
1. Immediately after float finishing, slightly roughen concrete surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Engineer before application.
- F. Nonslip Aggregate Finish: Apply nonslip aggregate finish to concrete stair treads, platforms, ramps, sloped walks, and where indicated.
1. After completing float finishing and before starting trowel finish, uniformly spread 25 lb of dampened

nonslip aggregate per 100 sq. ft. of surface. Tamp aggregate flush with surface using a steel trowel, but do not force below surface. After broadcasting and tamping, apply trowel finishing as specified.

2. After curing, lightly work surface with a steel wire brush or an abrasive stone, and water to expose nonslip aggregate.

3.11 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place, and cure concrete as specified to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete Work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on drawings. Set anchor bolts for machines and equipment to template at correct elevations, complying with diagrams or templates of manufacturer furnishing machines and equipment.

3.12 CONCRETE CURING AND PROTECTION

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. In hot, dry, and windy weather protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control material. Apply according to manufacturer's instructions after screeding and bull floating, but before power floating and troweling.
- B. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 7 days.
- C. Curing Methods: Cure concrete by curing compound.
- D. Provide moisture curing by the following methods:
 1. Apply curing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours and after surface water sheen has disappeared). Apply uniformly in continuous operation by power spray or

roller according to manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.

2. Use membrane curing compounds that will not affect surfaces to be covered with finish materials applied directly to concrete.
- E. Curing Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces, by moist curing with forms in place for the full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.
- F. Curing Unformed Surfaces: Cure unformed surfaces, including slabs, floor topping, and other flat surfaces, by applying the appropriate curing method.
1. Final cure concrete surfaces to receive finish flooring with a moisture-retaining cover, unless otherwise directed.

3.13 REMOVING FORMS

- A. General: Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form-removal operations, and provided curing and protection operations are maintained.
- B. Formwork supporting weight of concrete, such as beam soffits, joists, slabs, and other structural elements, may not be removed in less than 14 days or until concrete has attained at least 75 percent of design minimum compressive strength at 28 days. Determine potential compressive strength of in-place concrete by testing field-cured specimens representative of concrete location or members.
- C. Form-facing material may be removed 4 days after placement only if shores and other vertical supports have been arranged to permit removal of form-facing material without loosening or disturbing shores and supports.

3.14 REUSING FORMS

- A. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-coating compound as specified for new formwork.

- B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use patched forms for exposed concrete surfaces except as acceptable to Engineer.

3.15 CONCRETE SURFACE REPAIRS

- A. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removing forms, when acceptable to Engineer.
- B. Mix dry-pack mortar, consisting of one part portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing.
 - 1. Cut out honeycombs, rock pockets, voids over 1/4 inch in any dimension, and holes left by tie rods and bolts down to solid concrete but in no case to a depth less than 1 inch. Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush-coat the area to be patched with bonding agent. Place patching mortar before bonding agent has dried.
 - 2. For surfaces exposed to view, blend white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Provide test areas at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.
- C. Repairing Formed Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Engineer. Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes and fill with dry-pack mortar or precast cement cone plugs secured in place with bonding agent.
 - 1. Repair concealed formed surfaces, where possible, containing defects that affect the concrete's durability. If defects cannot be repaired, remove and replace the concrete.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface tolerances specified for each surface and finish. Correct low and high areas as specified. Test unformed surfaces sloped to drain for trueness of slope and smoothness by

using a template having the required slope.

1. Repair finished unformed surfaces containing defects that affect the concrete's durability. Surface defects include crazing and cracks in excess of 0.01 inch wide or that penetrate to the reinforcement or completely through nonreinforced sections regardless of width, spalling, popouts, honeycombs, rock pockets, and other objectionable conditions.
 2. Correct high areas in unformed surfaces by grinding after concrete has cured at least 14 days.
 3. Correct low areas in unformed surfaces during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete. Proprietary underlayment compounds may be used when acceptable to Engineer.
 4. Repair defective areas, except random cracks and single holes not exceeding 1 inch in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose reinforcing steel with at least 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
- E. Repair isolated random cracks and single holes 1 inch or less in diameter by dry-pack method. Groove top of cracks and cut out holes to sound concrete and clean of dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding compound. Place dry-pack before bonding agent has dried. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- F. Perform structural repairs with prior approval of Engineer for method and procedure, using specified epoxy adhesive and mortar.
- G. Repair methods not specified above may be used, subject to acceptance of Engineer.

3.16 QUALITY CONTROL TESTING DURING CONSTRUCTION

- A. General: The General Contractor will employ a testing agency to perform tests and to submit test reports.
- B. Sampling and testing for quality control during concrete placement shall include the following, as directed by Engineer.

1. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.
 - a. Slump: ASTM C 143; one test at point of discharge for each day's pour of each type of concrete; additional tests when concrete consistency seems to have changed.
 - b. Air Content: ASTM C 173, volumetric method for lightweight or normal weight concrete; ASTM C 231, pressure method for normal weight concrete; one for each day's pour of each type of air-entrained concrete.
 - c. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F (4 deg C) and below, when 80 deg F (27 deg C) and above, and one test for each set of compressive-strength specimens.
 - d. Compression Test Specimen: ASTM C 31; one set of four standard cylinders for each compressive-strength test, unless otherwise directed. Mold and store cylinders for laboratory-cured test specimens except when field-cured test specimens are required.
 - e. Compressive-Strength Tests: ASTM C 39; one set for each day's pour exceeding 5 cu. yd. plus additional sets for each 50 cu. yd. more than the first 25 cu. yd. of each concrete class placed in any one day; one specimen tested at 7 days, two specimens tested at 28 days, and one specimen retained in reserve for later testing if required.
 2. When frequency of testing will provide fewer than five strength tests for a given class of concrete, conduct testing from at least five randomly selected batches or from each batch if fewer than five are used.
 3. When total quantity of a given class of concrete is less than 50 cu. yd., Engineer may waive strength testing if adequate evidence of satisfactory strength is provided.
 4. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.
 5. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength and no individual strength test result falls below specified compressive strength by more than 500 psi.
- C. Test results will be reported in writing to Engineer, Structural Engineer, ready-mix producer, and Contractor within 24 hours after tests. Reports of compressive

strength tests shall contain the Project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-day tests and 28-day tests.

- D. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.

- E. Additional Tests: The testing agency will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by Engineer. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed.

END OF SECTION 03300

SECTION 04200 - UNIT MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Concrete unit masonry.
 - 2. Clay unit masonry in the form of brick.
- B. Related Sections: The following sections contain requirements that relate to this Section:
 - 1. Division 7 Section "Flashing and Sheet Metal" for exposed sheet metal flashing installed in masonry.
- C. Products installed but not furnished under this Section include the following:
 - 1. Steel lintels in unit masonry are specified in Division 5 Section "Metal Fabrications."
 - 2. Wood nailers and blocking built into unit masonry are specified in Division 6 Section "Rough Carpentry."
 - 3. Hollow metal frames in unit masonry openings are specified in Division 8 Section "Steel Doors and Frames."
 - 4. Hollow metal frames in unit masonry openings are specified in Division 8 Section "Custom Hollow Metal Work."

1.3 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product data for each different masonry unit, accessory, and other manufactured product indicated.
- D. Material certificates for the following signed by manufacturer and Contractor certifying that each material complies with requirements.

1. Each different cement product required for mortar and grout including name of manufacturer, brand, type, and weight slips at time of delivery.
 2. Each material and grade indicated for reinforcing bars.
 3. Each type and size of joint reinforcement.
 4. Each type and size of anchors, ties, and metal accessories.
- E. Material test reports from a qualified independent testing laboratory employed and paid by Contractor indicating and interpreting test results relative to compliance of the following proposed masonry materials with requirements indicated:
1. Mortar complying with property requirements of ASTM C 270.
 2. Grout mixes. Include description of type and proportions of grout ingredients.
- F. Cold-weather construction procedures evidencing compliance with requirements specified in referenced unit masonry standard.
- G. Hot-weather construction procedures evidencing compliance with requirements specified in referenced unit masonry standard.
- H. Qualification data for firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include list of completed projects with project names, addresses, telephone numbers, names of Engineers and Owners, and other information specified.
- I. Results from tests and inspections performed by Owner's representatives will be reported promptly and in writing to Engineer and Contractor.

1.4 QUALITY ASSURANCE

- A. Unit Masonry Standard: Comply with ACI 530.1/ASCE 6 "Specifications for Masonry Structures," except as otherwise indicated.
1. Revise ACI 530.1/ASCE 6 to exclude Sections 1.4 and 1.7; Parts 2.1.2, 3.1.2, and 4.1.2; and Articles 1.5.1.2, 1.5.1.3, 2.1.1.1, 2.1.1.2, and 2.3.3.6 and to modify Article 2.1.1.5 by deleting requirement for installing vent pipes and conduits built into masonry.
- B. Inspecting Laboratory Qualifications: To qualify for

employment in performing tests and inspection specified in this Section, an independent testing laboratory must demonstrate to Engineer's satisfaction, based on evaluation of laboratory-submitted criteria conforming to ASTM C 1093, that it has the experience and capability to conduct satisfactorily the testing indicated without delaying the progress of the Work.

- C. Preconstruction Testing: Owner will employ and pay a qualified independent testing laboratory to perform the following preconstruction testing indicated as well as other inspecting and testing services required by referenced unit masonry standard or indicated herein for source and field quality control:
 - 1. Clay unit masonry tests: For each different clay masonry unit indicated, units will be tested per ASTM C 67.

- D. Fire Performance Characteristics: Where indicated, provide materials and construction identical to those of assemblies whose fire resistance has been determined per ASTM E 119 by a testing and inspecting organization, by equivalent concrete masonry thickness, or by another means, as acceptable to authorities having jurisdiction.

- E. Single-Source Responsibility for Masonry Units: Obtain exposed masonry units of uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from one manufacturer for each different product required for each continuous surface or visually related surfaces.

- F. Single-Source Responsibility for Mortar Materials: Obtain mortar ingredients of uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source and producer for each aggregate.

- G. Field-Constructed Mock-Ups: Prior to installation of unit masonry, erect sample wall panels to further verify selections made under sample submittals and to demonstrate aesthetic effects as well as qualities of materials and execution. Build mock-ups to comply with the following requirements, using materials indicated for final unit of Work:
 - 1. Locate mock-ups on site in locations indicated or, if not indicated, as directed by Engineer.
 - 2. Build mock-ups for the following types of masonry in sizes of approximately 4 feet long by 4 feet high by full thickness, including face and backup wythes as well as accessories.

- a. Each type of exposed unit masonry construction.
- 3. Where masonry is to match existing, erect panels parallel to existing surface.
- 4. Notify Engineer one week in advance of the dates and times when mock-ups will be erected.
- 5. Protect mock-ups from the elements with weather-resistant membrane.
- 6. Retain and maintain mock-ups during construction in undisturbed condition as standard for judging completed unit masonry construction.

- a. When directed, demolish and remove mock-ups from Project site.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver masonry materials to project in undamaged condition.
- B. Store and handle masonry units off the ground, under cover, and in a dry location to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion, and other causes. If units become wet, do not place until units are in an air-dried condition.
- C. Store cementitious materials off the ground, under cover, and in dry location.
- D. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- E. Store masonry accessories including metal items to prevent corrosion and accumulation of dirt and oil.

1.7 PROJECT CONDITIONS

- A. Protection of Masonry: During erection, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
 - 1. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.
 - 2. Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe and hold cover in place.
- B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least 3 days after building masonry walls or columns.

- C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Remove immediately any grout, mortar, and soil that come in contact with such masonry.
 - 1. Protect base of walls from rain-splashed mud and mortar splatter by means of coverings spread on ground and over wall surface.
 - 2. Protect sills, ledges, and projections from mortar droppings.
 - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes from mortar droppings.

- D. Cold-Weather Construction: Comply with referenced unit masonry standard for cold-weather construction and the following:
 - 1. Do not lay masonry units that are wet or frozen.
 - 2. Remove masonry damaged by freezing conditions.

- E. Hot-Weather Construction: Comply with referenced unit masonry standard.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Comply with referenced unit masonry standard and other requirements specified in this Section applicable to each material indicated.

2.2 CLAY MASONRY UNITS

- A. Face Brick Standard: ASTM C 216 and as follows:
 - 1. Grade and Unit Compressive Strength: Provide units of grade and minimum average net area compressive strength indicated below:
 - a. Grade SW.
 - b. Not less than the unit compressive strengths required to produce clay masonry construction of compressive strength indicated.
 - 2. Type FBX (for general use in exposed masonry requiring minimum variations in size and color ranges).
 - 3. Size: Provide bricks manufactured to the following actual dimensions within the tolerances specified in

ASTM C 216:

- a. Standard: 3-5/8 inches thick by 2-1/4 inches high
4. Shape units during manufacture as indicated below:
 - a. Molding.
 - b. Pressing.
 - c. Extruding.
 - d. Any method indicated above.
 5. Application: Use where brick is exposed, unless otherwise indicated.
 6. Wherever shown to "match existing," provide face brick of matching color, texture, and size as existing adjacent brickwork.

2.3 CONCRETE MASONRY UNITS

- A. General: Comply with requirements indicated below applicable to each form of concrete masonry unit required.
 1. Provide special shapes where indicated and as follows:
 - a. For lintels, corners, jambs, sash, control joints, headers, bonding, and other special conditions.
 - b. Bullnose units for outside corners unless otherwise indicated.
 2. Size: Provide concrete masonry units complying with requirements indicated below for size that are manufactured to specified face dimensions within tolerances specified in the applicable referenced ASTM specification for concrete masonry units.
 - a. Concrete Masonry Units: Manufactured to specified dimensions of 3/8 inch less than nominal widths by nominal heights by nominal lengths indicated on drawings.
 - b. Concrete Building Brick: Specified dimensions as follows:
 - 1) Standard Modular: 3-5/8 inches wide by 2-1/4 inches high by 7-5/8 inches long.
 3. Provide Type I, moisture-controlled units.
 4. Exposed Faces: Manufacturer's standard color and texture, unless otherwise indicated.
- B. Hollow Load-Bearing Concrete Masonry Units: ASTM C 90, Grade N and as follows:

1. Unit Compressive Strength: Provide units with minimum average net area compressive strength indicated below:
 - a. 1900 psi.
 2. Weight Classification: Normal weight.
- C. Solid Load-Bearing Concrete Masonry Units: ASTM C 145, Grade N and as follows:
1. Unit Compressive Strength: Provide units with minimum average net area compressive strength indicated below:
 - a. 1800 psi.
 2. Weight Classification: Normal weight.

2.4 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce required mortar color.
- B. Masonry Cement: ASTM C 91.
1. For colored pigmented mortars use premixed colored masonry cements of formulation required to produce color indicated, or if not indicated, as selected from manufacturer's standard formulations.
 2. For colored aggregate mortars use masonry cement of natural color or white as required to produce mortar color indicated.
- C. Ready-Mixed Mortar: Cementitious materials, water, and aggregate complying with requirements specified in this article, combined with set-controlling admixtures to produce a ready-mixed mortar complying with ASTM C 1142.
- D. Hydrated Lime: ASTM C 207, Type S.
- E. Aggregate for Mortar: ASTM C 144, except for joints less than 1/4 inch use aggregate graded with 100 percent passing the No. 16 sieve.
- F. Aggregate for Grout: ASTM C 404.
- G. Water: Clean and potable.

2.5 REINFORCING STEEL

- A. General: Provide reinforcing steel complying with requirements of referenced unit masonry standard and this article.
- B. Steel Reinforcing Bars: Material and grade as follows:
 - 1. Grade 60.
- C. Deformed Reinforcing Wire: ASTM A 496.
- D. Plain Welded Wire Fabric: ASTM A 185.
- E. Deformed Welded Wire Fabric: ASTM A 497.

2.6 JOINT REINFORCEMENT

- A. General: Provide joint reinforcement complying with requirements of referenced unit masonry standard and this article, formed from the following:
 - 1. Galvanized carbon steel wire, coating class as required by referenced unit masonry standard for application indicated.
- B. Description: Welded-wire units prefabricated with deformed continuous side rods and plain cross rods into straight lengths of not less than 10 feet, with prefabricated corner and tee units, and complying with requirements indicated below:
 - 1. Wire Diameter for Side Rods: 0.1483 inch (9 gage).
 - 2. Wire Diameter for Cross Rods: 0.1483 inch (9 gage).
 - 3. For single-wythe masonry provide type as follows with single pair of side rods:
 - a. Truss design with continuous diagonal cross rods spaced not more than 16 inches o.c.
 - 4. For multiwythe masonry provide type as follows:
 - a. Truss design with diagonal cross rods spaced not more than 16 inches o.c. and number of side rods as follows:
 - 1) Number of Side Rods for Multiwythe Concrete Masonry: One side rod for each face shell of hollow masonry units more than 4 inches in nominal width plus one side rod for each wythe of masonry 4 inches or less in nominal width.
 - b. Tab design with single pair of side rods and rectangular box-type cross ties spaced not more than 16 inches o.c.; with side rods spaced for

embedment within each face shell of backup wythe and ties extended to engage the outer wythe by at least 1-1/2 inches.

C. Manufacturers: Subject to compliance with requirements, provide joint reinforcement by one of the following:

1. AA Wire Products Co.
2. Dur-O-Wal, Inc.
3. Heckman Building Products, Inc.
4. Hohmann & Barnard, Inc.
5. Masonry Reinforcing Corp. of America.
6. National Wire Products Industries.
7. Southern Construction Products, Inc.

2.7 TIES AND ANCHORS, GENERAL

A. General: Provide ties and anchors specified in subsequent articles that comply with requirements for metal and size of referenced unit masonry standard and of this article.

B. Galvanized Carbon Steel Wire: ASTM A 82, coating class as required by referenced unit masonry standard for application indicated.

C. Galvanized Carbon Steel Wire: ASTM A 82, coating class as required by referenced unit masonry standard, for wire ties and anchors in interior walls, unless otherwise indicated.

1. Wire Diameter: 0.1875 inch.

D. Galvanized Steel Sheet: ASTM A 366 (commercial quality) cold-rolled carbon steel sheet, hot-dip galvanized after fabrication to comply with ASTM A 525, Class B2 (for unit lengths over 15 inches) and Class B3 (for unit lengths under 15 inches), for sheet metal ties and anchors.

1. Thickness of Steel Sheet Galvanized After Fabrication: Uncoated thickness of steel sheet hot-dip galvanized after fabrication:

- a. 0.0747 inch (14 gage).

E. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. AA Wire Products Co.
2. Dur-O-Wal, Inc.
3. Heckman Building Products, Inc.
4. Hohmann & Barnard, Inc.
5. Masonry Reinforcing Corp. of America.
6. National Wire Products Industries.
7. Southern Construction Products, Inc.

2.8 CONTINUOUS WIRE REINFORCING AND TIES FOR MASONRY:

- A. Provide welded wire units prefabricated in straight lengths of not less than 10', with matching corner and tee units. Fabricate from cold-drawn steel wire complying with ASTM A 82, with deformed continuous side rods and plain cross-rods, and a unit width of 1-1/2" to 2" less than thickness of wall or partition.
- B. Provide units fabricated as follows:
 - 1. Truss Type fabricated with single pair of 9 ga. side rods and 9 ga. continuous diagonal cross-rods spaced not more than 16" o.c.
 - a. For multi-wythed or cavity exterior walls with concrete masonry back-up fabricate units with additional side rods spaced for embedment in inside face of back-up wythe.
 - 2. For interior walls, fabricate from mill galvanized wire.
 - 3. For exterior walls, hot-dip galvanize after fabrication with 1.5 oz. zinc coating, ASTM A 153, Class B2.

2.9 ADJUSTABLE MASONRY VENEER ANCHORS

- A. General: Provide two-piece assemblies allowing vertical or horizontal differential movement between wall and framework parallel to plane of wall, but resisting tension and compression forces perpendicular to it; for attachment over sheathing to metal studs.
- B. Screw-Attached Masonry Veneer Anchors: Units consisting of wire tie section and metal anchor section complying with the following requirements:
 - 1. Veneer Anchors: Zinc alloy barrel, flanged head, and eye with interchangeable corrosion resistant self drilling threaded screws appropriate for permanent attachment in steel studs, and/or masonry back-up. Barrel shaft in lengths consistent with thickness of materials penetrated, allowing shoulder to seat directly on structural back-up and flanged head to cover fastener hole. 3/4 inch rubber washer under flanged head shall seal surface penetration of anchor.
 - 2. Rectangular Ties: Hot dipped galvanized, 0.1875 inch pregalvanized wire diameter, conforming to ASTM A 82 with 1.30 oz/sf zinc coating conforming to Class B-3 of ASTM A153. Tie length shall provide not less than 2

inch embedment in mortar joints.

3. Products: Subject to compliance with requirements, provide the following:

- a. Screw-Attached Brick Ties to Stud Walls:

AA401CE Screw on Anchor
AA400 Flex-o-Lok Flexible Tie

2.10 POSTINSTALLED ANCHORS

- A. Anchors as described below, with capability to sustain, without failure, load imposed within factors of safety indicated, as determined by testing per ASTM E 488, conducted by a qualified independent testing laboratory.
 1. Type: Chemical anchors.
 2. Type: Expansion anchors.
 3. Corrosion Protection: Carbon steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5 (5 microns) for Class SC 1 service condition (mild).
 4. Corrosion Protection: Stainless steel components complying with ASTM F 593 and ASTM F 594, Group 1 alloy 304 or 316 for bolts and nuts; alloy 304 or 316 for anchor.
 5. For cast-in-place and postinstalled anchors in concrete: Capability to sustain, without failure, a load equal to 4 times loads imposed by masonry.
 6. For postinstalled anchors in grouted concrete masonry units: Capability to sustain, without failure, a load equal to 6 times loads imposed by masonry.

2.11 EMBEDDED FLASHING MATERIALS

- A. Provide concealed flashings, shown to be built into masonry.
- B. Provide concealed flashings as follows:
 1. Fabricate through-wall flashings with deformations in both directions for integral mechanical mortar bond.
- C. Reinforced Plastic Flashing: Manufacturer's standard composite plastic flashing as described below:
 1. Polyester film bonded to 20 by 10 fiberglass scrim reinforcement and 1.25-mil black vinyl ethylene film, with a total thickness of 8 mils.
 2. Joint Tape: Reinforced plastic flashing manufacturer's standard polyester tape, 2 inches wide by 2.0 mil thick.
 3. Application: Use where flashing is fully concealed in masonry.

- D. Adhesive for Flashings: Of type recommended by manufacturer of flashing material for use indicated.
- E. Products: Subject to compliance with requirements, provide one of the following:
 - 1. Reinforced Plastic Flashing:
 - a. "Fiberweb 200," Fiberweb International Corp.

2.12 MISCELLANEOUS MASONRY ACCESSORIES

- A. Weep Holes: Provide the following:
 - 1. Wicking Material: Material as indicated below, in length required to produce 2 inches exposure on exterior and 18 inches in cavity between wythes at 2'-0" on center in base of head joints.
 - a. Cotton sash cord.

2.13 MASONRY CLEANERS

- A. Job-Mixed Detergent Solution: Solution of trisodium phosphate (1/2-cup dry measure) and laundry detergent (1/2-cup dry measure) dissolved in one gallon of water.

2.14 MORTAR AND GROUT MIXES

- A. General: Do not add admixtures including coloring pigments, air-entraining agents, accelerators, retarders, water repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.
 - 1. Do not use calcium chloride in mortar or grout.
- B. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification, for types of mortar indicated below:
- C. Mortar for Unit Masonry: Comply with ASTM C 270, Property Specification for job-mixed mortar and ASTM C 1142 for ready-mixed mortar, of types indicated below:
 - 1. For masonry below grade and in contact with earth, and where indicated, use type indicated below:
 - a. Type S.
 - 2. For reinforced masonry and where indicated, use type indicated below:

a. Type S.

3. For exterior, above-grade loadbearing and nonloadbearing walls and parapet walls; for interior loadbearing walls; for interior nonloadbearing partitions, and for other applications where another type is not indicated, use type indicated below:

a. Type N.

D. Colored Pigmented Mortar: Select and proportion pigments with other ingredients to produce color required.

E. Colored Aggregate Mortar: Produce mortar of color required by use of colored aggregates in combination with selected cementitious materials.

1. Mix to match Engineer's sample.

F. Grout for Unit Masonry: Comply with ASTM C 476 and referenced unit masonry standard.

2.15 SOURCE QUALITY CONTROL

A. Brick Tests: For each type and grade of brick indicated, units will be tested by qualified independent testing laboratory per ASTM C 67 except 5 bricks will be selected at random for each 100,000 units or fraction thereof installed.

B. Concrete Masonry Unit Tests: For each type, class, and grade of concrete masonry unit indicated, units will be tested by qualified independent testing laboratory for strength, absorption, and moisture content per ASTM C 140.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other specific conditions, and other conditions affecting performance of unit masonry.

1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of unit masonry.

B. Examine rough-in and built-in construction to verify actual locations of piping connections prior to installation.

- C. Do not proceed until unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Comply with referenced unit masonry standard and other requirements indicated applicable to each type of installation included in Project.
- B. Thickness: Build cavity and composite walls and other masonry construction to the full thickness shown. Build single-wythe walls to the actual thickness of the masonry units, using units of nominal thickness indicated.
- C. Build chases and recesses as shown or required to accommodate items specified in this and other Sections of the Specifications. Provide not less than 8 inches of masonry between chase or recess and jamb of openings and between adjacent chases and recesses.
- D. Leave openings for equipment to be installed before completion of masonry. After installation of equipment, complete masonry to match construction immediately adjacent to the opening.
- E. Cut masonry units with motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide continuous pattern and to fit adjoining construction. Use full-size units without cutting where possible.
- F. Matching Existing Masonry: Match coursing, bonding, color, and texture of new masonry with existing masonry.

3.3 CONSTRUCTION TOLERANCES

- A. Comply with construction tolerances of referenced unit masonry standard.

3.4 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint widths and for accurate locating of openings, movement-type joints, returns, and offsets. Avoid the use of less-than-half-size units at corners, jambs, and where possible at other locations.
- B. Lay up walls to comply with specified construction tolerances, with courses accurately spaced and coordinated with other construction.
- C. Bond Pattern for Exposed Masonry: Lay exposed masonry in

the following bond pattern; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

1. Concrete Masonry Units: One-half running bond with vertical joint in each course centered on units in courses above and below (Match Existing).
 2. Face Brick: Running Bond (Match Existing).
- D. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 2 inches. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
- E. Stopping and Resuming Work: In each course, rack back 1/2-unit length for one-half running bond or 1/3-unit length for one-third running bond; do not tooth. Clean exposed surfaces of set masonry, wet clay masonry units lightly (if required), and remove loose masonry units and mortar prior to laying fresh masonry.
- F. Built-In Work: As construction progresses, build-in items specified under this and other Sections of the Specifications. Fill in solidly with masonry around built-in items.
1. Fill space between hollow metal frames and masonry solidly with mortar, unless otherwise indicated.
 2. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath in the joint below and rod mortar or grout into core.
 3. Fill cores in hollow concrete masonry units with grout 3 courses (24 inches) under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.

3.5 MORTAR BEDDING AND JOINTING

- A. Lay hollow concrete masonry units as follows:
1. With full mortar coverage on horizontal and vertical face shells.
 2. Bed webs in mortar in starting course on footings and in all courses of piers, columns, and pilasters, and where adjacent to cells or cavities to be filled with grout.
 3. For starting course on footings where cells are not grouted, spread out full mortar bed including areas under cells.
- B. Cut joints flush for masonry walls to be concealed or to be

covered by other materials, unless otherwise indicated.

3.6 STRUCTURAL BONDING OF MULTI-WYTHE MASONRY

- A. Use continuous horizontal joint reinforcement installed in horizontal mortar joints for bond tie between wythes.
- B. Corners: Provide interlocking masonry unit bond in each course at corners, unless otherwise shown.
 - 1. Provide continuity with horizontal joint reinforcement at corners using prefabricated "L" units, in addition to masonry bonding.
- C. Intersecting and Abutting Walls: Unless vertical expansion or control joints are shown at juncture, provide same type of bonding specified for structural bonding between wythes and space as follows:
 - 1. Provide individual metal ties.
 - 2. Provide continuity with horizontal joint reinforcement using prefabricated "T" units.
- D. Nonbearing Interior Partitions: Build full height of story to underside of solid floor or roof structure above and as follows:
 - 1. Install pressure-relieving joint filler in joint between top of partition and underside of structure above.

3.7 CAVITIES/AIR SPACES

- A. Keep cavities/air spaces clean of mortar droppings and other materials during construction. Strike joints facing cavities/air spaces flush.
- B. Tie exterior wythe to backup with continuous horizontal joint reinforcing.
- C. Install vents in vertical head joints at the top of each continuous cavity/air space. Space vents and close off cavities/air spaces vertically and horizontally with blocking in manner indicated.

3.8 HORIZONTAL JOINT REINFORCEMENT

- A. General: Provide continuous horizontal joint reinforcement as indicated. Install longitudinal side rods in mortar for their entire length with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcing a minimum of 6 inches.

- B. Cut or interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.
- C. Provide continuity at corners and wall intersections by use of prefabricated "L" and "T" sections. Cut and bend reinforcement units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.9 ANCHORING MASONRY TO STRUCTURAL MEMBERS

- A. Anchor masonry to structural members where masonry abuts or faces structural members to comply with the following:
 - 1. Provide an open space not less than 1 inch in width between masonry and structural member, unless otherwise indicated. Keep open space free of mortar or other rigid materials.
 - 2. Anchor masonry to structural members with flexible anchors embedded in masonry joints and attached to structure.
 - 3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

3.10 MOVEMENT (CONTROL AND EXPANSION) JOINTS

- A. General: Install control and expansion joints in unit masonry where indicated. Build in related items as the masonry progresses. Do not form a continuous span through movement joints unless provisions are made to prevent in-plane restraint of wall or partition movement.
- B. Form control joints in concrete masonry as follows:
 - 1. Install preformed control joint gaskets designed to fit standard sash block.
- C. Form expansion joints in brick made from clay or shale as follows:
 - 1. Form open joint of width indicated but not less than 3/8 inch for installation of sealant and backer rod specified in Division 7 Section "Joint Sealers." Maintain joint free and clear of mortar.

3.11 LINTELS

- A. Install steel lintels where indicated.
- B. Provide masonry lintels where shown and wherever openings of more than 1'-0" for brick size units and 2'-0" for block

size units are shown without structural steel or other supporting lintels. Provide precast or formed-in-place masonry lintels. Cure precast lintels before handling and installation. Temporarily support formed-in-place lintels.

1. For hollow concrete masonry unit walls, use specially formed bond beam units with reinforcement bars placed as indicated and filled with coarse grout.
- C. Provide minimum bearing of 8 inches at each jamb, unless otherwise indicated.

3.12 FLASHING/WEEP HOLES

- A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to the downward flow of water in the wall, and where indicated.
- B. Prepare masonry surfaces so that they are smooth and free from projections that could puncture flashing. Place through-wall flashing on sloping bed of mortar and cover with mortar. Seal penetrations in flashing with adhesive/sealant/tape as recommended by flashing manufacturer before covering with mortar.
- C. Install flashings as follows:
1. At lintels and shelf angles, extend flashing a minimum of 4 inches into masonry at each end. Extend flashing from exterior face of outer wythe of masonry, through the outer wythe, turned up a minimum of 4 inches, and through the inner wythe to within 1/2 inches of the interior face of the wall in exposed masonry. Where interior surface of inner wythe is concealed by furring, carry flashing completely through the inner wythe and turn up approximately 2 inches, unless otherwise indicated.
 2. At heads and sills, extend flashing as specified above unless otherwise indicated but turn up ends not less than 2 inches to form a pan.
 3. Install flashing in masonry veneer walls as specified above but carry flashing up face of sheathing at least 8 inches and behind air infiltration barrier/building paper.
 4. Cut off flashing flush with face of wall after masonry wall construction is completed.
- D. Install weep holes in the head joints in exterior wythes of the first course of masonry immediately above embedded flashings and as follows:
1. Form weep holes with product specified in Part 2 of this

Section.

2. Form weep holes by keeping head joints free and clear of mortar.
 3. Space weep holes 24 inches o.c.
- E. Install reglets and nailers for flashing and other related construction where shown to be built into masonry.

3.13 INSTALLATION OF REINFORCED UNIT MASONRY

- A. General: Install reinforced unit masonry to comply with requirements of referenced unit masonry standard.
- B. Temporary Formwork: Construct formwork and shores to support reinforced masonry elements during construction.
1. Construct formwork to conform to shape, line, and dimensions shown. Make sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
- C. Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist grout pressure.
- D. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other temporary loads that may be placed on them during construction.

3.14 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or if units do not match adjoining units. Install new units to match adjoining units and in fresh mortar or grout, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge any voids or holes, except weep holes, and completely fill with mortar. Point-up all joints including corners, openings, and adjacent construction to provide a neat, uniform appearance, prepared for application of sealants.
- C. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 2. Test cleaning methods on sample wall panel; leave 1/2 panel uncleaned for comparison purposes. Obtain

Engineer's approval of sample cleaning before proceeding with cleaning of masonry.

3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.
 4. Wet wall surfaces with water prior to application of cleaners; remove cleaners promptly by rinsing thoroughly with clear water.
 5. Clean brick by means of bucket and brush hand-cleaning method described in BIA "Technical Note No. 20 Revised" using the following masonry cleaner:
 - a. Job-mixed detergent solution.
 6. Clean concrete masonry by means of cleaning method indicated in NCMA TEK 45 applicable to type of stain present on exposed surfaces.
 7. Clean limestone units to comply with recommendations in "ILI Handbook" of Indiana Limestone Institute of America, Inc.
- D. Protection: Provide final protection and maintain conditions, in a manner acceptable to Installer, that ensure unit masonry is without damage and deterioration at time of Substantial Completion.

END OF SECTION 04200

SECTION 05120 - STRUCTURAL STEEL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes fabrication and erection of structural steel work, as shown on drawings including schedules, notes, and details showing size and location of members, typical connections, and types of steel required.

1. Structural steel is that work defined in American Institute of Steel Construction (AISC) "Code of Standard Practice" and as otherwise shown on drawings.

2. Miscellaneous Metal Fabrications are specified elsewhere in Division 5.

3. Refer to Division 3 for anchor bolt installation in concrete, Division 4 for anchor bolt installation in masonry.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Shop drawings including complete details and schedules for fabrication and assembly of structural steel members, procedures, and diagrams.

1. Include details of cuts, connections, camber, holes, and other pertinent data. Indicate welds by standard AWS symbols and show size, length, and type of each weld.

2. Provide setting drawings, templates, and directions for installation of anchor bolts and other anchorages to be installed as work of other sections.

C. Test reports conducted on shop- and field-bolted and welded connections. Include data on type(s) of tests conducted and test results.

1.4QUALITY ASSURANCE

A. Codes and Standards: Comply with provisions of following, except as otherwise indicated:

1. American Institute of Steel Construction (AISC) "Code of Standard Practice for Steel Buildings and Bridges."

a. Paragraph 4.2.1 of the above code is hereby modified by deletion of the following sentence:

1) "This approval constitutes the owner's acceptance of all responsibility for the design adequacy of any detail configuration of connections developed by the fabricator as a part of his preparation of these shop drawings."

2. AISC "Specifications for Structural Steel Buildings," including "Commentary."

3. "Specifications for Structural Joints using ASTM A 325 or A 490 Bolts" approved by the Research Council on Structural Connections.

4. American Welding Society (AWS) D1.1 "Structural Welding Code - Steel."

5. ASTM A 6 "General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use."

B. Qualifications for Welding Work: Qualify welding procedures and welding operators in accordance with AWS "Qualification" requirements.

1. Provide certification that welders to be employed in work have satisfactorily passed AWS qualification tests.

2. If recertification of welders is required, retesting will be Contractor's responsibility.

1.5DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to site at such intervals to ensure uninterrupted progress of work.

B. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete or masonry, in ample time to not to delay work.

C. Store materials to permit easy access for inspection and identification. Keep steel members off ground by using pallets, platforms, or other supports. Protect steel members and packaged materials from erosion and deterioration. If bolts and nuts become dry or rusty, clean and relubricate before use.

1. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Metal Surfaces, General: For fabrication of work that will be exposed to view, use only materials that are smooth and free of surface blemishes including pitting, rust and scale seam marks, roller marks, rolled trade names, and roughness. Remove such blemishes by grinding, or by welding and grinding, prior to cleaning, treating, and applying surface finishes.

B. Structural Steel Shapes, Plates, and Bars: ASTM A 36.

C. Cold-Formed Steel Tubing: ASTM A 500, Grade C.

D. Steel Pipe: ASTM A 53, Type E or S, Grade B; or ASTM A 501.

1. Finish: Black, except where indicated to be galvanized.

E. Anchor Bolts: ASTM A 307, nonheaded type unless otherwise indicated.

F. Unfinished Threaded Fasteners: ASTM A 307, Grade A, regular low-carbon steel bolts and nuts.

1. Provide hexagonal heads and nuts for all connections.

G. High-Strength Threaded Fasteners: Heavy hexagon structural bolts, heavy hexagon nuts, and hardened washers, as follows:

1. Quenched and tempered medium-carbon steel bolts, nuts, and washers, complying with ASTM A 325.

a. Where indicated as galvanized, provide units that are zinc coated,

either mechanically deposited complying with ASTM B 695, Class 50, or hot-dip galvanized complying with ASTM A 153.

H. Electrodes for Welding: Comply with AWS Code.

I. Structural Steel Primer Paint: Fabricator's standard rust-inhibiting primer.

J. Nonmetallic Shrinkage-Resistant Grout: Premixed, nonmetallic, noncorrosive, nonstaining product containing selected silica sands, Portland cement, shrinkage compensating agents, plasticizing and water-reducing agents, complying with CE-CRD-C621.

2.2 FABRICATION

A. Shop Fabrication and Assembly: Fabricate and assemble structural assemblies in shop to greatest extent possible. Fabricate items of structural steel in accordance with AISC Specifications and as indicated on final shop drawings. Provide camber in structural members where indicated.

1. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence that will expedite erection and minimize field handling of materials.
2. Where finishing is required, complete assembly, including welding of units, before start of finishing operations. Provide finish surfaces of members exposed in final structure free of markings, burrs, and other defects.

B. Connections: Weld or bolt shop connections, as indicated.

C. Bolt field connections, except where welded connections or other connections are indicated.

1. Provide high-strength threaded fasteners for principal bolted connections, except where unfinished bolts are indicated.
2. Provide unfinished threaded fasteners for only bolted connections of secondary framing members to primary members (including purlins, girts, and other framing members taking only nominal stresses) and for temporary bracing to facilitate erection.

D. High-Strength Bolted Construction: Install high-strength threaded fasteners in accordance with AISC "Specifications for Structural Joints using ASTM A 325 or A 490 Bolts."

- E. Welded Construction: Comply with AWS Code for procedures, appearance and quality of welds, and methods used in correcting welding work.
- F. Assemble and weld built-up sections by methods that will produce true alignment of axes without warp.
- G. Holes for Other Work: Provide holes required for securing other work to structural steel framing and for passage of other work through steel framing members, as shown on final shop drawings.
- H. Provide threaded nuts welded to framing and other specialty items as indicated to receive other work.
- I. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame-cut holes or enlarge holes by burning. Drill holes in bearing plates.
- J. Expansion Joints: Provide expansion joints in steel shelf angles when part of structural steel frame; locate at vertical brick expansion joints as indicated on drawings.

2.3 SHOP PAINTING

- A. General: Shop-paint structural steel, except those members or portions of members to be embedded in concrete or mortar. Paint embedded steel that is partially exposed on exposed portions and initial 2 inches of embedded areas only.
1. Do not paint surfaces to be welded or high-strength bolted with friction-type connections.
 2. Do not paint surfaces scheduled to receive sprayed-on fireproofing.
- B. Painting: Provide a one-coat, shop-applied paint system complying with Steel Structures Painting Council (SSPC) Paint System Guide No. 7.00.

2.4 SOURCE QUALITY CONTROL

- A. General: Materials and fabrication procedures are subject to inspection and tests in mill, shop, and field, conducted by a qualified inspection agency. Such inspections and tests will not relieve Contractor of responsibility for providing materials and fabrication procedures in compliance with

specified requirements.

1. Promptly remove and replace materials or fabricated components that do not comply.

B. Design of Members and Connections: Details shown are typical; similar details apply to similar conditions, unless otherwise indicated. Verify dimensions at site whenever possible without causing delay in the work.

1. Promptly notify Engineer whenever design of members and connections for any portion of structure are not clearly indicated.

PART 3 - EXECUTION

3.1 ERECTION

A. Temporary Shoring and Bracing: Provide temporary shoring and bracing members with connections of sufficient strength to bear imposed loads. Remove temporary members and connections when permanent members are in place and final connections are made. Provide temporary guy lines to achieve proper alignment of structures as erection proceeds.

B. Temporary Planking: Provide temporary planking and working platforms as necessary to effectively complete work.

C. Setting Bases and Bearing Plates: Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean bottom surface of base and bearing plates.

1. Set loose and attached base plates and bearing plates for structural members on wedges or other adjusting devices.

2. Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims, but if protruding, cut off flush with edge of base or bearing plate prior to packing with grout.

3. Pack grout solidly between bearing surfaces and bases or plates to ensure that no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure.

4. For proprietary grout materials, comply with manufacturer's instructions.

D. Field Assembly: Set structural frames accurately to lines and

elevations indicated. Align and adjust various members forming part of complete frame or structure before permanently fastening. Clean bearing surfaces and other surfaces that will be in permanent contact before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

E.Level and plumb individual members of structure within specified AISC tolerances.

F.Splice members only where indicated and accepted on shop drawings.

G.Erection Bolts: On exposed welded construction, remove erection bolts, fill holes with plug welds, and grind smooth at exposed surfaces.

1.Comply with AISC Specifications for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.

2.Do not enlarge unfair holes in members by burning or by using drift pins, except in secondary bracing members. Ream holes that must be enlarged to admit bolts.

H.Gas Cutting: Do not use gas cutting torches in field for correcting fabrication errors in primary structural framing. Cutting will be permitted only on secondary members that are not under stress, as acceptable to Engineer. Finish gas-cut sections equal to a sheared appearance when permitted.

I.Touch-Up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint. Apply paint to exposed areas using same material as used for shop painting.

1.Apply by brush or spray to provide minimum dry film thickness of 1.5 mils.

3.2QUALITY CONTROL

A.Engage an independent testing and inspection agency to inspect high-strength bolted connections and welded connections and to perform tests and prepare test reports.

B.Testing agency shall conduct and interpret tests, state in each report whether test specimens comply with requirements, and specifically state any deviations therefrom.

C.Provide access for testing agency to places where structural steel

work is being fabricated or produced so that required inspection and testing can be accomplished.

D. Testing agency may inspect structural steel at plant before shipment.

E. Correct deficiencies in structural steel work that inspections and laboratory test reports have indicated to be not in compliance with requirements. Perform additional tests, at Contractor's expense, as necessary to reconfirm any noncompliance of original work and to show compliance of corrected work.

F. Shop-Bolted Connections: Inspect or test in accordance with AISC specifications.

1. Verify that gaps of installed Direct Tension Indicators are less than gaps specified in ASTM F 959, Table 2.

G. Shop Welding: Inspect and test during fabrication of structural steel assemblies, as follows:

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. Perform visual inspection of all welds.

3. Perform tests of welds as follows. Inspection procedures listed are to be used at Contractor's option.

a. Liquid Penetrant Inspection: ASTM E 165.

b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration not acceptable.

c. Radiographic Inspection: ASTM E 94 and ASTM E 142; minimum quality level "2-2T."

d. Ultrasonic Inspection: ASTM E 164.

H. Field-Bolted Connections: Inspect in accordance with AISC specifications.

1. For Direct Tension Indicators, comply with requirements of ASTM F 959. Verify that gaps are less than gaps specified in Table 2.

I. Field Welding: Inspect and test during erection of structural steel as follows:

1. Certify welders and conduct inspections and tests as required.

2275-1

Record types and locations of defects found in work.
Record work required and performed to correct deficiencies.

2.Perform visual inspection of all welds.

3.Perform tests of welds as follows:

a.Liquid Penetrant Inspection: ASTM E 165.

b.Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration not acceptable.

c.Radiographic Inspection: ASTM E 94 and ASTM E 142; minimum quality level "2-2T."

d.Ultrasonic Inspection: ASTM E 164.

END OF SECTION 05120

SECTION 05220 - STEEL JOISTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes steel joists and joist girders for floor and roof framing. Types of joists required include the following:

1. LH and K Series Open Web Steel Joists.

B. Refer to Division 4 Sections for installation of anchors set in masonry.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data and installation instructions for each type of joist and accessories.

1. Include manufacturer's certification that joists comply with SJI "Specifications."

C. Shop drawings showing layout of joist members, special connections, joining and accessories. Include mark, number, type, location and spacing of joists and bridging.

1. Provide templates or location drawings for installation of anchor bolts and metal bearing plates.

1.4 QUALITY ASSURANCE

A. General: Provide joists fabricated in compliance with Steel Joist Institute (SJI) "Standard Specifications, Load Tables and

Weight Tables for Steel Joists and Joist Girders."

B. Qualification of Field Welding: Qualify welding processes and welding operators in accordance with American Welding Society (AWS) "Structural Welding Code - Steel," AWS D1.1.

C. Inspection: Inspect joists and girders in accordance with SJI "Specifications."

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver, store and handle steel joists as recommended in SJI "Specifications." Handle and store joists in a manner to avoid deforming members and to avoid excessive stresses.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Steel: Comply with SJI "Specifications" for chord and web sections.

B. Steel Bearing Plates: ASTM A 36.

C. Unfinished Threaded Fasteners: ASTM A 307, Grade A, regular hexagon type, low carbon steel.

D. Steel Prime Paint: Comply with SJI "Specifications."

2.2 FABRICATION

A. General: Fabricate steel joists in accordance with SJI "Specification."

B. Holes in Chord Members: Provide holes in chord members where shown for securing other work to steel joists; however, deduct area of holes from the area of chord when calculating strength of member.

C. Extended End: Provide extended ends on joists where indicated, complying with SJI "Specifications" and load tables.

D. Top Chord Extension: Provide top chord extensions ("S" type) on joists where indicated, complying with SJI "Specifications" and load tables.

E.Bridging: Provide horizontal or diagonal type bridging for joists and joist girders, complying with SJI "Specifications."

1.Provide bridging anchors for ends of bridging lines terminating at walls or beams.

F.End Anchorage: Provide end anchorages, including steel bearing plates, to secure joists to adjacent construction, complying with SJI "Specifications."

G.Header Units: Provide header units to support tail joists at openings in floor or roof system not framed with steel shapes.

H.Shop Painting: Remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories before application of shop paint.

1.Apply one shop coat of steel prime paint to joists and accessories, by spraying, dipping, or other method to provide a continuous dry paint film thickness of not less than 0.50 mil.

PART 3 - EXECUTION

3.1ERECTION

A. Place and secure steel joists in accordance with SJI "Specifications," final shop drawings, and as herein specified.

B.Anchors: Furnish anchor bolts, steel bearing plates, and other devices to be built into concrete and masonry construction.

1.Provide unfinished threaded fasteners for anchor bolts, unless high strength bolts indicated.

C.Placing Joists: Do not start placement of steel joists until supporting work is in place and secured. Place joists on supporting work, adjust and align in accurate locations and spacing before permanently fastening.

D.Provide temporary bridging, connections, and anchors to ensure lateral stability during construction.

1.Where "open-web" joist lengths are 40 feet and longer, install a

center row of bolted bridging to provide lateral stability before slackening of hoisting lines.

E.Bridging: Install bridging simultaneously with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords where terminating at walls or beams.

F.Fastening Joists: Comply with the following:

1.Field weld joists to supporting steel framework and steel bearing plates where indicated in accordance with SJI "Specifications" for type of joists used. Coordinate welding sequence and procedure with placing of joists.

G.Touch-Up Painting: After joist installation, wire brush welded areas, abraded or rusty surfaces, and clean with solvent. Paint field-applied bolt heads and nuts and prepared surfaces on joists and steel supporting members. Use same type of paint as used for shop painting.

END OF SECTION 05220

SECTION 05310 - STEEL DECK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes steel deck units for floor and roof applications.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

1. Product data including manufacturer's specifications and installation instructions for each type of decking and accessories.

a. Provide test data for mechanical fasteners used in lieu of welding for fastening deck to supporting structures.

2. Shop drawings showing layout and types of deck units, anchorage details, and conditions requiring closure strips, supplementary framing, cant strips, cut openings, special jointing, and other accessories.

1.4 QUALITY ASSURANCE

A. Codes and Standards: Comply with provisions of the following codes and standards, except as otherwise indicated:

1. American Iron and Steel Institute (AISI), "Specification for the Design of Cold-Formed Steel Structural Members."

2. American Welding Society (AWS), D1.3 "Structural Welding Code - Sheet Steel."

3. Steel Deck Institute (SDI), "Design Manual for Composite Decks, Form Decks and Roof Decks."

B. Qualification of Field Welding: Use qualified welding processes and welding operators in accordance with "Welder Qualification" procedures of AWS.

1. Welded decking in place is subject to inspection and testing. Owner will bear expense of removing and replacing portions of decking for testing purposes if welds are found to be satisfactory. Remove work found to be defective and replace with new acceptable work.

C. FM Listing: Provide steel roof deck units that have been evaluated by Factory Mutual System and are listed in "Factory Mutual Approval Guide" for "Class I" fire-rated construction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Bowman Metal Deck Div., Cyclops Corp.
2. Consolidated Systems, Inc.
3. Epic Metals Corp.
4. Marlyn Steel Products, Inc.
5. H. H. Robertson Co.
6. Roll Form Products, Inc.
7. Roof Deck, Inc.
8. United Steel Deck, Inc.
9. Vulcraft Div., Nucor Corp.
10. Wheeling Corrugating Co.

2.2 MATERIALS

A. Steel for Painted Metal Deck Units: ASTM A 611, grade as required to comply with SDI specifications.

B. Steel for Galvanized Metal Deck Units: ASTM A 446, grade as required to comply with SDI specifications.

C. Miscellaneous Steel Shapes: ASTM A 36.

D. Sheet Metal Accessories: ASTM A 526, commercial quality, galvanized.

2275-1

E.Galvanizing: ASTM A 525, G60.

F.Galvanizing Repair: Where galvanized surfaces are damaged, prepare surfaces and repair in accordance with procedures specified in ASTM A 780.

G.Paint: Manufacturer's baked-on, rust-inhibitive paint, for application to metal surfaces that have been chemically cleaned and phosphate chemical treated.

H.Flexible Closure Strips: Manufacturer's standard vulcanized, closed-cell, synthetic rubber.

I.Acoustic Sound Barrier Closures: Manufacturer's standard mineral fiber closures.

J.Sump pans for roof drains.

2.3FABRICATION

A.General: Form deck units in lengths to span three or more supports, with flush, telescoped, or nested 2-inch laps at ends and interlocking or nested side laps, of metal thickness, depth, and width as indicated.

B.Roof Deck Units: Provide deck configurations that comply with SDI "Specifications and Commentary for Steel Roof Deck."

PART 3 - EXECUTION

3.1INSTALLATION

A.General: Install deck units and accessories in accordance with manufacturer's recommendations, shop drawings, and as specified herein.

B.Place deck units on supporting steel framework and adjust to final position with ends accurately aligned and bearing on supporting members before being permanently fastened. Do not stretch or contract side lap interlocks.

C.Place deck units flat and square, secured to adjacent framing without warp or deflection.

D.Do not place deck units on concrete supporting structure until concrete has cured and is dry.

E.Coordinate and cooperate with structural steel erector in locating decking bundles to prevent overloading of structural members.

F.Fastening Deck Units:

- 1.Fasten roof deck units to steel supporting members by not less than 5/8-inch-diameter puddle welds or elongated welds of equal strength, spaced not more than 12 inches at every support, and at closer spacing where indicated. In addition, secure deck to each supporting member in ribs where side laps occur.
- 2.Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work.
- 3.Mechanical fasteners, either powder-actuated or pneumatically driven, may be used in lieu of welding. Locate mechanical fasteners and install in accordance with deck manufacturer's instructions.
- 4.Mechanically fasten side laps of adjacent deck units between supports, at intervals not exceeding 36 inches o.c., using self-tapping No. 10 screws.
- 5.Uplift Loading: Install and anchor roof deck units to resist gross uplift loading of 45 lbs. psf at eave overhang and 30 lbs. psf for other roof areas.

G.Cutting and Fitting: Cut and neatly fit deck units and accessories around other work projecting through or adjacent to the decking, as shown.

H. Reinforcement at Openings: Provide additional metal reinforcement and closure pieces as required for strength, continuity of decking, and support of other work shown.

I.Closure Strips: Provide metal closure strips at open uncovered ends and edges of roof decking and in voids between decking and other construction. Weld into position to provide a complete decking installation.

- 1.Provide flexible closure strips instead of metal closures, at Contractor's option, wherever their use will ensure complete closure. Install with adhesive in accordance with manufacturer's instructions.

J.Touch-Up Painting: After decking installation, wire brush, clean, and paint scarred areas, welds, and rust spots on top and bottom surfaces of decking units and supporting steel members.

2275-1

- 1.Touch-up galvanized surfaces with galvanizing repair paint applied in accordance with manufacturer's instructions.
 - 2.Touch-up painted surfaces with same type of shop paint used on adjacent surfaces.
- K.In areas where shop-painted surfaces are to be exposed, apply touch-up paint to blend into adjacent surfaces.

END OF SECTION 05310

SECTION 05500 - METAL FABRICATIONS

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 metal fabrications:

1. Rough hardware.
2. Loose steel lintels.
3. Roof ladder.
4. Equipment mezzanine ladder.
5. Loose bearing plates.
6. Steel pipe railing.
7. Miscellaneous Steel Plate and Angles

1.3 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Shop drawings detailing fabrication and erection of each metal fabrication indicated. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide templates for anchors and bolts specified for installation under other Sections.

1.4 QUALITY ASSURANCE

A. Fabricator Qualifications: Firm experienced in producing metal fabrications similar to those indicated for this Project with a record of successful in-service performance, and with sufficient production capacity to produce required units without delaying the Work.

B.Welding Standards: Comply with applicable provisions of AWS D1.1 "Structural Welding Code--Steel," AWS D1.2 "Structural Welding Code--Aluminum," and AWS D1.3 "Structural Welding Code--Sheet Steel."

1. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

1.5PROJECT CONDITIONS

A.Field Measurements: Check actual locations of walls and other construction to which metal fabrications must fit by accurate field measurements before fabrication. Show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PART 2 - PRODUCTS

2.1FERROUS METALS

A.Metal Surfaces, General: For metal fabrications exposed to view in the completed Work, provide materials selected for their surface flatness, smoothness, and freedom from surface blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

B.Steel Plates, Shapes, and Bars: ASTM A 36.

C.Steel Pipe: ASTM A 53, standard weight (schedule 40), unless otherwise indicated, or another weight required by structural loads.

1.Black finish, unless otherwise indicated.

D.Cast-in-Place Anchors in Concrete: Anchors of type indicated below, fabricated from corrosion-resistant materials capable of sustaining, without failure, the load imposed within a safety factor of 4, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.

1.Threaded or wedge type; galvanized ferrous castings, either ASTM A 47 (ASTM A 47M) malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as required,

hot-dip galvanized per ASTM A 153.

E. Welding Rods and Bare Electrodes: Select according to AWS specifications for the metal alloy to be welded.

2.2 PAINT

A. Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with performance requirements of FS TT-P-664, selected for good resistance to normal atmospheric corrosion, compatibility with finish paint systems indicated, and capability to provide a sound foundation for field-applied topcoats despite prolonged exposure.

B. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in galvanized steel, with dry film containing not less than 94 percent zinc dust by weight, and complying with DOD-P-21035 or SSPC-Paint 20.

2.3 FASTENERS

A. General: Provide plated fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating, for exterior use or where built into exterior walls. Select fasteners for the type, grade, and class required.

B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A (ASTM F 568, Property Class 4.6), with hex nuts, ASTM A 563 (ASTM A 563M), and, where indicated, flat washers.

C. Machine Screws: ANSI B18.6.3.

D. Lag Bolts: ANSI B18.2.1 (ANSI B18.2.3.8M).

E. Wood Screws: Flat head, carbon steel, ANSI B18.6.1.

F. Plain Washers: Round, carbon steel, ANSI B18.22.1 (ANSI B18.22M).

G. Lock Washers: Helical, spring type, carbon steel, ANSI B18.21.1.

2.4 GROUT

A. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for

interior and exterior applications.

B.Products: Subject to compliance with requirements, provide one of the following:

1.Nonshrink, Nonmetallic Grouts:

- a.B-6 Construction Grout; W. R. Bonsal Co.
- b.Diamond-Crete Grout; Concrete Service Materials Co.
- c.Supreme; Cormix Construction Chemicals.
- d.Sure-grip High Performance Grout; Dayton Superior Corp.
- e.Euco N-S Grout; Euclid Chemical Co.
- f.Five Star Grout; Five Star Products.
- g.Vibropruf #11; Lambert Corp.
- h.Crystex; L & M Construction Chemicals, Inc.
- i.Masterflow 928 and 713; Master Builders Technologies, Inc.
- j.Sealtight 588 Grout; W. R. Meadows, Inc.
- k.SonogROUT 14; Sonneborn Building Products--ChemRex, Inc.
- l.Kemset; The Spray-Cure Company.

2.5 FABRICATION, GENERAL

A.Form metal fabrications from materials of size, thickness, and shapes indicated but not less than that needed to comply with performance requirements indicated. Work to dimensions indicated or accepted on shop drawings, using proven details of fabrication and support. Use type of materials indicated or specified for various components of each metal fabrication.

B.Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges.

C.Shear and punch metals cleanly and accurately. Remove burrs.

D.Ease exposed edges to a radius of approximately 1/32 inch (1 mm), unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

E.Remove sharp or rough areas on exposed traffic surfaces.

F.Weld corners and seams continuously to comply with the following:

- 1.Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
- 2.Obtain fusion without undercut or overlap.
- 3.Remove welding flux immediately.

4. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing, and contour of welded surface matches those adjacent.
- G. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.
- H. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
- I. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

2.6 ROUGH HARDWARE

- A. Furnish bent, or otherwise custom-fabricated, bolts, plates, anchors, hangers, dowels, and other miscellaneous steel and iron shapes as required for framing and supporting woodwork, and for anchoring or securing woodwork to concrete or other structures. Straight bolts and other stock rough hardware items are specified in Division 6 Sections.
- B. Fabricate items to sizes, shapes, and dimensions required. Furnish malleable-iron washers for heads and nuts that bear on wood structural connections, and furnish steel washers elsewhere.

2.7 LOOSE STEEL LINTELS

- A. Fabricate loose structural steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated.
- B. Weld adjoining members together to form a single unit where indicated.
- C. Size loose lintels for equal bearing of 1 inch per foot (85 mm per meter) of clear span but not less than 8 inches (200 mm)

bearing at each side of openings, unless otherwise indicated.

D. Galvanize loose steel lintels located in exterior walls.

2.8 STEEL LADDERS

A. General: Fabricate ladders for the locations shown, with dimensions, spacings, details and anchorages as indicated. Comply with requirements of ANSI A14.3.

B. Siderails: Continuous steel flat bars, 1/2 inch x 2-1/2 inches, with eased edges, spaced 18 inches apart.

C. Bar Rungs: Round steel bars, 3/4 inch diameter, spaced 12 inches o.c.

D. Fit rungs in centerline of side rails, plug weld and grind smooth on outer rail faces.

E. Support each ladder at top and bottom and at intermediate points spaced not more than 4'-0" o.c. by means of welded or bolted steel brackets.

1. Size brackets to support design dead and live loads indicated and to hold centerline of ladder rungs clear of the wall surface by not less than 7 inches.

2. Extend side rails 42 inches above top rung, and return rails to wall or structure unless other secure handholds are provided. If the adjacent structure does not extend above the top rung, goose-neck the extended rails back to the structure to provide secure ladder access.

2.9 LOOSE BEARING PLATES

A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction, made flat, free from warps or twists, or of required thickness and bearing area. Drill plates to receive anchor bolts and for grouting as required.

2.10 STEEL PIPE RAILINGS AND HANDRAILS

A. General: Fabricate pipe railings and handrails to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of pipe, post spacings, and anchorage, but not less than that required to support structural loads.

B. Interconnect railing and handrail members by butt-welding or welding with internal connectors, at fabricator's option, unless otherwise indicated.

1. At tee and cross intersections, notch ends of intersecting members to fit contour of pipe to which end is joined and weld all around.

C. Form changes in direction of railing members as follows:

1. By insertion of prefabricated elbow fittings.

2. By radius bends of radius indicated.

3. By mitering at elbow bends.

4. By bending.

5. By any method indicated above, applicable to change of direction involved.

D. Form simple and compound curves by bending pipe in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross-section of pipe throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of pipe.

E. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated.

F. Close exposed ends of pipe by welding 3/16 inch thick steel plate in place or by use of prefabricated fittings, except where clearance of end of pipe and adjoining wall surface is 1/4 inch or less.

G. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnections of pipe and attachment of railings and handrails to other work. Furnish inserts and other anchorage devices for connecting railings and handrails to concrete or masonry work.

1. For railing posts set in concrete fabricate sleeves from steel pipe not less than 6 inches long and with an inside diameter not less than 1/2 inch greater than the outside diameter of post, with steel plate closure welded to bottom of sleeve.

a. Provide friction fit, removable covers designed to keep sleeves clean and hold top edge of sleeve 1/2 inch below finished surface of concrete.

H.Fillers: Provide steel sheet or plate fillers of thickness and size indicated or required to support structural loads of handrails where needed to transfer wall bracket loads through wall finishes to structural supports. Size fillers to suit wall finish thicknesses. Size fillers to produce adequate bearing to prevent bracket rotation and overstressing of substrate.

I.For interior steel railings formed from steel pipe with black finish, provide nongalvanized ferrous metal fittings, brackets, fasteners, and sleeves, except galvanize anchors embedded in exterior masonry and concrete construction.

2.11FINISHES, GENERAL

A.Comply with NAAMM "Metal Finishes Manual" for recommendations relative to applying and designing finishes.

B.Finish metal fabrications after assembly.

2.12STEEL AND IRON FINISHES

A.Galvanizing: For those items indicated for galvanizing, apply zinc coating by the hot-dip process complying with the following requirements:

- 1.ASTM A 153 for galvanizing iron and steel hardware.
- 2.ASTM A 123 for galvanizing both fabricated and unfabricated iron and steel products made of uncoated rolled, pressed, and forged shapes, plates, bars, and strip 0.0299 inch (0.76 mm) thick or thicker.

B.Preparation for Shop Priming: Prepare uncoated ferrous metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications:

C.Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes or to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with requirements of SSPC-PA 1 "Paint Application Specification No. 1" for shop painting.

- 1.Stripe paint corners, crevices, bolts, welds, and sharp edges.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installing anchorages, including concrete inserts, sleeves, anchor bolts, and miscellaneous items having integral anchors that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.
- B. Set sleeves in concrete with tops flush with finish surface elevations. Protect sleeves from water and concrete entry.

3.2 INSTALLATION, GENERAL

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction. Include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors as required.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing miscellaneous metal fabrications. Set metal fabrication accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete masonry or similar construction.
- D. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop-welded because of shipping size limitations. Do not weld, cut, or abrade the surfaces of exterior units that have been hot-dip galvanized after fabrication and are intended for bolted or screwed field connections.
- E. Field Welding: Comply with the following requirements:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.

2275-1

3.Remove welding flux immediately.

4.At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing, and contour of welded surface matches those adjacent.

3.3SETTING LOOSE PLATES

A.Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of bearing plates.

3.4ADJUSTING AND CLEANING

A.Touch-up Painting: Cleaning and touch-up painting of field welds, bolted connections, and abraded areas of the shop paint on miscellaneous metal is specified in Division 9 Section "Painting."

B.For galvanized surfaces, clean welds, bolted connections, and abraded areas, and apply galvanizing repair paint to comply with ASTM A 780.

END OF SECTION 05500

SECTION 06100 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Wood grounds, nailers, and blocking.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 6 Section "Finish Carpentry".

1.3 DEFINITIONS

- A. Rough carpentry includes carpentry work not specified as part of other Sections and generally not exposed, unless otherwise specified.

1.4 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product data for the following products:
- C. Wood treatment data as follows including chemical treatment manufacturer's instructions for handling, storing, installation, and finishing of treated material:
 - 1. For fire-retardant-treated wood products include certification by treating plant that treated material complies with specified standard and other requirements.

1.5 QUALITY ASSURANCE

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery and Storage: Keep materials under cover and dry. Protect against exposure to weather and contact with damp or

wet surfaces. Stack lumber as well as plywood and other panels; provide for air circulation within and around stacks and under temporary coverings including polyethylene and similar materials.

PART 2 - PRODUCTS

2.1 LUMBER, GENERAL

- A. Lumber Standards: Furnish lumber manufactured to comply with PS 20 "American Softwood Lumber Standard" and with applicable grading rules of inspection agencies certified by American Lumber Standards Committee's (ALSC) Board of Review.
- B. Grade Stamps: Provide lumber with each piece factory-marked with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.
- C. Nominal sizes are indicated, except as shown by detail dimensions. Provide actual sizes as required by PS 20, for moisture content specified for each use.
 - 1. Provide dressed lumber, S4S, unless otherwise indicated.
 - 2. Provide seasoned lumber with 19 percent maximum moisture content at time of dressing and shipment for sizes 2 inches or less in nominal thickness, unless otherwise indicated.

2.2 DIMENSION LUMBER

- A. For light framing (2 to 4 inches thick, 2 to 4 inches wide) provide the following grade and species:
 - 1. "Standard" grade.
 - 2. Any species graded under WWPA or WCLIB rules.

2.3 MISCELLANEOUS LUMBER

- A. General: Provide lumber for support or attachment of other construction including rooftop equipment curbs and support bases, cant strips, bucks, nailers, blocking, furring, grounds, stripping, and similar members.
- B. Fabricate miscellaneous lumber from dimension lumber of sizes indicated and into shapes shown.
- C. Moisture content: 19 percent maximum for lumber items not specified to receive wood preservative treatment.

- D. Grade: "Standard" grade light-framing-size lumber of any species or board-size lumber as required. "No. 3 Common" or "Standard" grade boards per WCLIB or WWPA rules or "No. 2 Boards" per SPIB rules.

2.6 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. Where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with a hot-dip zinc coating per ASTM A 153.
- B. Nails, Wire, Brads, and Staples: FS FF-N-105.
- C. Power Driven Fasteners: National Evaluation Report NER-272.
- D. Wood Screws: ANSI B18.6.1.
- E. Lag Bolts: ANSI B18.2.1.
- F. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and where indicated, flat washers.

2.7 MISCELLANEOUS MATERIALS

- A. Adhesives for Field Gluing Panels to Framing: Formulation complying with APA AFG-01 that is approved for use with type of construction panel indicated by both adhesive and panel manufacturer.

2.8 PRESERVATIVE WOOD TREATMENT BY PRESSURE PROCESS

- A. General: Where lumber or plywood is indicated as preservative-treated wood or is specified herein to be treated, comply with applicable requirements of AWPA Standards C2 (Lumber) and C9 (Plywood). Mark each treated item with the AWPB or SPIB Quality Mark Requirements.
- B. Pressure-treat above-ground items with water-borne preservatives to a minimum retention of 0.25 pcf. For interior uses, after treatment, kiln-dry lumber and plywood to a maximum moisture content, respectively, of 19 percent and 15 percent. Treat indicated items and the following:
 - 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.

2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
3. Wood floor plates installed over concrete slabs directly in contact with earth.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Discard units of material with defects that impair quality of rough carpentry construction and that are too small to use in fabricating rough carpentry with minimum joints or optimum joint arrangement.
- B. Set rough carpentry to required levels and lines, with members plumb and true to line and cut and fitted.
- C. Fit rough carpentry to other construction; scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds, and similar supports to allow attachment of other construction.
- D. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated.
- E. Countersink nail heads on exposed carpentry work and fill holes.
- F. Use common wire nails, unless otherwise indicated. Use finishing nails for finish work. Select fasteners of size that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting of wood; predrill as required.

3.2 WOOD GROUNDS, NAILERS, BLOCKING, AND SLEEPERS

- A. Install wood grounds, nailers, blocking, and sleepers where shown and where required for screeding or attachment of other work. Form to shapes as shown and cut as required for true line and level of work to be attached. Coordinate location with other work involved.
- B. Attach to substrates as required to support applied loading. Countersink bolts and nuts flush with surfaces, unless otherwise indicated. Build into masonry during installation of masonry work. Where possible, anchor to formwork before concrete placement.

END OF SECTION 06100

SECTION 06160 - SHEATHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Wall sheathing.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Capable of demonstrating that all wood procurement operations are conducted in accordance with procedures and policies of the Sustainable Forestry Initiative (SFI) Program.
- B. Code Compliance: Comply with requirements of the following:
 - 1. International Code Council Evaluation Service, ICC-ES ESR-1785.
 - 2. Voluntary Product Standard, DOC PS2-10, "Performance Standard for Wood-Based Structural-Use Panels."

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Outdoor Storage: Comply with manufacturer's recommendations:
 - 1. Set panel bundles on supports to keep off ground.

2. Cover panels loosely with waterproof protective material.
3. Anchor covers on top of stack, but keep away from sides and bottom to assure adequate air circulation.
4. When high moisture conditions exist, cut banding on panel stack to prevent edge damage.

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of flooring and sheathing system that fail due to manufacturing defects within specified warranty period.
 1. For subflooring and roof and wall sheathing applications, manufacturer shall warrant that the panels will not delaminate nor require sanding due to moisture absorption during installation within 500 days of purchase.
 2. Warranty Period: Lifetime beginning at date of Substantial Completion.

PART 2 - PRODUCTS

2.1 WALL SHEATHING

- A. PLYWOOD

A. Comply with PS 1.

B. Bear the mark of a recognized association or independent inspection agency that maintains continuing control over quality of plywood which identifies compliance by veneer grade, group number, span rating where applicable, and glue type.

C. Sheathing:

1. APA rated Exposure 1 or Exterior; panel grade CD or better.

2. Wall sheathing:

a. Minimum 12 mm (15/32 inch) thick with supports 610 mm (24 inches) on center unless specified otherwise.

b. Minimum 1200 mm (48 inches) wide at corners without corner bracing of framing.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.

C. Securely attach to substrate by fastening as indicated, complying with the following:

1. Chapter 23 in the ICC's International Building Code.
2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate

Attachments," in the ICC's International Residential Code for One- and Two-Family Dwellings.

3. ICC-ES evaluation report for fastener.
- D. Use common wire nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.
- E. Coordinate [**wall**] [**and**] [**roof**] sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

END OF SECTION 06100

SECTION 07210 - BUILDING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Foundation wall insulation.
 - 2. Board wall insulation at exterior existing walls.
 - 3. Safing insulation.
 - 4. Building insulation in batt form.
 - 5. Sound attenuation blankets.

- B. Related Sections: The following sections contain requirements that relate to this section:
 - 1. Division 4 Section "Unit Masonry" for polystyrene board insulation installed in cavity walls.
 - 2. Division 7 Roofing Section indicated below for roof insulation specified as part of roofing construction:
 - 3. Division 9 Section indicated below for thermal insulation and sound attenuation insulation installed as part of metal-framed wall and partition assemblies:

1.3 DEFINITIONS

- A. Thermal Resistivity: Where the thermal resistivity of insulation products are designated by "r-values," they represent the reciprocal of thermal conductivity (k-values). Thermal conductivity is the rate of heat flow through a homogenous material exactly 1 inch thick. Thermal resistivities are expressed by the temperature difference in degrees F between the two exposed faces required to cause one BTU to flow through one square foot per hour at mean temperatures indicated.

1.4 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

- B. Product data for each type of insulation product specified.

1.5 QUALITY ASSURANCE

- A. Fire Performance Characteristics: Provide insulation materials identical to those whose indicated fire performance characteristics have been determined per the ASTM test method indicated below, by UL or other testing and inspecting organizations acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing and inspecting organization.
- B. Single-Source Responsibility for Insulation Products: Obtain each type of building insulation from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's recommendations for handling, storage, and protection during installation.
- B. Protect plastic insulation as follows:
 - 1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
 - 2. Protect against ignition at all times. Do not deliver plastic insulating materials to project site ahead of installation time.
 - 3. Complete installation and concealment of plastic materials as rapidly as possibly in each area of construction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide insulation products of one of the following:
 - 1. Extruded Polystyrene Board Insulation:
 - a. Amoco Foam Products Co.
 - b. DiversiFoam Products.
 - c. Dow: The Dow Chemical Company.
 - d. UC Industries, Inc.

2. Manufacturers of Glass Fiber Insulation:

- a. CertainTeed Corp.
- b. Knauf Fiber Glass GmgH.
- c. Manville Building Insulations Div., Manville Sales Corp.
- d. Owens/Corning Fiberglass Corp.

2.2 INSULATING MATERIALS

- A. General: Provide insulating materials that comply with requirements and with referenced standards.
- B. Extruded Polystyrene Board Insulation: Rigid, cellular polystyrene thermal insulation with closed-cells and integral high density skin, formed by the expansion of polystyrene base resin in an extrusion process to comply with ASTM C 578 for type indicated; with 5-year aged r-values of 5.4 and 5 at 40 and 75 deg F (4.4 and 23.9 deg C), respectively; and as follows:
 1. Type IV, 1.6 pcf min. density, unless otherwise indicated.
 2. Surface Burning Characteristics: Maximum flame spread and smoke developed values of 75 and 450, respectively.
- C. Sound Attenuation Blankets: FS HH-I-521 Type I; Semi-Rigid Mineral Fiber Blanket without membrane, Class 25 Flame-Spread, thickness to be 3-5/8" and 6".
- D. Faced Mineral Fiber Blanket/Batt Insulation: Thermal insulation produced by combining mineral fibers of type described below with thermosetting resins to comply with ASTM C 665 for Type III, Class A (blankets with reflective vapor-retarder membrane facing with flame spread of 25 or less); scrim-kraft vapor-retarder membrane on one face, and as follows:
 1. Mineral Fiber Type: Fibers Manufactured from glass.
 2. Surface Burning Characteristics: Maximum flame spread and smoke developed values of 25 and 50, respectively.

2.3 SAFING INSULATION AND ACCESSORIES

- A. Semi-Refractory Fiber Board Safing Insulation: Semi-rigid boards designed for use as a fire stop at openings between

top of wall and underside of deck, produced by combining semi-refractory mineral fiber manufactured from slag with thermosetting resin binders to comply with ASTM C 612, Class 1 and 2; nominal density of 4.0 pcf; passing ASTM E 136 for combustion characteristics; r-value of 4.0 at 75 deg F (23.9 deg C).

- B. Caulking Compound: Material approved by manufacturer of safing insulation for sealing joint between foil backing of safing insulation and edge of concrete floor slab against penetration of smoke.
- C. Safing Clips: Galvanized steel safing clips approved by manufacturer of safing insulation for holding safing insulation in place.

2.4 AUXILIARY INSULATING MATERIALS

- A. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation or mechanical anchors securely to substrates indicated without damaging or corroding either insulation, anchors, or substrates.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions with Installer present, for compliance with requirements of the Sections in which substrates and related work are specified and to determine if other conditions affecting performance of insulation are satisfactory. Do not proceed with installation of insulation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrates of substances harmful to insulations or vapor retarders, including removal of projections that might puncture vapor retarders.
- B. Close off openings in cavities receiving poured-in-place insulation to prevent the escape of insulation. Provide bronze or stainless steel screen (inside) where openings must be maintained for drainage or ventilation.

3.3 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's instructions

applicable to products and application indicated. If printed instructions are not available or do not apply to project conditions, consult manufacturer's technical representative for specific recommendations before proceeding with installation of insulation.

- B. Extend insulation full thickness as indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions, and fill voids with insulation. Remove projections that interfere with placement.
- C. Apply a single layer of insulation of required thickness, unless otherwise shown or required to make up total thickness.

3.4 INSTALLATION OF PERIMETER AND UNDER-SLAB INSULATION

- A. On vertical surfaces, set units in adhesive applied in accordance with manufacturer's instructions. Use type of adhesive recommended by manufacturer of insulation.

3.5 INSTALLATION OF GENERAL BUILDING INSULATION

- A. Apply insulation units to substrate by method indicated, complying with manufacturer's recommendations. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- B. Set vapor retarder faced units with vapor retarder to warm side of construction, except as otherwise indicated. Do not obstruct ventilation spaces, except for firestopping.
- C. Stuff glass fiber loose fill insulation into miscellaneous voids and cavity spaces where shown. Compact to approximately 40 percent of normal maximum volume (to a density of approximately 2.5 pcf).

3.6 PROTECTION

- A. General: Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation will be subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 07210

SECTION 07411 - METAL ROOF PANELS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Mechanically-seamed, standing seam metal roof panels, with related metal trim and accessories.

1.2 RELATED REQUIREMENTS

- A. Division 05 Section "Steel Decking" for continuous metal decking supporting metal panels.
- B. Division 07 Section ["Thermal Insulation"] ["Roof Insulation"] for thermal insulation installed under metal panels.
- C. Division 07 Section "Air Barriers" for air barriers within roof assembly and adjacent to roof assembly.
- D. Division 07 Section "Sheet Metal Flashing and Trim" for formed sheet metal copings, flashings, reglets, and roof drainage items in addition to items specified in this Section.
- E. Division 07 Section "Manufactured Roof Specialties" for manufactured copings, reglets, and roof drainage items in addition to items specified in this Section.
- F. Division 07 Section "[Joint Sealants](#)" for field-applied [Joint Sealants](#).

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 A 980 - Standard Specification for Steel, Sheet, Carbon, Ultra High Strength Cold Rolled.
 5. ASTM C 645 - Specification for Nonstructural Steel Framing Members.
 6. ASTM D 226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.

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 1592 - Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference.
11. ASTM E 1646 - Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference.
12. ASTM E 1680 - Standard Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems.
13. ASTM E 1980 - Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces.

D. International Accreditation Service (IAS):

1. IAS AC 472 - Accreditation Criteria for Inspection Programs for Manufacturers of Metal Building Systems, Part B.

E. Underwriters Laboratories, Inc. (UL): www.ul.com:

1. UL 580 - Tests for Uplift Resistance of Roof Assemblies

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 [certified by metal panel manufacturer] with minimum of five years experience with successfully completed projects of a similar nature and scope.

1. Installer's Field Supervisor: Experienced mechanic [certified by metal panel manufacturer] supervising work on site whenever work is underway.

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. 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 in materials and workmanship within one year from date of Substantial Completion.
- B. **Special Weathertightness Warranty:** On manufacturer's standard form, in which manufacturer agrees to repair or replace metal panel assemblies that fail to remain weathertight, including leaks, [without monetary limitation] within [20] years from date of Substantial Completion.
- C. 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 [10] Hunter units per ASTM D 2244.
 - b. Chalking in excess of No. [6] rating per ASTM D 4214.
 - c. Failure of adhesion, peeling, checking, or cracking.
 - 2. Modified Silicone-Polyester Two-Coat System:

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.mbc.com.
 - 1. **24ga. Battenlok HS panel w/ Striations.**

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. 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. Seismic Performance: Comply with ASCE 7, Section 9, "Earthquake Loads."
- C. Air Infiltration, ASTM E 1680: Maximum **0.25 cfm/sq. ft. (1.27 L/s per sq. m)** at static-air-pressure difference of **6.24 lbf/sq. ft. (300 Pa)**.
- D. Water Penetration Static Pressure, ASTM E 1646: No uncontrolled water penetration at a static pressure of **12 lbf/sq. ft. (575 Pa)**.
- E. 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.

2.3 METAL ROOF PANELS

- A. Mechanically-seamed, Concealed Fastener, Metal Roof Panels: Structural metal roof panel consisting of formed metal sheet with vertical ribs at panel edges, installed by lapping and mechanically interlocking edges of adjacent panels, and attaching panels to supports using concealed clips and fasteners in a weathertight installation.
1. Basis of Design: **MBCI, BattenLok HS**, www.mbc.com/battenlokHS.html.
 2. **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.
 3. **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.
 - a. Nominal Coated Thickness: **[24 gage]**.
 - b. Panel Surface: **Match Existing**
 - c. Exterior Finish: **[Fluoropolymer two-coat system]**
 - d. Color: **[Medium Bronze Match Existing]**.
 4. Panel Width: **[16 inches (406 mm)]**. Match Existing
 5. Panel Seam Height: **2 inch (50.8 mm)**.
 6. Joint Type: Mechanically seamed.

2.4 METAL ROOF PANEL ACCESSORIES

- A. General: Provide complete metal roof panel assembly incorporating trim, copings, fasciae, gutters and downspouts, and miscellaneous flashings, in **[manufacturer's standard profiles]** **[profiles as indicated]**. Provide required fasteners, closure strips, thermal spacers, splice plates, support plates, and sealants as indicated in manufacturer's written instructions.
- B. Flashing and Trim: Match material, thickness, and finish of metal panel face sheet.
- C. Panel Clips: Provide panel clip of type specified, at spacing indicated on approved shop drawings.
1. **Two-piece Floating**: ASTM C 645, with ASTM A 653/A 653M, **G90 (Z180)** hot-dip galvanized zinc coating, configured for concealment in panel joints, and identical to clips utilized in tests demonstrating compliance with performance requirements.

2. **Single-Piece Fixed:** ASTM A 653/A 653M, **G90 (Z180)** hot-dip galvanized zinc coating, configured for concealment in panel joints, and identical to clips utilized in tests demonstrating compliance with performance requirements.
- D. **Panel Fasteners:** Self-tapping screws and other acceptable corrosion-resistant fasteners recommended by roof panel manufacturer. Where exposed fasteners cannot be avoided, supply fasteners with EPDM or neoprene gaskets, with heads matching color of metal panels by means of factory-applied coating.
- E. **Joint Sealers:** Manufacturer's standard or recommended liquid and preformed sealers and tapes, and as follows:
 1. **Factory-Applied Seam Sealant:** Manufacturer's standard hot-melt type.
 2. **Tape Sealers:** Manufacturer's standard non-curing butyl tape, AAMA 809.2.
- F. **Steel Sheet Miscellaneous Framing Components:** ASTM C 645, with ASTM A 653/A 653M, **G60 (Z180)** hot-dip galvanized zinc coating.
- G. **Roof Accessories:** Approved by metal roof panel manufacturer. Refer to Section 07 72 00 "Roof Accessories" for requirements for roof accessories.
- H. **Snow Guards:** Approved by metal roof panel manufacturer. Seam Mounted Aluminum rods or bars held in place by stainless steel clamps attached to vertical ribs of standing seam roof.

2.5 FABRICATION

- A. **General:** Provide factory fabricated and finished metal panels and accessories meeting performance requirements, indicated profiles, and structural requirements.
- B. Fabricate metal panel joints configured to accept factory-applied sealant providing weathertight seal and preventing metal-to-metal contact and minimizing noise resulting from thermal movement.
- C. Form panels in continuous lengths for full length of detailed runs, except where otherwise indicated on approved shop drawings.
- D. **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.

2.6 FINISHES

- A. **Finishes, General:** Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
- A. **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.**
- B. **Interior Finish:** **0.5 mil (0.013 mm)** total dry film thickness consisting of primer coat and wash coat of manufacturer's standard light-colored acrylic or polyester backer finish.

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 insulated metal roof panel system installation.

3.2 PREPARATION

- A. **Miscellaneous Supports:** Install subframing, girts, furring, and other miscellaneous panel support members according to ASTM C 754 and manufacturer's written instructions.
- B. Flashings: Provide flashings as required to complete metal roof panel system. Install in accordance with Section 07 62 00 "Sheet Metal Flashing and Trim" and approved shop drawings.

3.3 METAL PANEL INSTALLATION

- A. Mechanically-Seamed, Standing Seam 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. Attach panels to supports using clips, screws, fasteners, and sealants recommended by manufacturer and indicated on approved shop drawings.
 - 1. Fasten metal panels to supports with concealed clips at each location indicated on approved shop drawings, with spacing and fasteners recommended by manufacturer.
 - 2. Seamed Joint: Crimp standing seams with manufacturer-approved, motorized seamer tool so clip, metal roof panel, and factory-applied sealant are completely engaged.
 - 3. Provide weatherproof jacks for pipe and conduit penetrating metal panels of types recommended by manufacturer.
 - 4. 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. Provide for thermal expansion. 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. Provide concealed fasteners except where noted on approved shop drawings.
4. 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](#)."

3.5 CLEANING AND PROTECTION

A. Remove temporary protective films immediately in accordance with metal roof panel manufacturer's instructions. Clean finished surfaces as recommended by metal roof panel manufacturer.

B. Replace damaged panels and accessories that cannot be repaired to the satisfaction of the Architect.

END OF SECTION

SECTION 07530 - SINGLE-PLY MEMBRANE ROOFING

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 single-ply membrane roofing systems.
- B. Types of roofing systems specified in this Section using single-ply roofing membranes include the following:
 - 1. Totally adhered systems.
- C. Single-ply roofing membranes include the following:
 - 1. Ethylene propylene diene monomer (EPDM).
- D. Roof insulation related to single-ply membrane roofing is specified in this Section.
- E. Wood nailers, blocking, and other related items are specified in Division 6.
- F. Copings and gravel stops are specified in another Division 7 Section.

1.3 SUBMITTALS

- A. General: Submit the following according to Conditions of Contract and Division 1 Specification Sections.
- B. Product data, installation instructions, and general recommendations from manufacturer of single-ply membrane system for types of roofing required. Include data substantiating that materials comply with requirements.
- C. Samples of finished roofing sheets, including T-shaped side/end-lap seam. Also include the following:
- D. Shop drawings showing roof configuration, sheet layout, seam locations, colors (as applicable), details at perimeter, and special conditions.

1. Indicate layout of tapered insulation materials.

1.4 QUALITY ASSURANCE

- A. Manufacturer: Obtain primary single-ply membrane roofing from a single manufacturer. Provide secondary materials as recommended by manufacturer of primary materials.
- B. Installer: Engage an experienced Installer that has specialized in installing roofing systems similar to those required for this Project. Installer must be acceptable to or licensed by manufacturer of primary roofing material.
 1. Work associated with single-ply membrane roofing, including (but not limited to) insulation, flashing, and membrane sheet joint sealers, is to be performed by Installer of this Work.
- C. Pre-Roofing Conference: Before installing roofing and associated Work, meet at mutually agreed location with Installer, roofing manufacturer, installers of related work, and other entities concerned with roofing performance, including governing authorities, Engineer, and Owner. Record discussions and agreements and furnish copy to each participant. Provide at least 72 hours advance notice to participants prior to convening pre-roofing conference.
- D. UL Listing: Provide labeled materials that have been tested and listed by UL in "Building Materials Directory" or by other nationally recognized testing laboratory for Class A rated materials/system.

1.5 PROJECT CONDITIONS

- A. Weather: Proceed with roofing work when existing and forecasted weather conditions permit work to be performed in accordance with manufacturers' recommendations and warranty requirements.
- B. Substrate Conditions: Do not begin roofing installation until substrates have been inspected and are determined to be in satisfactory condition.

1.6 WARRANTY

- A. Warranty Period: 20 Year Mfg. standard warranty from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GENERAL

2.2 EPDM MEMBRANE

- A. General: Ethylene propylene diene monomers formed into uniform, flexible sheets, complying with ASTM D 4637, Type
 - 1. Class U: Unreinforced.
 - 2. Thickness: 60 mils, nominal.
 - 3. Exposed Face Color: Black.
- B. Fully Adhered EPDM Membrane: Manufacturer's standard installation.
 - 1. Manufacturers: Subject to compliance with requirements, provide products of the following:
 - a. FireStone Building Standard RubberGard EPDM Membrane or Approved Equal.
 - b. Carlisle Syntec Systems sure-seal EPDM Membrane or approved Equal.

2.3 AUXILIARY MATERIALS

- A. Sheet Seaming System: Manufacturer's standard materials for sealing lapped joints, including edge sealer to cover exposed spliced edges as recommended by membrane manufacturer.
- B. Cant Strips, Tapered Edge Strips, and Flashing Accessories: Types recommended by membrane manufacturer, including adhesive tapes, flashing cements, and sealants.
- C. Flashing Material: Manufacturer's standard system compatible with single-ply membrane.
- D. Membrane Adhesive: As recommended by membrane manufacturer for particular substrate and project conditions, formulated to withstand minimum 60-psf uplift force.
 - 1. Provide adhesives that comply with local requirements limiting amounts of volatile organic compounds.
- E. FireStone 1/2" HD polyisocyanurate or equal.
- F. Vapor Barrier: As recommended by manufacturer for particular substrate and project conditions, prepare roof deck surface for new vapor barrier 40 mil. Composite of 35 mils of self-adhering rubberized asphalt laminated to 5 mil. Woven polypropylene film.

Or approved equal.

2.4 INSULATING MATERIALS

- A. General: Provide insulating materials to comply with requirements indicated for materials and with referenced standards in sizes to fit applications indicated, selected from manufacturer's standard thicknesses, widths, and lengths.

- 1. Provide tapered boards where indicated for sloping to drain. Fabricate with taper of 1/4 inch per foot, unless otherwise indicated.

2.5 AUXILIARY INSULATION MATERIALS

- A. Mechanical Anchors: Corrosion-resistant type as recommended by insulation manufacturer for deck type and complying with fire and insurance wind-uplift rating requirements.

- 1. Provide system tested and approved for I-60 wind-uplift rating.

PART 3 - EXECUTION

Comply with FireStone Standard RubberGard Fully Adhered Single Ply Roof System.

3.1 PREPARING SUBSTRATE

- A. General: Comply with manufacturers' instructions to prepare substrate to receive single-ply membrane system.

- 1. Verify that penetrations, expansion joints, and blocking are in place and secured and that roof drains are properly clamped into position.

- B. Clean substrate of dust, debris, and other substances detrimental to single-ply system installation. Remove sharp projections.

- C. Install cant strips, flashings, and accessory items as shown and as recommended by manufacturer.

3.2 INSTALLING INSULATION

- A. General: Extend insulation full thickness in one layer, entire surface to be insulated, cutting and fitting tightly

around obstructions. Form cant strips, crickets, saddles, and tapered areas with additional material as shown and as required for proper drainage of membrane.

1. Stagger joints in one direction for each course.
 2. Provide tapered units to suit drainage pattern indicated.
- B. Do not install more insulation in a day than can be covered with membrane before end of day or before start of inclement weather.
- C. Secure roof insulation to substrate with mechanical anchors of type and spacing indicated but in no case provide less than one anchor per 4 sq. ft. of surface area or less anchorage than required by FM Loss Prevention Data Sheet 1-28.

3.3 INSTALLING MEMBRANE

- A. General: Start installation only in presence of manufacturer's technical representative.
1. Cut out and repair membrane defects at the end of each day's work.
- B. Fully Adhered Membrane: Install membrane by unrolling over prepared new 1/2" HD polyisocyanurate, lapping adjoining sheets as recommended by manufacturer. Apply adhesive to surfaces to be bonded and roll into place when adhesive has properly cured. Treat seams with special adhesive and apply sealant to exposed sheet edges, tapering application as recommended by manufacturer. Install mechanical fasteners, flashings and counterflashings, and accessories at locations and as recommended by manufacturer.

3.4 PROTECTING ROOFING

- A. After completing roofing (including associated work), institute appropriate procedures for surveillance and protection of roofing during remainder of construction period. At the end of the construction period, or at a time when remaining construction will in no way affect or endanger roofing, make a final inspection of roofing and prepare a written report to Owner, describing nature and extent of deterioration or damage found.
- B. Repair or replace (as required) deteriorated or defective work found at the time of final inspection to a condition free of damage and deterioration at the time of Substantial

2275-1

Completion and according to the requirements of the specified warranty.

END OF SECTION 07530

SECTION 07600 - FLASHING AND SHEET METAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 DESCRIPTION OF WORK:

- A. Extent of each type of flashing and sheet metal work is indicated on drawings and by provisions of this section.
- B. Types of work specified in this section include the following:
 - 1. Metal counter flashing; and base flashing.
 - 2. Metal wall flashing.
 - 3. Miscellaneous sheet metal accessories.
- C. Roofing accessories which are installed integral with roofing membrane are specified in roofing system sections as roofing work.

1.3 JOB CONDITIONS:

- A. Coordinate work of this section with interfacing and adjoining work for proper sequencing of each installation. Ensure best possible weather resistance and durability of the work and protection of materials and finishes.

PART 2 - PRODUCTS

2.1 FLASHING AND SHEET METAL MATERIALS:

- A. Copper: ASTM B 370, cold-rolled except where soft temper is required for forming; 16 oz. (0.0216" thick) except as otherwise indicated for flashing.
- B. Aluminum: ASTM B 209, alloy 3303, temper H14, AA-C22A41 clear anodized finish; 0.032" thick (20 gage) except as otherwise indicated.
- C. Counter, Base, Step and Wall Flashings:
 - 1. Provide and install flashings as indicated

on drawings.

- D. Miscellaneous Materials and Accessories:
- E. Solder: For use with copper, provide 50 - 50 tin/lead solder, with rosin flux.
- F. Fasteners: Same metal as flashing/sheet metal or, other noncorrosive metal as recommended by sheet manufacturer. Match finish of exposed heads with material being fastened.
- G. Bituminous Coating: FS TT-C-494 or SSPC - Paint 12, solvent type bituminous mastic, nominally free of sulfur, compounded for 15-mil dry film thickness per coat.
- H. Mastic Sealant: Polyisobutylene; nonhardening, nonskinning, nondrying, nonmigrating sealant.
- I. Metal Accessories: Provide sheet metal clips, straps, anchoring devices and similar accessory units as required for installation of work, matching or compatible with material being installed, noncorrosive, size and gage required for performance.

2.3 FABRICATED UNITS:

- A. General Metal Fabrication: Shop-fabricate work to greatest extent possible. Comply with details shown, and with applicable requirements of SMACNA "Architectural Sheet Metal Manual" and other recognized industry practices. Fabricate for waterproof and weather-resistant performance; with expansion provisions for running work, sufficient to permanently prevent leakage, damage or deterioration of the work. Form work to fit substrates. Comply with material manufacturer instructions and recommendations for forming material. Form exposed sheet metal work without excessive oil-canning, buckling and tool marks, true to line and levels indicated, with exposed edges folded back to form hems.
- B. Seams: Fabricate nonmoving seams in sheet metal with flat-lock seams. For metal other than aluminum, tin edges to be seamed, form seams, and solder. Form aluminum seams with epoxy seam sealer; rivet joints for additional strength where required.
- C. Expansion Provisions: Where lapped or bayonet-type expansion provisions in work cannot be used, or would not be sufficiently water/weatherproof, form expansion joints of intermeshing hooked flanges, not less than 1" deep, filled with mastic sealant (concealed within joints).

- D. Sealant Joints: Where movable, non-expansion type joints are indicated or required for proper performance of work, form metal to provide for proper installation of sealant as specified in Section 07900, in compliance with SMACNA standards.
- E. Separations: Provide for separation of metal from noncompatible metal or corrosive substrates by coating concealed surfaces at locations of contact, with bituminous coating.

PART 3 - EXECUTION

3.1 INSTALLATION REQUIREMENTS:

- A. General: Except as otherwise indicated, comply with manufacturer's installation instructions and recommendations, and with SMACNA "Architectural Sheet Metal Manual". Anchor units of work securely in place by methods indicated, providing for thermal expansion of metal units; conceal fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints and seams which will be permanently watertight and weatherproof.
- B. Nail flanges of expansion joint units to curb nailers, at maximum spacing of 6". Fabricate seams at joints between units with minimum 3" overlap, to form a continuous waterproof system.
- C. Copper Flexible Flashing: Provide flashing for all spandrels, heads, sills and through wall conditions. Secure flashing to masonry, concrete and other surfaces and at lapped joints with mastic. Apply a coat of primer to concrete and allow to dry before applying mastic. All flashing to be watertight.

3.2 CLEANING AND PROTECTION:

- A. Clean exposed metal surfaces, removing substances which might cause corrosion of metal or deterioration of finishes.
- B. Protection: Installer shall advise Contractor of required procedures for surveillance and protection of flashings and sheet metal work during construction, to ensure that work will be without damage or deterioration, other than natural weathering, at time of substantial completion.

END OF SECTION - 07600

SECTION 07710 Roof Specialties

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Copings.
- 2. Roof edge drainage systems.
- 3. Reglets and counterflashings.

B. Related Sections:

- 1. Division 06 Section "Miscellaneous Rough Carpentry" for wood nailers, curbs, and blocking.
- 2. Division 07 Section "Metal Roof Panels" for roof-edge drainage-system components provided by metal-roof-panel manufacturer and for color match.
- 3. Division 07 Section "Joint Sealants" for field-applied sealants between roof specialties and adjacent materials.

1.3 PERFORMANCE REQUIREMENTS

- A. General Performance: Roof specialties shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.
- B. SPRI Wind Design Standard: Manufacture and install copings and roof-edge flashings tested according to SPRI ES-1 and capable of resisting the following design pressures:
 - 1. Design Pressure: As indicated on Drawings.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of thermal movements. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.4 ACTION SUBMITTALS

- A. Shop Drawings: For roof specialties. Include plans, elevations, expansion-joint locations, keyed details, and attachments to other work. Distinguish between plant- and field-assembled work. Include the following:
 1. Details for expansion and contraction; locations of expansion joints, including direction of expansion and contraction.
 2. Pattern of seams and layout of fasteners, cleats, clips, and other attachments.
 3. Details of termination points and assemblies, including fixed points.
 4. Details of special conditions.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Do not store roof specialties in contact with other materials that might cause staining, denting, or other surface damage. Store roof specialties away from uncured concrete and masonry.
- B. Protect strippable protective covering on roof specialties from exposure to sunlight and high humidity, except to extent necessary for the period of roof specialties installation.

1.6 WARRANTY

- A. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace roof specialties that show evidence of deterioration of factory-applied finishes within specified warranty period.
 1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 EXPOSED METALS

- A. Aluminum Sheet: ASTM B 209, alloy as standard with manufacturer for finish required, with temper to suit forming operations and performance required.

1. Surface: Smooth, flat finish.
2. Exposed Coil-Coated Finishes: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - a. Two-Coat Fluoropolymer: AAMA 620. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight.
 - b. Concealed Surface: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.
- B. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304.

2.2 CONCEALED METALS

- A. Aluminum Sheet: ASTM B 209, alloy and temper recommended by manufacturer for type of use and structural performance indicated, mill finished.
- B. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304.

2.3 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.
- B. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.
- C. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.4 COPINGS

- A. Copings: Manufactured coping system consisting of formed-metal coping cap in section lengths not exceeding 12 feet, concealed anchorage; corner units, end cap units, and concealed splice plates with same finish as coping caps.
 1. Basis-of-Design Product: Subject to compliance with requirements, provide "Permasnap" as manufactured by W.P. Hickman Company or comparable product by one of the following:
 - a. Architectural Products Company.
 - b. Division 7 Mtls, Inc.
 - c. Metal-Era, Inc.
 - d. Pac-Clad
 - e. W.P. Hickman
 - f. Roofing membrane manufacturers' approved and warranted product that

complies with this Section.

2. Coping-cap Material: Formed aluminum of thickness based on width of covered wall: Up to 16 inches - 0.050 inch; 16+ inches to 24 inches - 0.063 inch; 24+ inches to 36 inches - 0.080 inch.
 - a. Finish: Two-coat fluoropolymer.
 - b. Color: Match MBCI "Medium Bronze".
3. Corners: Factory-mitered and continuously welded.
 - a. Corner units shall have minimum 18 inches length legs measured on inside of each leg.
4. Coping-Cap Attachment Method: Snap-on, fabricated from coping-cap material.
5. Snap-on-Coping Anchor Plates: Concealed, galvanized-steel sheet, 12 inches wide, with integral cleats.

2.5 ROOF-EDGE DRAINAGE SYSTEMS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Architectural Products Company.
 2. Division 7 Mtls, Inc.
 3. Hickman Company, W. P.
 4. Merchant & Evans, Inc.
 5. Metal-Era, Inc.
 6. Pac-Clad.
 7. Roofing membrane manufacturers' approved and warranted product that complies with this Section.
- B. Downspouts (at scupper/conductor head locations): Plain rectangular complete with mitered elbows, manufactured from the following exposed metal. Furnish with metal hangers, from same material as downspouts, and anchors.
 1. Formed Aluminum: 0.040 inch thick.
 2. Color: Match MBCI "Medium Bronze"
- C. Parapet Scuppers: Manufactured with closure flange trim to exterior, 4-inch- wide wall flanges to interior, and base extending 4 inches beyond cant or tapered strip into field of roof.
 1. Fabricate from the following exposed metal:
 - a. Formed Aluminum: 0.032 inch thick.
 - b. Color: Match MBCI "Medium Bronze".

- D. Conductor Heads: Manufactured conductor heads, each with flanged back and stiffened top edge and of dimensions and shape indicated, complete with outlet tube that nests into upper end of downspout, exterior flange trim.

- 1. Fabricate from the following exposed metal:
 - a. Formed Aluminum: 0.032 inch thick.
 - b. Color: Match MBCI "Medium Bronze".

2.6 REGLETS AND COUNTERFLASHINGS

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

- 1. Cheney Flashing Company.
- 2. Fry Reglet Corporation.
- 3. Heckmann Building Products Inc.
- 4. Hickman Company, W. P.
- 5. Keystone Flashing Company, Inc.
- 6. Metal-Era, Inc.
- 7. Roofing membrane manufacturers' approved and warranted product that complies with this Section.

- B. Reglets: Manufactured units formed to provide secure interlocking of separate reglet and counterflashing pieces, from the following exposed metal:

- 1. Stainless Steel: 0.019 inch thick.
- 2. Corners: Factory-mitered and continuously welded.
- 3. Masonry Type, Embedded: Provide reglets with offset top flange for embedment in masonry mortar joint.

- C. Counterflashings: Manufactured units of heights to overlap top edges of base flashings by 4 inches and in lengths not exceeding 12 feet designed to snap into reglets and compress against base flashings with joints lapped, from the following exposed metal:

- 1. Stainless Steel: 0.019 inch thick.

- D. Stainless-Steel Finish: No. 2B (bright, cold rolled, unpolished).

2.7 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.
- B. Examine walls, roof edges, and parapets for suitable conditions for roof specialties.
- C. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. General: Install roof specialties according to manufacturer's written instructions. Anchor roof specialties securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete roof-specialty systems.
 - 1. Install roof specialties level, plumb, true to line and elevation; with limited oil-canning and without warping, jogs in alignment, buckling, or tool marks.
 - 2. Provide uniform, neat seams with minimum exposure of solder and sealant.
 - 3. Install roof specialties to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before manufacture.
 - 4. Torch cutting of roof specialties is not permitted.
 - 5. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
 - 1. Coat concealed side of and roof specialties with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
 - 2. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof specialties for waterproof performance.
- C. Expansion Provisions: Allow for thermal expansion of exposed roof specialties.
 - 1. Space movement joints at a maximum of 12 feet with no joints within 18 inches of

corners or intersections unless otherwise shown on Drawings.

2. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures.
- D. Fastener Sizes: Use fasteners of sizes that will penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.
 - E. Seal joints as required for watertight construction. Place sealant to be completely concealed in joint. Do not install sealants at temperatures below 40 deg F.

3.3 COPING INSTALLATION

- A. Install cleats, anchor plates, and other anchoring and attachment accessories and devices with concealed fasteners.
- B. Anchor copings to meet performance requirements.
 1. Interlock face and back leg drip edges of snap-on coping cap into cleated anchor plates anchored to substrate at manufacturer's required spacing that meets performance requirements.

3.4 ROOF-EDGE DRAINAGE-SYSTEM INSTALLATION

- A. General: Install components to produce a complete roof-edge drainage system according to manufacturer's written instructions. Coordinate installation of roof perimeter flashing with installation of roof-edge drainage system.
- B. Downspouts: Join sections with manufacturer's standard telescoping joints. Provide hangers with fasteners designed to hold downspouts securely to walls and 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c.
 1. Connect downspouts to underground drainage system indicated.
- C. Parapet Scuppers: Install scuppers through parapet where indicated. Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.
 1. Anchor scupper closure trim flange to exterior wall and seal or solder to scupper.
 2. Loosely lock front edge of scupper with conductor head.
 3. Seal or solder exterior wall scupper flanges into back of conductor head.
- D. Conductor Heads: Anchor securely to wall with elevation of conductor top edge 1 inch below scupper discharge.

3.5 REGLET AND COUNTERFLASHING INSTALLATION

- A. General: Coordinate installation of reglets and counterflashings with installation of base flashings.
- B. Embedded Reglets: See Division 04 Section "Unit Masonry" for installation of reglets.
- C. Counterflashings: Insert counterflashings into reglets or other indicated receivers; ensure that counterflashings overlap 4 inches over top edge of base flashings. Lap counterflashing joints a minimum of 4 inches and bed with sealant. Fit counterflashings tightly to base flashings.

3.6 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder and sealants.
- C. Remove temporary protective coverings and strippable films as roof specialties are installed. On completion of installation, clean finished surfaces including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain roof specialties in a clean condition during construction.
- D. Replace roof specialties that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION

SECTION 07901 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes joint sealants for the following locations:
 - 1. Exterior joints in vertical surfaces and nontraffic horizontal surfaces as indicated below:
 - a. Control and expansion joints in unit masonry.
 - b. Joints between different materials listed above.
 - c. Perimeter joints between materials listed above and frames of doors and windows.
 - 2. Exterior joints in horizontal traffic surfaces as indicated below:
 - a. Control, expansion, and isolation joints in cast-in-place concrete slabs.
 - 3. Interior joints in vertical surfaces and horizontal nontraffic surfaces as indicated below:
 - a. Control and expansion joints on exposed interior surfaces of exterior walls.
 - b. Perimeter joints of exterior openings where indicated.
 - c. Vertical control joints on exposed surfaces of interior unit masonry and concrete walls and partitions.
 - d. Perimeter joints between interior wall surfaces and frames of interior doors and windows.
 - e. Perimeter joints of toilet fixtures.
 - f. Other joints as indicated.
 - 4. Interior joints in horizontal traffic: Surfaces as indicated below:
 - a. Control and expansion joints in cast-in-place concrete slabs.

- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 7 Section "Flashing and Sheet Metal" for sealing joints related to flashing and sheet metal for roofing.
 - 2. Division 8 "Glass and Glazing" for sealants used in glazing.

1.3 SYSTEM PERFORMANCE REQUIREMENTS

- A. Provide elastomeric joint sealants that have been produced and installed to establish and to maintain watertight and airtight continuous seals without causing staining or deterioration of joint substrates.
- B. Provide joint sealants for interior applications that have been produced and installed to establish and maintain airtight continuous seals that are water resistant and cause no staining or deterioration of joint substrates.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced Installer who has completed joint sealant applications similar in material, design, and extent to that indicated for Project that have resulted in construction with a record of successful in-service performance.
- B. Single Source Responsibility for Joint Sealant Materials: Obtain joint sealant materials from a single manufacturer for each different product required.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multicomponent materials.
- B. Store and handle materials in compliance with manufacturer's recommendations to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.6 PROJECT CONDITIONS

- A. Environmental Conditions: Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside the limits permitted by joint sealant manufacturer or below 40 deg F (4.4 deg C).
 2. When joint substrates are wet.
- B. Joint Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than allowed by joint sealant manufacturer for application indicated.
- C. Joint Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with their adhesion are removed from joint substrates.

1.7 SEQUENCING AND SCHEDULING

- A. Sequence installation of joint sealants to occur not less than 21 nor more than 30 days after completion of waterproofing, unless otherwise indicated.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, joint fillers, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
- B. Colors: Provide color of exposed joint sealants to comply with the following:
1. Provide selections made by Engineer from manufacturer's full range of standard colors for products of type indicated.

2.2 ELASTOMERIC JOINT SEALANTS

- A. Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing elastomeric sealants that comply with ASTM C 920 and other requirements indicated on each Elastomeric Joint Sealant Data Sheet at end of this Section, including those requirements referencing ASTM C 920 classifications for Type, Grade, Class, and Uses.
1. Additional Movement Capability: Where additional movement capability is specified in Elastomeric Joint Sealant Data Sheet, provide products with the

capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719, to withstand the specified percentage change in the joint width existing at time of installation and remain in compliance with other requirements of ASTM C 920 for Uses indicated.

- B. Products: Subject to compliance with requirements, provide one of the products specified in Joint Sealant Data Sheet.

2.3 SOLVENT-RELEASE-CURING JOINT SEALANTS

- A. Acrylic Sealant: Manufacturer's standard one-part, nonsag, solvent-release-curing acrylic terpolymer sealant complying with AAMA 808.3 or FS TT-S-00230 or both, with capability when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719 and other requirements specified on the joint sealant data sheets at the end of this section:

- 1. Products: Subject to compliance with requirements, provide one of the products specified in Joint Sealant Data Sheet.

2.4 LATEX JOINT SEALANTS

- A. General: Provide manufacturer's standard one-part, nonsag, mildew-resistant, paintable latex sealant of formulation indicated that is recommended for exposed applications on interior and protected exterior locations and that accommodates indicated percentage change in joint width existing at time of installation without failing either adhesively or cohesively.
- B. Acrylic-Emulsion Sealant: Provide product complying with ASTM C 834 that accommodates joint movement of not more than 5 percent in both extension and compression for a total of 10 percent.
- C. Silicone Emulsion Sealant: Provide product complying with ASTM C 834 and, except for weight loss measured per ASTM C 792, with ASTM C 920 that accommodates joint movement of not more than 25 percent in both extension and compression for a total of 50 percent.
- 1. Products: Subject to compliance with requirements, provide one of the products specified in Joint Sealant Data Sheet.

2.5 JOINT SEALANT BACKING

- A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates,

sealants, primers and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

- B. Plastic Foam Joint Fillers: Preformed, compressible, resilient, nonstaining, nonwaxing, nonextruding strips of flexible plastic foam of material indicated below and of size, shape, and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
 1. Open-cell polyurethane foam.
 2. Closed-cell polyethylene foam, nonabsorbent to liquid water and gas, nonoutgassing in unruptured state.
 3. Proprietary, reticulated, closed-cell polymeric foam, nonoutgassing, with a density of 2.5 pcf and tensile strength of 35 psi per ASTM D 1623, and with water absorption less than 0.02 gms/cc per ASTM C 1083.
 4. Any material indicated above.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape as recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.6 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming in any way joint substrates and adjacent nonporous surfaces, and formulated to promote optimum adhesion of sealants with joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint sealant performance. Do not

proceed with installation of joint sealants until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with recommendations of joint sealant manufacturer and the following requirements:
1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 2. Clean concrete, masonry, unglazed surfaces of ceramic tile, and similar porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.
 3. Remove laitance and form release agents from concrete.
 4. Clean metal, glass, porcelain enamel, glazed surfaces of ceramic tile, and other nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
- B. Joint Priming: Prime joint substrates where indicated or where recommended by joint sealant manufacturer based on sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's recommendations. Confine primers to areas of joint sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint sealant manufacturer's printed installation instructions applicable to products and applications indicated, except where more stringent

requirements apply.

- B. Sealant Installation Standard: Comply with recommendations of ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Installation of Sealant Backings: Install sealant backings to comply with the following requirements:
 - 1. Install joint fillers of type indicated to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - a. Do not leave gaps between ends of joint fillers.
 - b. Do not stretch, twist, puncture, or tear joint fillers.
 - c. Remove absorbent joint fillers that have become wet prior to sealant application and replace with dry material.
- D. Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability. Install sealants at the same time sealant backings are installed.
- E. Tooling of Nonsag Sealants: Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.
 - 1. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.
 - 2. Provide flush joint configuration, per Figure 5B in ASTM C 1193, where indicated.
 - a. Use masking tape to protect adjacent surfaces of recessed tooled joints.
 - 3. Provide recessed joint configuration, per Figure 5C in ASTM C 1193, of recess depth and at locations indicated.

3.4 CLEANING

- A. Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so that and installations with repaired areas are indistinguishable from original work.

JOINT SEALANT SCHEDULE

Install sealant indicated in joints fitting the descriptions and locations listed below.

- A. Joint Sealer: Two-part Urethane Sealant
Joint Construction and/or Location:
Exterior - Vertical surfaces of masonry

- B. Joint Sealer: One-part pourable, self-leveling, Bitumen modified polyurethane sealant.
Joint Construction and/or Location:
Exterior - Horizontal control, expansion, and isolation joints in Cast-in-Place Concrete.

- C. Joint Sealer: One-part Neutral Cure Silicone Sealant
Joint Construction and/or Location:
Exterior - Perimeter joints of aluminum frames
Exposed joints in aluminum framing members
Interior - Perimeter joints of aluminum frames
Exposed joints in aluminum framing members

- D. Joint Sealer: Acrylic-Emulsion Sealant

2275-1

Joint Construction and/or Location:

Interior - Field painted vertical and overhead surfaces of:
perimeter of hollow metal door frames
gypsum drywall
skim coat plaster
concrete masonry units
all other interior joints not noted otherwise

E. Joint Sealer: One-part Mildew Resistant Silicone Sealant

Joint Construction and/or Location:

Interior - Perimeter joints of plumbing fixtures

END OF SECTION - 07901

SECTION 08114 - CUSTOM STEEL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes custom-fabricated, commercial-quality steel doors and frames for doors and related openings.
- B. Customized hollow metal work for other than doors, panels, and frames are specified in a Division 5 Section.
- C. Building in of anchors and grouting of frames in masonry construction are specified in a Division 4 Section.
- D. Door hardware installation is specified in Division 8 Section "Door Hardware" or "Finish Hardware."
- E. Related Sections: The following sections contain requirements that relate to this Section:
 - 1. Division 8 Section "Door Hardware" for door hardware installed in doors and frames.
 - 2. Division 8 Section "Flush Wood Door" for solid-core wood doors installed in steel frames.
 - 3. Division 9 Section "Painting" for field painting of doors and frames.
- F. Products furnished but not installed under this Section include steel doors and frames.

1.3 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product Data: Manufacturer's specifications for fabrication and installation, including data substantiating that products comply with requirements.
 - 1. Manufacturer's certificate stating that each assembly required to be fire rated but exceeding sizes of tested assemblies has been constructed to conform to design,

materials, and details of construction equivalent to requirements for labeled units.

- C. Shop Drawings: For fabrication and installation of custom steel doors and frames work. Include details of each frame type, elevations of door design types, conditions at openings, details of construction, location and installation requirements of finish hardware and reinforcements, and details of joints and connections.
 - 1. Provide a schedule of doors and frames using same reference numbers for details and openings as those on the Contract Drawings.

1.4 QUALITY ASSURANCE

- A. Provide custom steel doors and frames manufactured by a single firm specializing in the production of this type of work, unless otherwise acceptable to the Engineer.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver doors and frames palletted, wrapped, or crated to provide protection during transit and job storage.
- B. Inspect doors and frames upon delivery for damage. Minor damages may be repaired provided refinished items are equal in all respects to new work and acceptable to the Engineer; otherwise remove and replace damaged items as directed.
- C. Store doors and frames at the building site under cover. Place units on minimum 4-inch-high wood blocking. Avoid the use of nonvented plastic or canvas shelters that could create a humidity chamber. If cardboard wrappers on doors become wet, remove cartons immediately. Provide 1/4-inch spaces between stacked doors to promote air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Custom Steel Doors and Frames:

- Curries
 - Mesker
 - Steel Craft Manufacturing Co.

2.2 MATERIALS

- A. Cold-Rolled Steel Sheets: Commercial-quality, level, carbon steel, complying with ASTM A 366.
- B. Hot-Rolled Steel Sheets and Strips: Commercial-quality carbon steel, pickled and oiled, complying with ASTM A 569, free of scale, pitting, or surface defects.
- C. Galvanized Steel Sheets: Zinc-coated carbon steel sheets of commercial quality, complying with ASTM A 526 and ASTM A 525 with A60 or G60 coating designation, mill phosphatized.
- D. Supports and Anchors: Fabricate of not less than 16-gage sheet metal. Galvanize after fabrication units to be built into exterior walls, complying with ASTM A 153, Class B.
- E. Inserts, Bolts, and Fasteners: Manufacturer's standard units, except hot-dip galvanize items to be built into exterior walls, complying with ASTM A 153, Class C or D as applicable.
- F. Shop-Applied Paint: Rust-inhibitive enamel or paint, either air-drying or baking, suitable as base for specified finish paints on steel surfaces.

2.3 DOORS

- A. General: Provide flush design doors, 1-3/4 inches thick, seamless hollow construction, unless otherwise indicated.
 - 1. For single-acting swing doors, bevel both vertical edges 1/8 inch in 2 inches. For double-acting swing doors, round vertical edges with 2-1/8-inch radius.
 - 2. Unless otherwise required for acoustical or thermal doors, provide filler of fiberboard, mineral-wool board, or other insulating material solidly packed full door height to fill voids between inner core reinforcing members.
 - 3. Reinforce doors with rigid tubular frame where stiles and rails are less than 8 inches wide. Form tubular frame with 16-gage steel, welded to outer sheets.
- B. Painted Exterior Doors: Fabricate exterior doors of 2 outer, galvanized, stretcher-leveled steel sheets not less than 16 gage. Construct doors with smooth, flush surfaces without visible joints or seams on exposed faces or stile edges, except around glazed or louvered panel inserts. Provide thermal insulation. Provide weep-hole openings in the bottom of doors to permit escape of entrapped moisture.
 - 1. Reinforce inside of doors with vertical galvanized sheet

steel sections not less than 22 gage. Space vertical reinforcing 6 inches o.c. and extend full door height. Spot weld at not more than 5 inches o.c. to both face sheets.

- a. Continuous truss-form inner core of 28-gage galvanized sheet steel reinforcing may be provided as inner reinforcement, in lieu of above. Spot weld truss-form reinforcement 3 inches o.c. vertically and horizontally over entire surface of both sides.
2. Reinforce tops and bottoms of doors with 16-gage horizontal steel channels welded continuously to outer sheets. Close top and bottom edges to provide flush, waterproof weather seal, as integral part of door construction or by addition of inverted steel channels.
- C. Painted Interior Doors: Fabricate interior doors of 2 outer, cold-rolled, stretcher-leveled steel sheets not less than 18 gage. Construct doors with smooth, flush surfaces, without visible joints or seams on exposed faces or stile edges, except around glazed or louvered panel inserts.
1. Reinforce inside of doors with vertical, hot-rolled, not less than 22-gage steel sections. Space vertical reinforcing 6 inches o.c. and extend full door height. Spot weld at not more than 5 inches o.c. to both face sheets.
 - a. Continuous truss-form inner core of 28-gage sheet metal reinforcing may be provided as inner reinforcement in lieu of above. Spot weld truss-form reinforcement 3 inches o.c. vertically and horizontally over entire surface of both sides.
 2. Reinforce tops and bottoms of doors with 18-gage, horizontal steel channels, welded continuously to outer sheets.
- D. Finish Hardware Reinforcement: Minimum gages of steel reinforcing plates for the following hardware:
1. Hinges and Pivots: 7 gage thick by 1-1/2 inches wide by 6 inches longer than hinge, secured by not less than 6 spot welds. Note: Verify exterior doors with continuous hinge
 2. Lock Face, Flush Bolts, Closers, and Concealed Holders: 12 gage.
 3. All Other Surface-Mounted Hardware: 16 gage.

2.4 FRAMES

- A. Fabricate frames of full-welded unit construction, with corners mitered, reinforced, continuously welded full depth

and width of frame. Knock-down type frames are not acceptable.

1. Form frames of minimum 14-gage galvanized steel sheets for exterior, and either cold or hot-rolled sheet steel of the following minimum gages for interior:
 - a. Openings up to and including 4'-0" wide: 16 gage.
 - b. Openings over 4'-0" wide: 14 gage.
- B. Finish Hardware Reinforcement: Minimum gages of steel reinforcing plates for the following hardware:
 1. Hinges and Pivots: 7 gage thick by 1-1/2 inches wide by 6 inches longer than hinge, secured by not less than 6 spot welds. Note: Verify door frames for doors with continuous hinges
 2. Strikes, Flush Bolts, and Closers: 12 gage.
 3. Surface-Mounted Hold-Open Arms and Panic Devices: 12 gage.
- C. Head Reinforcing: Where installed in masonry, leave vertical mullions in frames open at top for grouting.
- D. Jamb Anchors: Furnish jamb anchors as required to secure frames to adjacent construction, formed of not less than 18-gage galvanized steel.
 1. Masonry Construction: Adjustable, flat, corrugated, or perforated, t-shaped to suit frame size, with leg not less than 2 inches wide by 10 inches long. Furnish at least 3 anchors per jamb up to 7'-6" height; 4 anchors up to 8'-0" jamb height; one additional anchor for each 24 inches or fraction thereof over 8'-0" height.
 2. Metal Stud Partitions: Insert type with notched clip to engage metal stud, welded to back of frames. Provide at least 4 anchors for each jamb for frames up to 7'-6" in height; 5 anchors up to 8'-0" jamb height; one additional anchor each 24 inches or fraction thereof over 8'-0" height.
 3. In-Place Concrete or Masonry: Anchor frame jambs with minimum 3/8-inch concealed bolts into expansion shields or inserts at 6 inches from top and bottom and 26 inches o.c., unless otherwise shown. Reinforce frames at anchor locations. Except for fire-rated openings, apply removable stop to cover anchor bolts unless otherwise indicated.
- E. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, formed of not less than 14-gage galvanized steel sheet, as follows:
 1. Monolithic Concrete Slabs: Clip-type anchors, with 2 holes to receive fasteners, welded to bottom of jambs

and mullions.

- F. Head Anchors: Provide 2 anchors at head of frames exceeding 42 inches wide for frames mounted in steel stud walls.
- G. Structural Reinforcing Members: Provide as part of frame assembly, where indicated at mullions, transoms, or other locations that are to be built into frame.
- H. Spreader Bars: Provide removable spreader bar across bottom of frames, tack welded to jambs and mullions.
- I. Rubber Door Silencers: Except on weatherstripped doors, drill stop in strike jamb to receive 3 silencers on single-door frames and drill head jamb stop to receive 4 silencers on double-door frames. Install plastic plugs to keep holes clear during construction.

2.5 STOPS AND MOLDINGS

- A. Provide removable stops and moldings where indicated or required, formed of not less than 20-gage steel sheets matching steel of frames. Secure with countersunk flat or oval head machine screws spaced uniformly not more than 12 inches o.c. **Form corners with butted hairline joints.**
- B. Coordinate width of rabbet between fixed and removable stops with type of glass and type of installation indicated.

2.6 FABRICATION, GENERAL

- A. Fabricate hollow metal units to be rigid, neat in appearance, and free from defects, warp, or buckle. Accurately form metal to required sizes and profiles. Wherever practicable, fit and assemble units in the manufacturer's plant. Clearly identify work that cannot be permanently factory-assembled before shipment, to assure proper assembly at the project site. Weld exposed joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
 - 1. Interior Doors: Minimum 18-gage face sheets.
 - 2. Exterior Doors: Minimum 16-gage face sheets.
- B. Exposed Fasteners: Unless otherwise indicated, provide countersunk flat or oval heads for exposed screws and bolts.
- C. Thermal-Rated (Insulating) Assemblies: At exterior locations and elsewhere as shown or scheduled, provide doors **and frames** that have been fabricated as thermal insulating assemblies and tested in accordance with ASTM C 236 or C 976.

1. Unless otherwise indicated, provide assemblies U-value rating of 0.68 to .19 Btu/(hr by sq ft by deg F).
- D. Finish Hardware Preparation: As follows:
1. Prepare doors and frames to receive finish hardware, including cutouts, reinforcing, mortising, drilling, and tapping in accordance with final Finish Hardware Schedule and templates provided by hardware supplier. Comply with applicable requirements of ANSI A 115 series specifications for door and frame preparation for hardware.
 2. Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for surface-applied finish hardware may be done at project site.
 3. Locate finish hardware as shown on final shop drawings, or if not shown, in accordance with "Recommended Locations for Builder's Hardware for Custom Steel Doors and Frames," published by Door and Hardware Institute.
- E. Shop Painting: Clean, treat, and paint exposed surfaces of steel doors and frames, including galvanized surfaces.
1. Clean steel surfaces of mill scale, rust, oil, grease, dirt, and other foreign materials before application of paint.
 2. Apply pretreatment to cleaned metal surfaces, using cold phosphate solution (SSPC-PT2), hot phosphate solution (SSPC-PT4), or basic zinc chromate-vinyl butyryl solution (SSPC-PT3).
 3. Apply shop coat of prime paint within time limits recommended by pretreatment manufacturer. Apply a smooth coat of even consistency to provide a uniform dry film thickness of not less than 0.7 mils.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Frames: Provide custom steel frames for doors, transoms, side lights, borrowed lights, and other openings, of size and profile as indicated.
1. Install frames and accessories in accordance with shop drawings, manufacturer's data, and as herein specified.
 2. Setting Masonry Anchorage Devices: Provide masonry anchorage devices where required for securing frames to in-place concrete or masonry construction.
 - a. Set anchorage devices opposite each anchor location, in accordance with details on final shop drawings and anchorage device manufacturer's instructions. Leave drilled holes rough, not

- reamed, and free from dust and debris.
3. Floor anchors may be set with powder-actuated fasteners instead of masonry anchorage devices and machine screws, if so indicated on final shop drawings.
 4. Placing Frames: Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces and spreaders, leaving surfaces smooth and undamaged.
 - a. At in-place concrete or masonry construction, set frames and secure in place with machine screws and masonry anchorage devices.
 - b. Place frames at fire-rated openings in accordance with NFPA Standard No. 80.
 - c. Make field splices in frames as detailed on final shop drawings, welded and finished to match factory work.
 - d. Remove spreader bars only after frames or bucks have been properly set and secured.
- B. Door: Fit non-fire-rated doors accurately in their respective frames, with the following clearances:
1. Jambs and Head: **3/32 inch.**
 2. Meeting Edges, Pairs of Doors: **1/8 inch.**
 3. Bottom: 3/8 inch, where no threshold or carpet.
 4. Bottom: 1/8 inch, at threshold or carpet.
- C. Place fire-rated doors with clearances as specified in NFPA Standard No. 80.

3.2 ADJUST AND CLEAN

- A. Final Adjustments: Check and readjust operating hardware items just prior to final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including doors or frames that are warped, bowed, or otherwise unacceptable.
- B. Prime Coat Touch-Up: Immediately after erection, sand smooth any rusted or damaged areas of prime coat and apply touch-up of compatible air-drying primer.

END OF SECTION 08114

SECTION 08211 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

- A. Extent and location of each type of flush wood door is indicated on drawings and in schedules.
- B. Types of doors required include the following:
 - 1. Solid core flush wood doors with wood veneer faces.
- C. Factory-prefitting to frames and factory-premachining for hardware for wood doors is included in this section.
- D. Metal door frames for flush wood doors are specified in another Division-8 section.

1.3 SUBMITTALS:

- A. Product Data: Door manufacturer's technical data for each type of door, including details of core and edge construction, trim for openings and louvers, and factory-finishing specifications.
- B. Shop Drawings: Submit shop drawings indicating location and size of each door, elevation of each kind of door, details of construction, location and extent of hardware blocking, fire ratings, requirements for factory finishing and other pertinent data.
 - 1. For factory-premachined doors, indicate dimensions and locations of cutouts for locksets and other cutouts adjacent to light and louver openings.

1.4 QUALITY ASSURANCE:

- A. Quality Standards: Comply with the following standards:
 - 1. NWWDA Quality Standard: I.S.1 "Industry Standard for Wood Flush Doors", of National Wood Window and Door

Association (NWWDA).

2. AWI Quality Standard: "Architectural Woodwork Quality Standards"; including Section 1300 "Architectural Flush Doors", of Architectural Woodwork Institute (AWI) for grade of door, core construction, finish and other requirements exceeding those of NWWDA quality standard.
- C. Manufacturer: Obtain doors from a single manufacturer.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING:

- A. Protect doors during transit, storage and handling to prevent damage, soiling and deterioration. Comply with requirements of referenced standards and recommendations of NWWDA pamphlet "How to Store, Handle, Finish, Install, and Maintain Wood Doors", as well as with manufacturer's instructions.
- B. Identify each door with individual opening numbers which correlate with designation system used on shop drawings for door, frames, and hardware, using temporary, removable or concealed markings.

1.6 PROJECT CONDITIONS:

- A. Conditioning: Do not deliver or install doors until conditions for temperature and relative humidity have been stabilized and will be maintained in storage and installation areas during remainder of construction period to comply with the following requirements applicable to project's geographical location:
 1. Referenced AWI quality standard including Section 100-S-3 "Moisture Content".

1.7 WARRANTY:

- A. General: Warranties shall be in addition to, and not a limitation of, other rights the Owner may have under the Contract Documents.
- B. Door Manufacturer's Warranty: Submit written agreement in door manufacturer's standard form signed by Manufacturer, Installer and Contractor, agreeing to repair or replace defective doors that have warped (bow, cup or twist) or that show telegraphing of core construction in face veneers, or do not conform to tolerance limitations of referenced quality standards.

1. Warranty shall also include reinstallation which may be required due to repair or replacement of defective doors where defect was not apparent prior to hanging.
 2. Warranty shall be in effect during following period of time after date of Substantial Completion.
 3. Solid Core Interior Doors:
 - a. Two years.
- C. Contractor's Responsibilities: Replace or refinish doors where Contractor's work contributed to rejection or to voiding of manufacturer's warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

- A. Manufacturer: Subject to compliance with requirements, provide products of one of the following:
1. Solid Core Doors with Wood Veneer Faces:
 - a. Algoma Hardwoods, Inc.
 - b. Chappell Door Company.
 - c. VT Industries
 - d. Graham Manufacturing Corp.
 - e. Mohawk.

2.2 INTERIOR FLUSH WOOD DOORS:

- A. Solid Core Doors for Transparent Finish: Comply with the following requirements:
1. Faces: See Finish color selections.
 2. AWI Grade: Premium.
 3. Construction: PC-7 (Particleboard core - 7-ply)

2.4 FABRICATION:

- A. Fabricate flush wood doors to produce doors complying with following requirements:
1. In sizes indicated for job-site fitting. (Contractors Option)
 2. Factory-prefit and premachine doors (Contractors Option) to fit frame opening sizes indicated with the following uniform clearances and bevels:
 - a. Comply with tolerance requirements of AWI for

prefitting. Comply with final hardware schedules and door frame shop drawings and with hardware templates.

- b. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before proceeding with factory premachining.
- B. Metal Astragals: Premachine astragals and formed steel edges for hardware where required for pairs of fire-rated doors.
 - C. Openings: Cut and trim openings through doors to comply with applicable requirements of referenced standards for kind(s) of doors required.
 - 1. Light Openings: Trim openings with moldings of material and profile indicated.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Examine installed door frames prior to hanging door:
 - 1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with plumb jambs and level heads.
 - 2. Reject doors with defects.
- B. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION:

- A. Hardware: For installation see Division-8 "Finish Hardware" section of these specifications.
- B. Manufacturer's Instructions: Install wood doors to comply with manufacturer's instructions and of referenced AWI standard and as indicated.
- C. Job-Fit Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted with fire-rated doors. Machine doors for hardware. Seal cut surfaces after fitting and machining.
 - 1. Fitting Clearances for Non-Rated Doors: Provide **1/8"** at jambs and heads; **1/16"** per leaf at meeting stiles for pairs of doors; and **1/8"** from bottom of door to top of decorative floor finish or covering. Where threshold is

shown or scheduled, provide 1/4" clearance from bottom of door to top of threshold.

2. Bevel non-rated doors 1/8" in 2" at lock and hinge edges.

- D. Prefit Doors: Fit to frames for uniform clearance at each edge.

3.3 ADJUSTING AND PROTECTION:

- A. Operation: Rehang or replace doors which do not swing or operate freely.
- B. Finished Doors: Refinish or replace doors damaged during installation.
- C. Protect doors as recommended by door manufacturer to ensure that wood doors will be without damage or deterioration at time of Substantial Completion.

END OF SECTION 08211

SECTION 08360
SECTIONAL OVERHEAD DOORS
521S SERIES ALUMINUM SECTIONAL OVERHEAD DOORS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Glazed Aluminum Sectional Overhead Doors
- B. Electric Operators and Controls.
- C. Operating Hardware, tracks, and support.

1.2 RELATED SECTIONS

- A. Section 03300 - Cast-In-Place Concrete: Prepared opening in concrete. Execution requirements for placement of anchors in concrete wall construction.
- B. Section 04810 - Unit Masonry Assemblies: Prepared opening in masonry. Execution requirements for placement of anchors in masonry wall construction.
- C. Section 05500 - Metal Fabrications: Steel frame and supports.
- D. Section 06114 - Wood Blocking and Curbing: Rough wood framing and blocking for door opening.
- E. Section 07900 - Joint Sealers: Perimeter sealant and backup materials.
- F. Section 08710 - Door Hardware: Cylinder locks.
- G. Section 09900 - Paints and Coatings: Field painting.
- H. Section 11150 – Parking Control Equipment: Remote door control.
- I. Section 16130 - Raceway and Boxes: Empty conduit from control station to door operator.
- J. Section 16150 - Wiring Connections: Electrical service to door operator.

1.3 REFERENCES

- A. [ANSI/DASMA 102](#) - American National Standard Specifications for Sectional Overhead Type Doors.

1.4 DESIGN / PERFORMANCE REQUIREMENTS

- A. Wind Loads: Design and size components to withstand loads caused by pressure and suction of wind acting normal to plane of wall as calculated in accordance with applicable code.
- B. Single-Source Responsibility: Provide doors, tracks, motors, and accessories from one manufacturer for each type of door. Provide secondary components from source acceptable to manufacturer of primary components.

1.5 SUBMITTALS

- A. Submit under provisions of Section 01300.

- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- C. Shop Drawings: Indicate plans and elevations including opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.
- D. Manufacturer's Certificates: Certify products meet or exceed specified requirements.
- E. Operation and Maintenance Data.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum five years documented experience.
- B. Installer Qualifications: Authorized representative of the manufacturer with minimum five years documented experience.
- C. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories, Inc. acceptable to authority having jurisdiction as suitable for purpose specified.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened labeled packaging until ready for installation.
- B. Protect materials from exposure to moisture until ready for installation.
- C. Store materials in a dry, ventilated weathertight location.

1.8 PROJECT CONDITIONS

- A. Pre-Installation Conference: Convene a pre-installation conference just prior to commencement of field operations, to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Overhead Door Corp., 2501 S. State Hwy. 121, Suite 200, Lewisville, TX 75067. ASD. Tel. Toll Free: (800) 275-3290. Phone: (469) 549-7100. Fax: (972) 906-1499. Web Site: www.overheaddoor.com. E-mail: sales@overheaddoor.com.
- B. Substitutions: Not permitted.
- C. Requests for substitutions will be considered in accordance with provisions of Specifications.

2.2 GLAZED ALUMINUM SECTIONAL OVERHEAD DOORS

- A. Glazed Sectional Overhead Doors: 521 Series Aluminum Doors by Overhead Door Corporation.

1. Door Assembly: Stile and rail assembly secured with 1/4 inch (6 mm) diameter through rods.
 - a. Panel Thickness: 1-3/4 inches (44 mm).
 - b. Center Stile Width: 2-11/16 inches (68 mm)
 - c. End Stile Width: 3-5/16 inches (84 mm) - 2 Per End
 - d. Intermediate Rail Pair Width: 3-11/16 inches (94 mm).
 - e. Top Rail Width:
 - 1) 2-3/8 inches (60 mm).
 - 2) 3-3/4 inches (95 mm).
 - f. Bottom Rail Width:
 - 1) 3-3/4 inches (95 mm).
 - 2) 4-1/2 inches (114 mm).
 - g. Aluminum Panels: 0.050 inch (1.3 mm) thick, aluminum.
 - h. Stiles and Rails: 6063 - T6 aluminum.
 - i. Glazing:
 - 1) 1/8 inch (3 mm) Tempered glass.
2. Finish and Color:
 - a. Anodized Finish: Clear anodized.
3. Windload Design: Provide to meet the Design/Performance requirements specified.
4. Hardware: Galvanized steel hinges and fixtures. Precision bearing rollers with hardened steel races.
5. Lock:
 - a. None
6. Weatherstripping:
 - a. Flexible bulb-type strip at bottom section.
 - b. Flexible Jamb seals.
 - c. Flexible Header seal.
7. Track: Provide track as recommended by manufacturer to suit loading required and clearances available.
8. Motor: Direct drive, integrated gear motor/brake assembly sized for openings. Provide with a manual hand chain for operation during power outages. Operator and drive assembly is provided with all wiring harnesses needed direct from the factory
 - a. Entrapment Protection: Required for momentary contact or,radio control operation.
 - 1) Wireless electric sensing edge monitored to meet UL 325/2010.
 - 2) Built-in (to motor assembly) brake mechanism eliminates uncontrolled curtain travel independent of other safeties.
 - b. Operator Controls:
 - 1) Push-button operated control stations with open, close, and stop buttons.
 - 2) Surface mounting.
 - 3) Interior location.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until openings have been properly prepared.
- B. Verify wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.
- C. Verify electric power is available and of correct characteristics.
- D. If preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

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

3.3 INSTALLATION

- A. Install overhead doors and track in accordance with approved shop drawings and the manufacturer's printed instructions.
- B. Coordinate installation with adjacent work to ensure proper clearances and allow for maintenance.
- C. Anchor assembly to wall construction and building framing without distortion or stress.
- D. Securely brace door tracks suspended from structure. Secure tracks to structural members only.
- E. Fit and align door assembly including hardware.
- F. Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.

3.4 CLEANING AND ADJUSTING

- A. Adjust door assembly to smooth operation and in full contact with weatherstripping.
- B. Clean doors, frames and glass.
- C. Remove temporary labels and visible markings.

3.5 PROTECTION

- A. Do not permit construction traffic through overhead door openings after adjustment and cleaning.
- B. Protect installed products until completion of project.
- C. Touch-up, damaged coatings and finishes and repair minor damage before Substantial Completion.

END OF SECTION

SECTION 08410 - ALUMINUM ENTRANCES

PART 1 - GENERAL

This Contractor shall furnish all labor, materials, equipment and appliances and shall perform all operations in connection with the complete installation of aluminum entrances as shown on the drawings.

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION OF WORK:

- A. Extent of aluminum entrances is shown on drawings and schedules.
- B. Types of aluminum entrances required include the following:
 - 1. Exterior entrance doors.
 - 2. Frames for exterior entrances.
 - 3. Frames for exterior openings.
 - 4. Frames for interior openings.
- C. Glazing: Refer to "Glass and Glazing" section of Division 8 for glazing requirements for aluminum entrances, including doors specified herein to be factory preglazed.
- D. Hardware for all doors specified in Division 8 Section "Finish Hardware".

1.3 SYSTEM DESCRIPTION:

- A. Performance and Testing:
 - 1. Thermal Movement: Fabricate exterior components from manufacturer's stock systems which have been designed to provide for expansion and contraction resulting from ambient temperature range of 120°F (49°C).
 - 2. Weather Resistance: Fabricate exterior components from manufacturer's stock systems which have been tested to demonstrate permanent resistance to leakages as follows with test pressure differential

of 10% of design loading (excluding operable door edges).

3. Air infiltration: Not more than 0.06 cfm per square foot, tested in accordance with ASTM E 283.
4. Water infiltration: No uncontrolled water penetration, tested in accordance with ASTM E 331.

1.4 QUALITY ASSURANCE:

- A. Drawings: Plans, elevations and details showing spacings of members as well as profile and similar dimensional requirements of aluminum entrances. Minor deviations will be accepted in order to utilize manufacturer's standard products when, in Engineers sole judgement, such deviations do not materially detract from design concept or intended performances.
- B. Field Measurements: Wherever possible, take field measurements prior to preparation of shop drawings and fabrication, to ensure proper fitting of work. However, proceed with fabrication and coordinate installation tolerances as necessary when field measurements might delay work.
- C. Samples: Submit samples of color of aluminum finish, on 12" long sections of extrusions or formed shapes and on 6" square sheets.

PART 2 - PRODUCTS

- 2.1 Manufacturer: Subject to compliance with requirements, provide products of one of the following or approved equal:

Cross Aluminum Products
Efco Corp.
Kawneer Company Inc.

2.2 MATERIALS AND ACCESSORIES:

- A. Aluminum Members: Alloy and temper recommended by manufacturer for strength, corrosion resistance, and application of required finish; ASTM B 221 for extrusions, ASTM B 209 for sheet/plate.
- B. Fasteners: Aluminum, non-magnetic stainless steel, or other materials warranted by manufacturer to be noncorrosive and compatible with aluminum components.
 1. Do not use exposed fasteners except where

unavoidable for application of hardware. Match finish of adjoining metal.

2. Provide Phillips flat-head machine screws for exposed fasteners.
- C. Concealed Flashing: Dead-soft stainless steel, 26-gage minimum, type selected by manufacturer for compatibility.
- D. Brackets and Reinforcements: Manufacturer's high-strength aluminum units where feasible; otherwise, nonmagnetic stainless steel or hot-dip galvanized steel complying with ASTM A 386.
- E. Concrete/Masonry Inserts: Cast-iron, malleable iron, or hot-dip galvanized steel complying with ASTM A 386.
- F. Bituminous Coatings: Cold-applied asphalt mastic complying with SSPC-PS 12, compounded for 30-mil thickness per coat.
- G. Clear Protective Coatings: AAMA 602.2, compounded specifically for protection of aluminum finish during construction.
- H. Compression Weatherstripping: Manufacturer's standard replaceable stripping of either molded neoprene gaskets complying with ASTM D 200 or molded PVC gaskets complying with ASTM D 2287.
- I. Sliding Weatherstripping: Manufacturer's standard replaceable stripping of wool, polypropylene, or nylon woven pile, with nylon fabric and aluminum strip backing, complying with AAMA 701.2.

2.3 FABRICATION:

- A. General:
 1. Sizes and Profiles: Required sizes for door and frame units, including profile requirements, are shown on drawings. Any variable dimensions are indicated, together with maximum and minimum dimensions required to achieve design requirements and coordination with other work.
 2. Details shown are based upon standard details by manufacturer indicated. Similar details by other manufacturers listed will be acceptable, provided they comply with other requirements, including profile limitations.
- B. Prefabrication: To greatest extent possible, complete

fabrication assembly, finishing, hardware application, and other work before shipment to project site. Disassemble components only as necessary for shipment and installation.

1. Do not drill and tap for surface-mounted hardware items until time of installation of project site.
 2. Sequence: Complete cutting, fitting, forming, drilling, and grinding of metal work prior to cleaning, finishing, surface treatment, and applications of finishes. Remove arrises from cut edges and ease edges and corner to radius of approximately 1/64".
 3. Continuity: Maintain accurate relation of planes and angles, with hairline fit of contacting members.
 4. Fasteners: Conceal fasteners wherever possible.
- C. Weatherstripping: For all doors, provide compression weatherstripping against fixed stops; at other edges, provide sliding weatherstripping retained in adjustable strip mortised into door edge.
1. Provide heavy-duty, hollow, compression weatherstripping in bottom door rail, adjustable for contact with threshold.

2.4 Aluminum Door:

- A. Stile-and-Rail Type Entrance Doors: Provide tubular frame members, fabricated with mechanical joints using heavy inserted reinforcing plates and concealed tie-rods or j-bolts.
1. Glazing: Fabricate doors to facilitate replacement of glass or panels, without disassembly of stiles and rails. Provide snap-on extruded aluminum glazing stops, with exterior stops anchored for nonremoval.
 2. Design: Provide 1-3/4 inch-thick Kawneer 500 Wide Stile doors.
 3. Finish: Class 1 colored Anodic coating.
 4. Color shall TBD, verify with Engineer.

B. Aluminum Planked Type Entrance Doors:

1. Door sections to be 4" tubular shapes.
2. Joiner shall be steel tie rod bolted through stiles minimum of 4 ties.
3. Minimum wall thickness .100" with .187" minimum at lock and hinge stiles.
4. Provide top and bottom closure strips.
5. Core to be insulated.
6. Finish coating equal to fluorocarbon 2-coat thermocured system; comply with AAMA 605.2.
7. Color shall be Modern Ivory, a special match color through MAB Paints to match existing doors.

2.5 Aluminum Door Frames and Fixed Window Opening Frames:

- A. Fabricate tubular frame assemblies Kawneer (or equal) 451T series with thermal break for exterior frames and 451 series for interior frames, as shown with either welded or mechanical joints. All frames shall be in accordance with manufacturer's standard, reinforced as necessary to support required loads.
1. Finish: Class 1 colored Anodic coating.
 2. Color shall be #40 dark bronze, verify with Engineer.

PART 3 - EXECUTION

3.1 INSTALLATION:

- A. Comply with manufacturer's instructions and recommendations for installation of aluminum entrances.
- B. Set units plumb, level, and true to line, without warp or rack of framing members, doors, or panels. Anchor securely in place, separating aluminum and other corrodible metal surfaces from sources of corrosion of electrolytic action at points of contact with other materials.
- C. Drill and tap frames and doors and apply surface-mounted hardware items, complying with hardware manufacturer's instructions and template requirements. Use concealed fasteners wherever possible.
- D. Set sill members and other members in bed of compound as shown, or with joint fillers or gaskets as shown to provide weathertight construction.

2275-1

3.2 ADJUST AND CLEAN:

- A. Adjust operating hardware to function properly, without binding, and to provide tight fit at contact points and weatherstripping.
- B. Remove protective coating when completion of construction activities no longer requires its retention.

END OF SECTION 08410

SECTION 08710 - DOOR HARDWARE

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes:

1. Mechanical and electrified door hardware

B. Section excludes:

1. Windows
2. Cabinets (casework), including locks in cabinets
3. Signage
4. Toilet accessories
5. Overhead doors

C. Related Sections:

1. Division 01 Section "Alternates" for alternates affecting this section.
2. Division 06 Section "Rough Carpentry"
3. Division 06 Section "Finish Carpentry"
4. Division 07 Section "Joint Sealants" for sealant requirements applicable to threshold installation specified in this section.
5. Division 08 Sections:
 - a. "Metal Doors and Frames"
 - b. "Flush Wood Doors"
 - c. "Interior Aluminum Doors and Frames"
 - d. "Aluminum-Framed Entrances and Storefronts"

1.02 REFERENCES

A. UL LLC

1. UL 10B - Fire Test of Door Assemblies
2. UL 10C - Positive Pressure Test of Fire Door Assemblies
3. UL 1784 - Air Leakage Tests of Door Assemblies
4. UL 305 - Panic Hardware

B. DHI - Door and Hardware Institute

1. Sequence and Format for the Hardware Schedule
2. Recommended Locations for Builders Hardware
3. Keying Systems and Nomenclature
4. Installation Guide for Doors and Hardware

C. NFPA – National Fire Protection Association

1. NFPA 80 – 2016 Edition – Standard for Fire Doors and Other Opening Protectives
2. NFPA 101 – Life Safety Code
3. NFPA 105 – Smoke and Draft Control Door Assemblies
4. NFPA 252 – Fire Tests of Door Assemblies

D. ANSI - American National Standards Institute

1. ANSI A117.1 – 2017 Edition – Accessible and Usable Buildings and Facilities
2. ANSI/BHMA A156.1 - A156.29, and ANSI/BHMA A156.31 - Standards for Hardware and Specialties
3. ANSI/BHMA A156.28 - Recommended Practices for Keying Systems
4. ANSI/WDMA I.S. 1A - Interior Architectural Wood Flush Doors
5. ANSI/SDI A250.8 - Standard Steel Doors and Frames

1.03 SUBMITTALS

A. General:

1. Submit in accordance with Conditions of Contract and Division 01 Submittal Procedures.
2. Prior to forwarding submittal:
 - a. Review drawings and Sections from related trades to verify compatibility with specified hardware.
 - b. Highlight, encircle, or otherwise specifically identify on submittals: deviations from Contract Documents, issues of incompatibility or other issues which may detrimentally affect the Work.

B. Action Submittals:

1. Product Data: Submit technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
2. Samples for Verification: If requested by Architect, submit production sample of requested door hardware unit in finish indicated and tagged with full description for coordination with schedule.
 - a. Samples will be returned to supplier. Units that are acceptable to Architect may, after final check of operations, be incorporated into Work, within limitations of key coordination requirements.
3. Door Hardware Schedule:
 - a. Submit concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate fabrication of other work critical in Project construction schedule.
 - b. Submit under direct supervision of a Door Hardware Institute (DHI) certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule published by DHI.
 - c. Indicate complete designations of each item required for each opening, include:
 - 1) Door Index: door number, heading number, and Architect's hardware set number.
 - 2) Quantity, type, style, function, size, and finish of each hardware item.
 - 3) Name and manufacturer of each item.
 - 4) Fastenings and other pertinent information.
 - 5) Location of each hardware set cross-referenced to indications on Drawings.
 - 6) Explanation of all abbreviations, symbols, and codes contained in schedule.
 - 7) Mounting locations for hardware.
 - 8) Door and frame sizes and materials.
 - 9) Degree of door swing and handing.
4. Key Schedule:
 - a. After Keying Conference, provide keying schedule that includes levels of keying, explanations of key system's function, key symbols used, and door numbers controlled.
 - b. Use ANSI/BHMA A156.28 "Recommended Practices for Keying Systems" as guideline for nomenclature, definitions, and approach for selecting optimal keying system.
 - c. Provide 3 copies of keying schedule for review prepared and detailed in accordance with referenced DHI publication. Include schematic keying diagram and index each key to unique door designations.
 - d. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.

- e. Provide one complete bitting list of key cuts and one key system schematic illustrating system usage and expansion. Forward bitting list, key cuts and key system schematic directly to Owner, by means as directed by Owner.
- f. Prepare key schedule by or under supervision of supplier, detailing Owner's final keying instructions for locks.

C. Informational Submittals:

- 1. Provide Qualification Data for Supplier, Installer and Architectural Hardware Consultant.
- 2. Provide Product Data:
 - a. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.
 - b. Include warranties for specified door hardware.

D. Closeout Submittals:

- 1. Operations and Maintenance Data: Provide in accordance with Division 01 and include:
 - a. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.
 - b. Catalog pages for each product.
 - c. Final approved hardware schedule edited to reflect conditions as installed.
 - d. Final keying schedule
 - e. Copy of warranties including appropriate reference numbers for manufacturers to identify project.

E. Inspection and Testing:

- 1. Submit written reports to the Owner and Authority Having Jurisdiction (AHJ) of the results of functional testing and inspection for:
 - a. Fire door assemblies, in compliance with NFPA 80.
 - b. Required egress door assemblies, in compliance with NFPA 101.

1.04 QUALITY ASSURANCE

A. Qualifications and Responsibilities:

- 1. Supplier: Recognized architectural hardware supplier with a minimum of 5 years documented experience supplying both mechanical and electromechanical door hardware similar in quantity, type, and quality to that indicated for this Project. Supplier to be recognized as a factory direct distributor by the manufacturer of the primary materials with a warehousing facility in the Project's vicinity. Supplier to have on staff, a certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) available to Owner, Architect, and Contractor, at reasonable times during the Work for consultation.
- 2. Installer: Qualified tradesperson skilled in the application of commercial grade hardware with experience installing door hardware similar in quantity, type, and quality as indicated for this Project.
- 3. Architectural Hardware Consultant: Person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and meets these requirements:
 - a. For door hardware: DHI certified AHC or DHC.
 - b. Can provide installation and technical data to Architect and other related subcontractors.
 - c. Can inspect and verify components are in working order upon completion of installation.
- 4. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.

B. Certifications:

- 1. Fire-Rated Door Openings:

- a. Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction.
 - b. Provide only items of door hardware that are listed products tested by UL LLC, Intertek Testing Services, or other testing and inspecting organizations acceptable to authorities having jurisdiction for use on types and sizes of doors indicated, based on testing at positive pressure and according to NFPA 252 or UL 10C and in compliance with requirements of fire-rated door and door frame labels.
2. Smoke and Draft Control Door Assemblies:
- a. Provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105
 - b. Comply with the maximum air leakage of 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at tested pressure differential of 0.3-inch wg (75 Pa) of water.
3. Accessibility Requirements:
- a. Comply with governing accessibility regulations cited in "REFERENCES" article 087100, 1.02.D3 herein for door hardware on doors in an accessible route. This project must comply with all Federal Americans with Disability Act regulations and all Local Accessibility Regulations.

C. Pre-Installation Meetings

1. Keying Conference
- a. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including:
 - 1) Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
 - 2) Preliminary key system schematic diagram.
 - 3) Address for delivery of keys.
2. Pre-installation Conference
- a. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - b. Inspect and discuss preparatory work performed by other trades.
 - c. Review required testing, inspecting, and certifying procedures.
 - d. Review questions or concerns related to proper installation and adjustment of door hardware.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site. Promptly replace products damaged during shipping.
- B. Tag each item or package separately with identification coordinated with final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package. Deliver each article of hardware in manufacturer's original packaging.
- C. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.
- D. Provide secure lock-up for door hardware delivered to Project. Control handling and installation of hardware items so that completion of Work will not be delayed by hardware losses both before and after installation.
- E. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

1.06 COORDINATION

- A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete.
- B. Installation Templates: Distribute for doors, frames, and other work specified to be factory or shop prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

1.07 WARRANTY

- A. Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within published warranty period.
 - 1. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.
 - 2. Warranty Period: Beginning from date of Substantial Completion, for durations indicated in manufacturer's published listings.
 - a. Mechanical Warranty
 - 1) Locks: 3 years
 - 2) Exit Devices: 3 years
 - 3) Closers: 30 years

1.08 MAINTENANCE

- A. Furnish complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.
- B. Turn over unused materials to Owner for maintenance purposes.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. The Owner requires use of certain products for their unique characteristics and project suitability to ensure continuity of existing and future performance and maintenance standards. After investigating available product offerings, the Awarding Authority has elected to prepare proprietary specifications. These products are specified with the notation: "No Substitute."
 - 1. Where "No Substitute" is noted, submittals and substitution requests for other products will not be considered.
- B. Approval of alternate manufacturers and/or products other than those listed as "Scheduled Manufacturer" or "Acceptable Manufacturers" in the individual article for the product category are only to be considered by official substitution request in accordance with section 01 25 00.
- C. Approval of products from manufacturers indicated in "Acceptable Manufacturers" is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer's product.
- D. Where specified hardware is not adaptable to finished shape or size of members requiring hardware, furnish suitable types having same operation and quality as type specified, subject to Architect's approval.

2.02 MATERIALS

A. Fabrication

1. Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. provide screws according to manufacturer's recognized installation standards for application intended.
2. Finish exposed screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work including prepared for paint surfaces to receive painted finish.
3. Provide concealed fasteners wherever possible for hardware units exposed when door is closed. Coordinate with "Metal Doors and Frames", "Flush Wood Doors", "Stile and Rail Wood Doors" to ensure proper reinforcements. Advise the Architect where visible fasteners, such as thru bolts, are required.

B. Provide screws, bolts, expansion shields, drop plates and other devices necessary for hardware installation.

1. Where fasteners are exposed to view: Finish to match adjacent door hardware material.

2.03 HINGES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. Ives 5BB series
2. Acceptable Manufacturers and Products:
 - a. Hager BB1191/1279 series
 - b. McKinney TB series

B. Requirements:

1. Provide hinges conforming to ANSI/BHMA A156.1.
2. Provide five knuckle, ball bearing hinges.
3. 1-3/4 inch (44 mm) thick doors, up to and including 36 inches (914 mm) wide:
 - a. Exterior: Standard weight, bronze or stainless steel, 4-1/2 inches (114 mm) high
 - b. Interior: Standard weight, steel, 4-1/2 inches (114 mm) high
4. 1-3/4 inch (44 mm) thick doors over 36 inches (914 mm) wide:
 - a. Exterior: Heavy weight, bronze/stainless steel, 5 inches (127 mm) high
 - b. Interior: Heavy weight, steel, 5 inches (127 mm) high
5. 2 inches or thicker doors:
 - a. Exterior: Heavy weight, bronze or stainless steel, 5 inches (127 mm) high
 - b. Interior: Heavy weight, steel, 5 inches (127 mm) high
6. Adjust hinge width for door, frame, and wall conditions to allow proper degree of opening.
7. Provide three hinges per door leaf for doors 90 inches (2286 mm) or less in height, and one additional hinge for each 30 inches (762 mm) of additional door height.
8. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
 - a. Steel Hinges: Steel pins
 - b. Non-Ferrous Hinges: Stainless steel pins
 - c. Out-Swinging Exterior Doors: Non-removable pins
 - d. Out-Swinging Interior Lockable Doors: Non-removable pins
 - e. Interior Non-lockable Doors: Non-rising pins

2.04 CONTINUOUS HINGES

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Ives
2. Acceptable Manufacturers:
 - a. Select
 - b. ABH
 - c. Hager

B. Requirements:

1. Provide aluminum geared continuous hinges conforming to ANSI/BHMA A156.26, Grade 1.
2. Provide aluminum geared continuous hinges, where specified in the hardware sets, fabricated from 6063-T6 aluminum.
3. Provide split nylon bearings at each hinge knuckle for quiet, smooth, self-lubricating operation.
4. Provide hinges capable of supporting door weights up to 450 pounds, and successfully tested for 1,500,000 cycles.
5. On fire-rated doors, provide aluminum geared continuous hinges classified for use on rated doors by testing agency acceptable to authority having jurisdiction.
6. Provide hinges 1 inch (25 mm) shorter in length than nominal height of door, unless otherwise noted or door details require shorter length and with symmetrical hole pattern.

2.05 CYLINDRICAL LOCKS – GRADE 1

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. Schlage ND series
2. Acceptable Manufacturers and Products:
 - a. Best 9K series

B. Requirements:

1. Provide cylindrical locks conforming to ANSI/BHMA A156.2 Series 4000, Grade 1, and UL Listed for 3-hour fire doors.
2. Cylinders: Refer to "KEYING" article, herein.
3. Provide locks with standard 2-3/4 inches (70 mm) backset, unless noted otherwise, with 1/2-inch latch throw. Provide proper latch throw for UL listing at pairs.
4. Provide locksets with separate anti-rotation thru-bolts, and no exposed screws.
5. Provide independently operating levers with two external return spring cassettes mounted under roses to prevent lever sag.
6. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
7. Lever Trim: Solid cast levers without plastic inserts and wrought roses on both sides.
 - a. Lever Design: Rhodes.

2.06 EXIT DEVICES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:

- a. Von Duprin 99/33A series
2. Acceptable Manufacturers and Products:
 - a. No Substitute
- B. Requirements:
1. Provide exit devices tested to ANSI/BHMA A156.3 Grade 1 and UL listed for Panic Exit or Fire Exit Hardware.
 2. Cylinders: Refer to "KEYING" article, herein.
 3. Provide grooved touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.
 4. Touchpad must extend a minimum of one half of door width. No plastic inserts are allowed in touchpads.
 5. Provide exit devices with weather resistant components that can withstand harsh conditions of various climates and corrosive cleaners used in outdoor pool environments.
 6. Provide flush end caps for exit devices.
 7. Provide exit devices with manufacturer's approved strikes.
 8. Provide exit devices cut to door width and height. Install exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by Architect.
 9. Mount mechanism case flush on face of doors or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.
 10. Provide cylinder or hex-key dogging as specified at non fire-rated openings.
 11. Removable Mullions: 2 inches (51 mm) x 3 inches (76 mm) steel tube. Where scheduled as keyed removable mullion, provide type that can be removed by use of a keyed cylinder, which is self-locking when re-installed.
 12. Provide factory drilled weep holes for exit devices used in full exterior application, highly corrosive areas, and where noted in hardware sets.
 13. Top latch mounting: double- or single-tab mount for steel doors, face mount for aluminum doors eliminating requirement of tabs, and double tab mount for wood doors.
 14. Provide exit devices with optional trim designs to match other lever and pull designs used on the project.
 15. Special Options:
 - a. CVC
 - 1) Provide cable-actuated concealed vertical latch system in two-point for non-rated or fire rated wood doors up to a 90 minute rating and less bottom latch (LBL) configuration for non-rated or fire rated wood doors up to 20 minute rating. Vertical rods not permitted.
 - a) Cable: Stainless steel with abrasive resistant coating. Conduit and core wire ends snap into latch and center slides without use of tools.
 - b) Wood Door Prep: Maximum 1 inch x 1.1875 inch x 3.875 inches top latch pocket and 1 inch x 1.1875 inch x 5 inches bottom latch pocket which does not require the use of a metal wrap or edge for non-rated or fire rated wood doors up to a 45 minute rating.
 - c) Latchbolts and Blocking Cams: Manufactured from sintered metal low carbon copper-infiltrated steel, with molybdenum disulfide low friction coating.
 - d) Top Latchbolt: Minimum 0.38 inch (10 mm) and greater than 90-degree engagement with strike to prevent door and frame separation under high static load.
 - e) Bottom Latchbolt: Minimum of 0.44-inch (11 mm) engagement with strike.
 - f) Product Cycle Life: 1,000,000 cycles.
 - g) Latch Operation: Top and bottom latch operate independently of each other. Top latch fully engages top strike even when bottom latch is compromised. Separate trigger mechanisms not permitted.
 - h) Latch release does not require separate trigger mechanism.
 - i) Cable and latching system characteristics:
 - i. Installed independently of exit device installation, and capable of functioning on door prior to device and trim installation.
 - ii. Connected to exit device at single point in steel and aluminum doors, and two points for top and bottom latches in wood doors.

- iii. Bottom latch height adjusted, from single point for steel and aluminum doors and two points for wood doors, after system is installed and connected to exit device, while door is hanging
- iv. Bottom latch position altered up and down minimum of 2 inches (51 mm) in steel and aluminum doors without additional adjustment. Bottom latch deadlocks in every adjustment position in wood doors.
- v. Top and bottom latches in steel and aluminum doors and top latch in wood doors may be removed while door is hanging.

2.07 CYLINDERS

A. Manufacturers:

- 1. Scheduled Manufacturer and Product:
 - a. Existing System
- 2. Acceptable Manufacturers and Products:
 - a. No Substitute

B. Requirements:

- 1. Provide cylinders/cores to match Owner's existing key system, compliant with ANSI/BHMA A156.5; latest revision; cylinder face finished to match lockset, manufacturer's series as indicated. Refer to "KEYING" article, herein.

2.08 KEYING

A. Scheduled System:

- 1. Existing factory registered system:
 - a. Provide cylinders/cores keyed into Owner's existing factory registered keying system. Comply with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.

B. Requirements:

- 1. Construction Keying:
 - a. Replaceable Construction Cores.
 - 1) Provide temporary construction cores replaceable by permanent cores, furnished in accordance with the following requirements.
 - a) 3 construction control keys
 - b) 12 construction change (day) keys.
 - 2) Owner or Owner's Representative will replace temporary construction cores with permanent cores.
- 2. Permanent Keying:
 - a. Provide permanent cylinders/cores keyed by the manufacturer according to the following key system.
 - 1) Master Keying system as directed by the Owner.
 - b. Forward bitting list and keys separately from cylinders, by means as directed by Owner. Failure to comply with forwarding requirements will be cause for replacement of cylinders/cores involved at no additional cost to Owner.
 - c. Provide keys with the following features:
 - 1) Material: Nickel silver; minimum thickness of .107-inch (2.3mm)
 - d. Identification:

- 1) Mark permanent cylinders/cores and keys with applicable blind code for identification. Do not provide blind code marks with actual key cuts.
 - 2) Identification stamping provisions must be approved by the Architect and Owner.
 - 3) Stamp cylinders/cores and keys with Owner's unique key system facility code as established by the manufacturer; key symbol and embossed or stamped with "DO NOT DUPLICATE".
 - 4) Failure to comply with stamping requirements will be cause for replacement of keys involved at no additional cost to Owner.
 - 5) Forward permanent cylinders/cores to Owner, separately from keys, by means as directed by Owner.
- e. Quantity: Furnish in the following quantities.
- 1) Permanent Control Keys: 3.
 - 2) Master Keys: 6.
 - 3) Change (Day) Keys: 3 per cylinder/core that is keyed differently
 - 4) Key Blanks: Quantity as determined in the keying meeting.

2.09 DOOR CLOSERS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. LCN 4040XP series
2. Acceptable Manufacturers and Products:
 - a. No Substitute

B. Requirements:

1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. ISO 9000 certify closers. Stamp units with date of manufacture code.
2. Provide door closers with fully hydraulic, full rack and pinion action with high strength cast iron cylinder, and full complement bearings at shaft.
3. Cylinder Body: 1-1/2-inch (38 mm) diameter piston with 5/8-inch (16 mm) diameter double heat-treated pinion journal. QR code with a direct link to maintenance instructions.
4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards. Provide snap-on cover clip, with plastic covers, that secures cover to spring tube.
6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck. Provide graphically labelled instructions on the closer body adjacent to each adjustment valve. Provide positive stop on reg valve that prevents reg screw from being backed out.
7. Provide closers with solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers.
8. Pressure Relief Valve (PRV) Technology: Not permitted.
9. Finish for Closer Cylinders, Arms, Adapter Plates, and Metal Covers: Powder coating finish which has been certified to exceed 100 hours salt spray testing as described in ANSI Standard A156.4 and ASTM B117, or has special rust inhibitor (SRI).
10. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

2.10 PROTECTION PLATES

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Ives
2. Acceptable Manufacturers:
 - a. Trimco
 - b. Rockwood

B. Requirements:

1. Provide protection plates with a minimum of 0.050 inch (1 mm) thick, beveled four edges as scheduled. Furnish with sheet metal or wood screws, finished to match plates.
2. Sizes plates 1-1/2 inches (51 mm) less width of door on single doors, pairs of doors with a mullion, and doors with edge guards. Size plates 1 inch (25 mm) less width of door on pairs without a mullion or edge guards.
3. At fire rated doors, provide protection plates over 16 inches high with UL label.

2.11 DOOR STOPS AND HOLDERS

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Ives
2. Acceptable Manufacturers:
 - a. Trimco
 - b. Rockwood

B. Provide door stops at each door leaf:

1. Provide wall stops wherever possible. Provide concave type where lockset has a push button of thumbturn.
2. Where a wall stop cannot be used, provide universal floor stops.
3. Where wall or floor stop cannot be used, provide overhead stop.
4. Provide roller bumper where doors open into each other and overhead stop cannot be used.

2.12 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Zero International
2. Acceptable Manufacturers:
 - a. National Guard
 - b. Pemko

B. Requirements:

1. Provide thresholds, weather-stripping, and gasketing systems as specified and per architectural details. Match finish of other items.
2. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
3. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.

4. Size thresholds 1/2 inch (13 mm) high by 5 inches (127 mm) wide by door width unless otherwise specified in the hardware sets or detailed in the drawings.

2.13 SILENCERS

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Ives
2. Acceptable Manufacturers:
 - a. Rockwood
 - b. Trimco

B. Requirements:

1. Provide "push-in" type silencers for hollow metal or wood frames.
2. Provide one silencer per 30 inches (762 mm) of height on each single frame, and two for each pair frame.
3. Omit where gasketing is specified.

2.14 FINISHES

A. FINISH: BHMA 626/652 (US26D); EXCEPT:

1. Aluminum Geared Continuous Hinges: BHMA 628 (US28)
2. Protection Plates: BHMA 630 (US32D)
3. Door Closers: Powder Coat to Match
4. Weatherstripping: Clear Anodized Aluminum
5. Thresholds: Mill Finish Aluminum

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Prior to installation of hardware, examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance. Verify doors, frames, and walls have been properly reinforced for hardware installation.
- B. Submit a list of deficiencies in writing and proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Mount door hardware units at heights to comply with the following, unless otherwise indicated or required to comply with governing regulations.
 1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
 2. Custom Steel Doors and Frames: HMMA 831.
 3. Interior Architectural Wood Flush Doors: ANSI/WDMA I.S. 1A
 4. Installation Guide for Doors and Hardware: DHI TDH-007-20

- B. Install door hardware in accordance with NFPA 80, NFPA 101 and provide post-install inspection, testing as specified in section 1.03.E unless otherwise required to comply with governing regulations.
- C. Install each hardware item in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer.
- D. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.
- E. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.
- F. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- G. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.
- H. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated.
- I. Lock Cylinders:
 - 1. Install construction cores to secure building and areas during construction period.
 - 2. Replace construction cores with permanent cores as indicated in keying section.
 - 3. Furnish permanent cores to Owner for installation.
- J. Door Closers & Auto Operators: Mount closers/operators on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Mount closers/operators so they are not visible in corridors, lobbies and other public spaces unless approved by Architect.
- K. Thresholds: Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."
- L. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they may impede traffic or present tripping hazard.
- M. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
- N. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
- O. Door Bottoms and Sweeps: Apply to bottom of door, forming seal with threshold when door is closed.

3.03 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
 - 1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.

- B. Occupancy Adjustment: Approximately three to six months after date of Substantial Completion, examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors and door hardware.

3.04 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items per manufacturer's instructions to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

3.05 DOOR HARDWARE SCHEDULE

- A. The intent of the hardware specification is to specify the hardware for interior and exterior doors, and to establish a type, continuity, and standard of quality. However, it is the door hardware supplier's responsibility to thoroughly review existing conditions, schedules, specifications, drawings, and other Contract Documents to verify the suitability of the hardware specified.
- B. Discrepancies, conflicting hardware, and missing items are to be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application.
- C. Hardware items are referenced in the following hardware schedule. Refer to the above specifications for special features, options, cylinders/keying, and other requirements.
- D. Hardware Sets:

102675 OPT0350730 Version 1

Legend:












 Link to catalog cut sheet Electrified Opening

Hardware Group No. 1

For use on Door #(s):

101A 104A 105A

Provide each PR door(s) with the following:










QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	CONT. HINGE	112XY		628	IVE
1	EA	PANIC HARDWARE	CD-9949-DT		626	VON
1	EA	PANIC HARDWARE	CD-9949-NL		626	VON
1	EA	SFIC RIM CYLINDER	80-116		626	SCH
2	EA	SFIC MORTISE CYL.	80-132		626	SCH
3	EA	SMALL FORMAT IC	KEYED TO EXISTING SYSTEM		626	
2	EA	SURFACE CLOSER	4040XP SCUSH		689	LCN
2	EA	PA MOUNTING PLATE	4040XP-18PA SRT		689	LCN
2	EA	CUSH SHOE SUPPORT	4040XP-30 SRT		689	LCN
2	EA	BLADE STOP SPACER	4040XP-61 SRT		689	LCN
1	EA	WEATHERSTRIPPING	BY DOOR/FRAME MANUFACTURER			B/O
2	EA	DOOR SWEEP	8197AA		AA	ZER
1	EA	THRESHOLD	65A		A	ZER

Hardware Group No. 2

For use on Door #(s):

101B

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
6	EA	HINGE	5BB1HW 4.5 X 4.5 NRP		652	IVE
1	EA	FIRE EXIT HARDWARE	9949-L-F-06-LBL		626	VON
1	EA	FIRE EXIT HARDWARE	9949-L-F-06-LBLAFL		626	VON
2	EA	SFIC RIM CYLINDER	80-116		626	SCH
2	EA	SMALL FORMAT IC	KEYED TO EXISTING SYSTEM		626	
2	EA	SURFACE CLOSER	4040XP EDA		689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS		630	IVE
2	EA	FLOOR STOP	FS436/FS438 (AS REQ'D)		626	IVE
1	SET	MEETING STILE	328AA-S		AA	ZER
1	EA	GASKETING	488SBK PSA		BK	ZER






2275-1

Hardware Group No. 3

For use on Door #(s):

102A 103A

Provide each SGL door(s) with the following:










QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5		652	IVE
1	EA	PRIVACY LOCK	ND40S RHO		626	SCH
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CCV		626	IVE
1	EA	GASKETING	488SBK PSA		BK	ZER

Hardware Group No. 4

For use on Door #(s):

104B

Provide each PR door(s) with the following:





QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
6	EA	HINGE	5BB1HW 4.5 X 4.5 NRP		652	IVE
1	EA	PANIC HARDWARE	CD-9949-DT-LBL		626	VON
1	EA	PANIC HARDWARE	CD-9949-NL-LBL		626	VON
1	EA	SFIC RIM CYLINDER	80-116		626	SCH
2	EA	SFIC MORTISE CYL.	80-132		626	SCH
3	EA	SMALL FORMAT IC	KEYED TO EXISTING SYSTEM		626	
2	EA	SURFACE CLOSER	4040XP SHCUSH		689	LCN
1	EA	PA MOUNTING PLATE	4040XP-18PA SRT		689	LCN
1	EA	CUSH SHOE SUPPORT	4040XP-30 SRT		689	LCN
1	EA	BLADE STOP SPACER	4040XP-61 SRT		689	LCN

Hardware Group No. 5

For use on Door #(s):

105B

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5		652	IVE
1	EA	DBL CYL STORE LOCK	ND66BDC RHO		626	SCH
2	EA	SMALL FORMAT IC	KEYED TO EXISTING SYSTEM		626	
1	EA	WALL STOP	WS406/407CCV		626	IVE
3	EA	SILENCER	SR64		GRY	IVE





2275-1

Hardware Group No. 6

For use on Door #(s):

106A 107A

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5		652	IVE
1	EA	PASSAGE SET	ND10S RHO		626	SCH
1	EA	WALL STOP	WS406/407CCV		626	IVE
3	EA	SILENCER	SR64		GRY	IVE

END OF SECTION

SECTION 08800 - GLASS AND GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 DESCRIPTION OF WORK:

- A. Definitions: "Glass" includes prime glass, processed glass, and fabricated glass products. "Glazing" includes glass installation and materials used to install glass. Types of work in this section include glass and glazing for:

- 1. Window Units
- 2. Entrance and Other Doors
- 3. Aluminum Entrances
- 4. Fixed and Side Lights

- B. "Glass Products" is hereby defined to include glazing plastics.

1.3 QUALITY ASSURANCE:

- A. Prime Glass Manufacturer: One of the following for each type/color/pattern of glass.

- 1. Ford Glass Company
- 2. Libbey-Owens-Ford Company
- 3. PPG Industries, Inc.

- B. Safety Glass Standard: CPSC 16 CFR 1201.

1.4 SUBMITTALS:

- A. Samples: 2 samples, 12" square, of each glass product, except for clear single-pane units.

PART 2- PRODUCTS

2.1 Materials

2.2 Glass Products:

- A. Materials shall conform to the following requirements:
1. "Glass, Plate, Sheet, Figured, Float, Flat for Glazing and Other Uses", FS-DD-G-451C.
- B. Laminated safety glass shall be manufactured to comply with federal specification DD-G-451d, 1977 and ANSI Z97.1, 1975. Type 1/4" clear or tinted (Grey Standard Tint) DSD float laminated plastic thickness .030".
- C. Tempered Glass shall be heat treated double strength, A Grade, float glass, 1/4" thickness clear or tinted (Bronze Standard Tint).
- D. Wire glass shall be 1/4" thick clear rolled glass with .020" diameter wire welded into squares or rectangular pattern embedded in approximate center of sheet. Glass shall be polished both sides.
- E. Spandral Glass: Grade A (Heat Strengthened), unless otherwise indicated; Style II (interior surface ceramic coated); Type I (float); Quality Q3 (Glazing select), and as follows:
1. Color Bronze: Provide color as selected by Engineer from Manufacturer's standard colors.
 2. Insulated Backing: Factory laminate the following materials on back of each glass unit, with edge treatment as required for application indicated:
 3. Glass fiber insulation, 2-lb. per Cu. Ft. density, 1" thick, with 0.005" thick Foil-Scrim-Kraft vapor retarder backing.
- F. 1" Insulating glass shall be total 1" thick composed of two sheets of 1/4" glass (Glass must meet State and National Codes) with 1/2" air space.
1. Glass sheets shall be separated with metal spacers and sealed with a polyisobutylene sealant. Air space shall be at atmospheric pressure and space shall be kept dehydrated with a permanent drying agent in the air space.
 2. Outdoor sheet to be Bronze, indoor sheet shall be clear glass.
 - a. Manufacturer's standard tint, with visible light transmittance of 16%, summer daytime U-value of 0.58, winter nighttime U-value of 0.49, shading coefficient of 0.38 and outdoor reflectance of 37%.

2.3 GLAZING SEALANTS AND COMPONENTS:

- A. General: Provide color of exposed sealant/compound indicated or if not otherwise indicated, as selected by Engineer from manufacturer's standard colors, or black if no color is selected. Comply with manufacturer's recommendations for selection of hardness, depending upon the location of each application, conditions at time of installation, and performance requirements as indicated. Select materials, and variations or modifications, carefully for compatibility with surfaces contacted in the installation.
- B. Part Polysulfide Glazing Sealant (2Ps-GS): Elastomeric polysulfide sealant complying with FS TT-S-227, Class A, Type 2; specially compounded and tested to show a minimum of 20 years resistance to deterioration in normal glazing applications.

2.4 GLAZING GASKETS:

- A. Molded Neoprene Glazing Gaskets (MN-GG): Molded or extruded neoprene gaskets of the profile and hardness required for water tight construction; complying with ASTM D 2000 designation 2BC 415 to 3BC 620, black.

2.5 MISCELLANEOUS GLAZING MATERIALS:

- A. Cleaners, Primers and Sealers: Type recommended by sealant or gasket manufacturer. Structural silicone w/silicone compatible tape backer.
- B. Setting Blocks: Neoprene or EPDM, 70-90 durometer hardness, with proven compatibility with sealants used.
- C. Spacers: Neoprene or EPDM, 40-50 durometer hardness and proven compatibility with sealants used.

PART 3 - EXECUTION

3.1 STANDARDS AND PERFORMANCE:

- A. Watertight and airtight installation of each glass product is required, except as otherwise shown. Each installation must withstand normal temperature changes, wind loading, impact loading (for operating sash and doors), without failure including loss or breakage of glass, failure of sealants or gaskets to remain watertight and airtight, deterioration of glazing materials and other defects in the work.

- B. Protect glass from edge damage during handling and installation, and subsequent operation of glazed components of the work. During installation, discard units with significant edge damage or other imperfections.
- C. Glazing channel dimensions as shown are intended to provide necessary bite on glass, minimum edge clearance, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by job conditions at time of installation.
- D. Comply with combined recommendations and technical reports by manufacturers of glass and glazing products as used in each glazing channel, and with recommendations of Flat Glass Marketing Association "Glazing Manual", except where more stringent requirements are indicated.

3.2 PREPARATION FOR GLAZING:

- A. Clean glazing channel and other framing members to receive glass, immediately before glazing. Remove coatings which are not firmly bonded to substrate. Remove lacquer from metal surfaces where elastomeric sealants are used.
- B. Apply primer or sealant to joint surfaces where recommended by sealant manufacturer.

3.3 GLAZING:

- A. Install setting blocks of proper size in sill rabbet, located 1/4th of glass width from each corner. Set blocks in thin course of heel-bead compound, if any.
- B. Provide spacers inside and out, of proper size and spacing, for glass sizes larger than 50 united inches, except where gaskets or preshimmed tapes are used for glazing. Provide 1/8" minimum bite of spacers on glass and use thickness equal to sealant width, except with sealant tape use thickness slightly less than final compressed thickness of tape.
- C. Set units of glass in each series with uniformity of pattern, draw, bow, and similar characteristics.
- D. Voids and Filler Rods: Prevent exudation of sealant or compound by forming voids or installing filler rods in

channel at heel of jambs and head (do not leave voids in sill channels), except as otherwise indicated and depending on light size, thickness and type of glass, and complying with manufacturer's recommendations.

- E. Force sealants into channel to eliminate voids and to ensure complete "wetting" or bond of sealant to glass and channel surfaces.
- F. Tool exposed surfaces of glazing liquids and compounds to provide a substantial "wash" away from glass. Install pressurized tapes and gaskets to protrude slightly out of channel, so as to eliminate dirt and moisture pockets.
- G. Clean and trim excess glazing materials from glass and stops or frames promptly after installation, and eliminate stains and discolorations.
- H. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage to ensure that gasket will not "walk" out when installation is subjected to movement. Anchor gasket to stop with matching ribs, or by proven adhesives, including embedment of gasket tail in cured heel bead.
- I. Gasket Glazing: Miter cut and bond ends together at corners where gaskets are used for channel glazing, so that gaskets will not pull away from corners and result in voids or leaks in glazing system.
- J. Tape Glazing:
 1. Position tapes on fixed stops so that when compressed by glass their exposed edges are flush with or protrude slightly above sightline of stops.
 2. Install tapes continuously but not in one continuous length. Do not stretch tapes to make them fit opening.
 3. Where framing joints are vertical, cover these joints by applying tapes to heads and sills first and then to jambs. Where framing joints are horizontal, cover these joints by applying tapes to jambs and then to heads and sills.
 4. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
 5. Do not remove release paper from tape until just before each lite is installed.

6. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

3.4 CURE, PROTECTION AND CLEANING:

- A. Protect exterior glass from breakage immediately upon installation, by use of crossed streamers attached to framing and held away from glass. Do not apply markers to surfaces of glass. Remove non-permanent labels and clean surfaces. Cure sealants for high early strength and durability.
- B. Remove and replace glass which is broken, chipped, cracked, abraded or damaged in other ways during construction period, including natural causes, accidents and vandalism.
- C. Wash and polish glass on both faces not more than 4 days prior to date scheduled for inspections intended to establish date of substantial completion in each area of project. Comply with glass product manufacturer's recommendations for final cleaning.

END OF SECTION 08800

School Zone Fine Fissured AirAssure**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

A. Section Includes

1. Acoustical ceiling panels
2. Exposed grid suspension system
3. Wire hangers, fasteners, main runners, cross tees, and wall angle moldings
4. Perimeter Trim

B. Related Sections

1. Divisions 23 - HVAC Air Distribution
2. Division 26 - Electrical

C. Alternates

1. Prior Approval: Unless otherwise provided for in the Contract documents, proposed product substitutions may be submitted no later than TEN (10) working days prior to the date established for receipt of bids. Acceptability of a proposed substitution is contingent upon the Architect's review of the proposal for acceptability and approved products will be set forth by the Addenda. If included in a Bid are substitute products that have not been approved by Addenda, the specified products shall be provided without additional compensation.

2. Submittals that do not provide adequate data for the product evaluation will not be considered. The proposed substitution must meet all requirements of this section, including but not necessarily limited to, the following: Single source materials suppliers (if specified in Section 1.5); Underwriters' Laboratories Classified Acoustical performance; Panel design, size, composition, color, and finish; Suspension system component profiles and sizes; Compliance with the referenced standards.

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. ASTM A 1008 Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability
2. ASTM A 641 Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire

3. ASTM A 653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process

4. ASTM C 423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method

5. ASTM C 635 Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings

6. ASTM C 636 Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels

7. ASTM D 3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber

8. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials

9. ASTM E 580 Installation of Metal Suspension Systems in Areas Requiring Moderate Seismic Restraint

10. ASTM E 1111 Standard Test Method for Measuring the Interzone Attenuation of Ceilings Systems

11. ASTM E 1414 Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum

12. ASTM E 1264 Classification for Acoustical Ceiling Products

B. International Building Code

C. ASHRAE Standard 62.1-2004, Ventilation for Acceptable Indoor Air Quality

D. NFPA 70 National Electrical Code

E. ASCE 7 American Society of Civil Engineers, Minimum Design Loads for Buildings and Other Structures

F. International Code Council-Evaluation Services - AC 156 Acceptance Criteria for Seismic Qualification Testing of Non-structural Components

G. International Code Council-Evaluation Services Report - Seismic Engineer Report

1. ESR 1308 - Armstrong Suspension Systems

H. International Association of Plumbing and Mechanical Officials - Seismic Engineer Report

1. 0244 - Armstrong Single Span Suspension System

I. California Department of Public Health CDPH/EHLB Emission Standard Method Version 1.2 2017

J. LEED - Leadership in Energy and Environmental Design is a set of rating systems for the design, construction, operation, and maintenance of green buildings

K. International Well Building Standard

L. Mindful Materials

M. Living Building Challenge

N. U.S. Department of Agriculture BioPreferred program (USDA BioPreferred).

1.4 SYSTEM DESCRIPTION

Continuous/Wall-to-Wall

1.5 SUBMITTALS

A. Product Data: Submit manufacturer's technical data for each type of acoustical ceiling unit and suspension system required.

B. Samples: Minimum 6-inch x 6-inch samples of specified acoustical panel; 8-inch-long samples of exposed wall molding and suspension system, including main runner and 4-foot cross tees.

C. Shop Drawings: Layout and details of acoustical ceilings show locations of items that are to be coordinated with or supported by the ceilings.

D. Acoustical Certifications: Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards. For acoustical performance, each carton of material must carry an approved independent laboratory classification of NRC, CAC, and AC.

a.) If the material supplied by the acoustical subcontractor does not have an Underwriter's Laboratory classification of acoustical performance on every carton, subcontractor shall be required to send material from every production run appearing on the job to an independent or NVLAP approved laboratory for testing, at the architect's or owner's discretion. All products not conforming to manufacturer's current published values must be removed, disposed of, and replaced with complying product at the expense of the Contractor performing the work.

1.7 QUALITY ASSURANCE

A. Single-Source Responsibility: Provide acoustical panel units and grid components by a single manufacturer.

1. Fire Performance Characteristics: Identify acoustical ceiling components with appropriate markings of applicable testing and inspecting organization.

2. Surface Burning Characteristics: As follows, tested per ASTM E 84 and complying with ASTM E 1264 Classification.

1.8 DELIVERY, STORAGE AND HANDLING

A. Deliver acoustical ceiling units to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical ceiling units, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical ceiling units carefully to avoid chipping edges or damaged units in any way.

1.9 PROJECT CONDITIONS

A. Space Enclosure:

HumiGuard Plus Ceilings: Building areas to receive ceilings shall be free of construction dust and debris. Products with HumiGuard Plus performance and hot dipped galvanized steel, aluminum or stainless-steel suspension systems can be installed up to 120°F (49°C) and in spaces before the building is enclosed, where HVAC systems are cycled or not operating. Cannot be used in exterior applications where standing water is present or where moisture will come in direct contact with the ceiling.

ii. Option 2: Divert ceilings to qualify for one of the 4 material streams (75%)

1.11 WARRANTY

A. Acoustical Panel: Submit a written warranty executed by the manufacturer, agreeing to repair or replace panels that fail within the warranty period. Failures include, but are not limited to the following:

1. Acoustical Panels: Sagging and warping
2. Grid System: Rusting and manufacturer's defects.

B. Warranty Period:

1. Ceiling System: Thirty (30) years from date of substantial completion

C. The Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

1.12 MAINTENANCE

A. Extra Materials: Deliver extra materials to Owner. Furnish extra materials described below that match products installed. Packaged with protective covering for storage and identified with appropriate labels.

1. Acoustical Ceiling Units: Furnish quality of full-size units equal to 5.0 percent of amount installed.

2. Exposed Suspension System Components: Furnish quantity of each exposed suspension component equal to 2.0 percent of amount installed.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Ceiling Panels:

1. Basis of Design

Armstrong World Industries, Inc. School Zone Fine Fissured AirAssure

B. Suspension Systems:

1. Armstrong World Industries, Inc.

2.2.1 ACOUSTICAL CEILING UNITS

A. Acoustical Panels Type AP

1. Surface Texture: Medium
2. Composition: Mineral Fiber
3. Color: White
4. Size: 24 in x 24 in
5. Edge Profile: Angled Tegular
6. Noise Reduction Coefficient NRC ASTM C 423 Classified w/ UL label on product carton 0.75 with Angled Tegular or 0.70 with Square Lay-in edge profile
7. Ceiling Attenuation Class CAC ASTM C 1414 Classified w/ UL label on product carton 45 with Angled Tegular or 42 with Square Lay-in edge profile
8. Flame Spread: ASTM E 1264; Class A (UL)
9. Light Reflectance (LR) White Panel: ASTM E 1477; 0.85
10. Dimensional Stability: HumiGuard Plus
11. Recycle Content: Up to 56% total recycled content. Pre-consumer, Post-consumer and Post-industrial.
12. Material Ingredient Transparency: Health Product Declaration (HPD); Declare Label
13. Life Cycle Assessment: Third Party Certified Environment Product Declaration (EPD)

4. Acceptable Product: School Zone Fine Fissured AirAssure (1356, 1357, 2806 or 2807) No added formaldehyde as manufactured by Armstrong World Industries

2.3.1 METAL SUSPENSION SYSTEMS

A. Components:

Main beams, cross tees, and end detail fabricated from commercial quality hot dipped galvanized steel complying with ASTM A 653. Main beams and cross tees are double-web steel construction exposed flange design. Exposed surfaces chemically cleansed, capping prefinished galvanized steel in baked polyester paint. Main beams and cross tees shall have rotary stitching.

a. Structural Classification: ASTM C 635 Heavy or Intermediate Duty

b. Color: White and match the actual color of the selected ceiling tile, unless noted otherwise.

c. Sustainability: Environmental Product Declaration (EPD), Health Product Declaration (HPD)

d. Acceptable Product:

- Prelude Plus XL as manufactured by Armstrong World Industries (15/16 in)

AIR LEAKAGE DATA MEASURED IN UNITS OF [CFM/FT²]

Item No.	Suspension System	Air Leakage in [CFM/ft ²] Without Hold Down Clips (Item 442) @ 0.02 [in WC]	Air Leakage in [CFM/ft ²] With Hold Down Clips (Item 442) @ 0.02 [in WC]
2806	15/16" Prelude® XL®	0.51	0.32
2807	15/16" Prelude® XL®	0.24	0.17
1356	15/16" Prelude® XL®	0.22	0.12
1357	15/16" Prelude® XL®	0.34	0.27

Positive pressures above 0.09 [in WC] may require use of hold down clips

Questions? email Techline@armstrongceilings.com for more information and independent 3rd party test details.

B. Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.

C. Wire for Hangers and Ties: ASTM A 641, Class 1 zinc coating, soft annealed, with a yield stress load of at least time three design load, but not less than 12 gauge.

D. Edge Moldings and Trim:

1. 7800HRC - 12ft Hemmed Angle Molding as selected by design professional.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not proceed with installation until all wet work such as concrete, terrazzo, plastering and painting has been completed and thoroughly dried out, unless expressly permitted by manufacturer's printed recommendations. (Exception: HumiGuard Max Ceilings)

3.2 PREPARATION

A. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less than half width units at borders and comply with reflected ceiling plans. Coordinate panel layout with mechanical and electrical fixtures.

B. Coordination: Furnish layouts for preset inserts, clips, and other ceiling anchors whose installation is specified in other sections.

1. Furnish concrete inserts and similar devices to other trades for installation well in advance of time needed for coordination of other work.

3.3 INSTALLATION

A. Follow manufacturer installation instructions.

B. Install suspension system and panels in accordance with the manufacturer's instructions, and in compliance with ASTM C 636 and with the authorities having jurisdiction.

C. Suspend main beam from overhead construction with hanger wires spaced 4-0 on center along the length of the main runner. Install hanger wires plumb and straight.

D. Install wall moldings at intersection of suspended ceiling and vertical surfaces. Miter corners where wall moldings intersect or install corner caps.

E. For reveal edge panels: Cut and reveal or rabbet edges of ceiling panels at border areas and vertical surfaces.

F. Install acoustical panels in coordination with suspended system, with edges resting on flanges of main runner and cross tees. Cut and fit panels neatly against abutting surfaces. Support edges by wall moldings.

3.4 ADJUSTING AND CLEANING

A. Replace damaged and broken panels.

B. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch up of minor finish damage.

2275-1

Remove any ceiling products that cannot be successfully cleaned and or repaired. Replace with attic stock or new product to eliminate evidence of damage.

END OF SECTION

SECTION 09650 - VINYL BASE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 DESCRIPTION OF WORK:

- A. Extent of Vinyl base is shown on drawings and in schedules.

1.3 QUALITY ASSURANCE:

- A. Manufacturer: Provide each type of Vinyl base as produced by a single manufacturer, including recommended primers and adhesives.

1.4 SUBMITTALS:

- A. Product Data: Submit manufacturer's technical data for each type of vinyl base.
- B. Samples for Initial Selection Purposes: Submit manufacturer's standard color charts in form of actual sections of vinyl base.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:

1. Manufacturers of Vinyl Base:

- a. Armstrong World Industries, Inc.
- b. Azrock Floor Products Div., Azrock Industries, Inc.
- c. Flexco Div., Textile Rubber Co.
- d. Roppe Rubber Corp.

2.2 VINYL BASE:

- A. Vinyl Wall Base: Provide vinyl base complying with FS SS-W-40, Type II, with matching end stops and preformed or molded corner units, and as follows:
 - 1. Height: 4" and 6" at all toilets.(See Drawings)
 - 2. Thickness: 1/8" gage.
 - 3. Thickness: 0.080" gage.
 - 4. Style: Standard top-set cove.
 - 5. Finish: Matte.
- B. Adhesives (Cements): Waterproof, stabilized type as recommended by flooring manufacturer to suit material and substrate conditions.

PART 3 - EXECUTION

3.1 INSPECTION:

- A. Require Installer to inspect surfaces to determine that they are satisfactory.

3.2 PREPARATION:

- A. Prepare existing and new surfaces:
 - 1. Clean surface of dust and loose material.

3.3 INSTALLATION VINYL BASE:

3.4 INSTALLATION OF VINYL BASE:

- A. Apply wall base to walls, columns, pilasters, casework and other permanent fixtures in rooms or areas where base is required. Install base in lengths as long as practicable, with preformed corner units, or fabricated from base materials with mitered or coped inside corners. Tightly bond base to substrate throughout length of each piece, with continuous contact at horizontal and vertical surfaces.

1. On masonry surfaces, or other similar irregular substrates, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler material.
- B. Place resilient edge strips tightly butted to flooring and secure with adhesive. Install edging strips at edges of flooring which would otherwise be exposed.
- C. Apply butt type metal edge strips as required and before installation of resilient flooring. Secure units to substrate with countersunk stainless steel anchors, complying with manufacturer's recommendations.

3.5 CLEANING AND PROTECTION:

- A. Clean vinyl base after install.

3.8 EXTRA STOCK:

- A. Deliver stock of maintenance materials to Owner. Furnish maintenance materials from same manufactured lot as materials installed and enclosed in protective packaging with appropriate identifying labels.
 1. Tile Flooring: Furnish not less than one box for each 50 boxes or fraction thereof, for each type, color, pattern and size installed.

END OF SECTION 09650

SECTION 09670**DECORATIVE RESILIENT FLAKE POLYMERIC FLOORING SYSTEM
Dex-O-Tex Elastaflake RFS****PART 1.00 – GENERAL****1.1 GENERAL REQUIREMENTS**

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

1.2 WORK INCLUDED

- A. Work of this section includes all labor materials equipment and services necessary to complete the decorative resilient flake polymeric flooring system as selected on drawings and/or specified herein.

1.3 RELATED WORK

A FLUID APPLIED FILM FORMING CURING COMPOUND COMPLYING WITH ASTM C 309 OR ASTM C 1315 SHOULD BE APPLIED TO THE CONCRETE TO FACILITATE PROPER CURING OF THE CONCRETE SUBSTRATE. OTHER TYPES OF CURING COMPOUNDS ARE GENERALLY NOT ACCEPTABLE. CONCRETE SHOULD BE CURED FOR A MINIMUM OF 28 DAYS. ON GRADE FLOORS SHOULD HAVE FUNCTIONING VAPOR RETARDER BENEATH SLAB.)

1.4 SUBMITTALS

- A. General: Submit the following in accordance with conditions of Contract and Division 1 Specification Sections.
- B. Product Data: Submit manufacturer's technical data application instructions and general recommendations for decorative polymer flooring system specified herein.
- C. Samples for initial selection purposes in form of manufacturer's color charts showing full range of colors available including white and off-white colors.
- D. Samples for verification: for each resinous flooring system or color specified, provide 2 each, 6 inches (150mm) square samples in the selected color and texture, applied to a ridged backing by the installing contractor for this project.
- E. Material certificates signed by manufacturer certifying that the decorative resilient flake polymeric flooring system supplied for the project complies with requirements specified herein.
- F. Maintenance Instructions: Submit manufacturer's written instructions for recommended maintenance practices.
- G. Contractor Certification: Submit a letter from the primary materials manufacturer certifying that the installing contractor has been properly trained in the application of the materials being installed, and is acceptable to the materials manufacturer.
 - 1. Engage an installer who employs only persons trained and qualified for accomplishing preparation and installation of the resinous flooring systems specified, including any sub-contractors performing work on the project.
 - 2. Engage an installer who is certified in writing by the resinous flooring manufacturer as a factory trained applicator qualified to apply the specified resinous flooring system

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer or applicator who has specialized in installing resinous flooring types similar to that required for this Project The polymeric resinous flooring installation contractor shall have a minimum five year experience in the installation of similar materials and be a current SSPC member with a SSPC Society of Protective Coatings QP-8 certification And is acceptable to materials manufacturer.

- B. Acceptable Materials Manufacturers: Manufacturer shall certify that they are the primary formulator of the materials used in the completion of the work as specified herein. The materials manufacturer shall have a minimum 10 years experience in producing polymeric flooring materials. They shall also be a member of the SSPC Society of Protective Coatings and meeting SSPC ISO 9001 Quality Control manufacture requirements.

1.6 DELIVERY STORAGE AND HANDLING

- A. Deliver materials in original packages and containers with seals unbroken and bearing manufacturer's labels containing brand name, directions for storage and mixing with other components.
- B. Store materials to comply with manufacturer's directions to prevent deterioration from moisture. Store and temper materials to a temperature between 63°F -83°F for a minimum of 48 hours before commencement of the work.
- C. Lighting: Permanent lighting will be in place and working before installing polymeric floor coating.
- D. Moisture Vapor Emissions: Perform Calcium Chloride test in conformance to ASTM F 1869-09 to determine moisture vapor emission levels and in situ relative humidity test conforming to ASTM F 2170 in situ relative humidity in substrate prior to application of any component of the flooring system. Do not install flooring over substrate with moisture vapor emission levels in excess of 10 lbs. per 24 hour period over a 1000 square foot area or with a relative humidity in excess of 84%. Notify the Architect and Project Administrator immediately if MVE or rh levels exceed these levels.

PART 2:00 – PRODUCTS

2.1 MATERIALS

- A. Decorative resilient flake polymeric flooring system shall be Dex-O-Tex Elastaflake RFS as manufactured by Crossfield Products Corp. in Rancho Dominguez, California and Roselle Park, New Jersey.

2.2 PROPERTIES

- A. Colors: As indicated, or if not otherwise indicated, as selected by Architect from manufacturer's standard colors, which must include white and off-white.
- B. Physical Properties: Provide floor coatings system that meets or exceeds the listed minimum physical property requirements when tested according to the referenced standard test method in parentheses.

Thickness	1/8"
Hardness (ASTM D2240), Shore D	80 - 85
Adhesion (ASTM D7234) (100% failure in Concrete)	>473 psi
Tensile Elongation (ASTM D412)	500%

Tensile Strength (ASTM D412)	1050 psi
Thermal Shock (ASTM D1211)	Complies
Waterproofness (Sample Exposed to 50 psi water pressure for one hour)	No Water Transmission
Water Resistance (MIL-PRF-1044)	16 mg
Microbial Resistance (ASTM G21)	Passes Rating 1
Moisture Absorption	< 0.4%
Indentation Resistance (2,000 psi 1 Hr.)	< 0.3%
Fire, Critical Radiant Flux (ASTM E648)	0.75 W/cm ²
Smoke Density (ASTM E 662)	< 183 D _s
Chemical Resistance (ASTM D1308)	
Gasoline	No Effect
Kerosene	No Effect
Skydrol	No Effect
Isopropyl Alcohol	No Effect
Toluene	No Effect
Hydrogen Peroxide	Slight Stain
Hydrochloric Acid (25%)	No Effect

PART 3.00 – EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where the decorative resilient polymeric flooring system is to be installed and notify the Architect of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected by the Contractor in a manner acceptable to the Architect.
- B. Job Site Pre-Installation Survey
 1. Perform moisture testing in accordance with ASTM F 1869, and ASTM F 2170. Verify and document result in accordance with the specification. If the MVER exceeds 10 lbs. or the relative humidity (RH) of the substrate is greater than 84%, apply Dex-O-Tex Vapor Control 200 as per manufacturer's application specification before proceeding.
 2. Inspect Substrate to verify proper preparation and detailing before applying any materials.
 3. Measure and record ambient temperature and humidity, surface temperature and the temperature of the material being used at the start of work, mid-day and at the commencement of work each day. Do not proceed with the application if the conditions are outside the recommended parameters. Inspect materials to be used. Verify material is the proper material and all components and sizes are correct. Inspect all containers and verify a proper factory seal with no signs of damage or leakage. Premix Liquid materials into a smooth homogenous blend before uses.

3.2 PREPARATION

- A. Substrate: Perform preparation and cleaning procedures according to flooring manufacturer's instructions for particular substrate conditions involved, and as specified. Prepare in accordance with SSPC SP 13/NACE No.6
- B. Concrete Surfaces: Shot blast, or power grind as required to obtain optimum bond of flooring to concrete. Remove sufficient material to provide a sound surface free of laitance, glaze, efflorescence, and any bond

inhibiting curing compounds or form release agents. Remove grease, oil, and other penetrating contaminants. Prepare substrate in accordance with SSPC SP 13/ NACE No.6. Repair damaged and deteriorated concrete to acceptable condition. Leave surface free of dust, dirt, laitance, and efflorescence. Perform surface cleanliness test in conformance with ISO 8502 and a water break test.

- C. Materials: Mix epoxy and polymeric coating components when required and prepare materials according to flooring system manufacturer's instructions.

3.3 APPLICATION

- A. General: Apply each component of decorative flake polymeric flooring system according to manufacturer's directions to produce a uniform monolithic flooring surface.
- B. Environmental Check Points: Measure and record ambient temperature, relative humidity, dew point, surface temperature, and material temperatures at the beginning of work, mid-day, and at the work day.
- C. Cordon of the area of the work, provide warning tape and barriers to prohibit traffic in the area during the installation. Protect all adjacent areas or equipment from coatings materials being applied.
- D. Crack Repair: For Cracks over 1/6" wide after surface preparation.
 1. Route top of crack to be 1/2" X 1/4" minimum. Insure all walls of the fracture are clean dry and free from all contaminants, use grinder blade to clean side walls if required.
 2. Prime down into the prepared fracture and extending out a minimum of two inches on both sides of the fracture.
 3. Apply second coat into crack to fill areas that have settled from the first application. Continue application a strip coat which extends out a minimum of two inches on both sides of the fracture. Application shall be a minimum 40 mils dft at the center of the fracture extending out 2 inches. The edge may then be feathered out as required.
 4. If application is free from sink holes apply fiber reinforced fabric onto the surface of the strip coat application. If application has sink holes make another application before applying fabric reinforcement.
- E. Bond Coat: Apply VaporControl epoxy bond coat over prepared substrate at manufacturer's recommended spreading rate for the MVER and RH level of the substrate. Allow to cure, apply the subsequent coat within 24 hours.
- F. Basecoat: Over bond coat apply nominal 80 dft thickness Elastaflake Basecoat by gauge rake or notched squeegee, then roll with a spiked roller to aid in air release and increase flow ability, Loop roll to even out inconsistencies if required. Measure thickness by measuring with a mil gauge a minimum of every 100 square feet. Verify thickness by material coverage of 20 square feet per gallon. Allow to cure, apply the subsequent coat within 48 hours.
- G. Color/Receiving coat: Once the Basecoat is full cured, Apply color coat with a notched squeegee at a thickness of approximately 12 mils, then backroll with 1/4" mohair roller. Allow to flow out and settle. Then while the color coat is still wet, broadcast PVC color chip into the wet resin to the desired density and color combination as selected and approved. Allow to cure, apply the subsequent coat within 48 hours.
- H. After the receiving coat has fully cured, remove all excess color chips. Lightly sand the surface with 120 – 200 grit screen. Vacuum all remaining color chips and residue created by screening the surface. Inspect the entire area for any irregularities or defects and address them as required by proceeding to sealing the surface.
- I. Finish Coats: apply two coats clear polyaspartic enamel at a thickness of approximately 12 mils per coat over the cured color and PVC broadcast. Lightly sand between coats. Allow the first coat to cure, apply the subsequent coat within 18 hours.

- J. Cove Base: Apply cove base mix to wall surfaces at locations shown to form cove base height of 4 inches unless otherwise indicated. Follow manufacturer's printed instructions and details including taping, mixing, troweling, and sanding, of cove base

3.4 CURING, PROTECTION AND CLEANING

- A. Cure polymeric floor coating materials according to manufacturer's directions, taking care to prevent contamination during application stages and before completing curing process. Close application area for a minimum of 24 hours.
- B. After the floor has fully cured protect the floor with a 4 mil visqueen, and construction paper. Tape all seams and edges. If the area will be subject heavy rolling loads during construction, further protect the area with 1/8" Masonite taped at all seams and edges.
- C. Do not expose the floor to excess traffic, chemicals, water or heat for a minimum 96 hours.

END OF SECTION

SECTION 09900 - PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes surface preparation, painting, and finishing of exposed interior and exterior items and surfaces.
 - 1. Surface preparation, priming, and finish coats specified in this section are in addition to shop priming and surface treatment specified under other sections.
- B. Paint exposed surfaces whether or not colors are designated in "schedules," except where a surface or material is specifically indicated not to be painted or is to remain natural. Where an item or surface is not specifically mentioned, paint the same as similar adjacent materials or surfaces. If color or finish is not designated, the Engineer will select from standard colors or finishes available.
- C. Painting of exposed bare and covered pipes and conduits (including color coding) installed by the Mechanical Contractor is by the Mechanical Contractor.
- D. Painting is not required on prefinished items, finished metal surfaces, concealed surfaces, operating parts, and labels.
- E. Related Sections: The following sections contain requirements that relate to this section:
 - 1. Division 5 Section "Metal Fabrications" for shop priming ferrous metal.
 - 2. Division 8 Section "Steel Doors and Frames" for shop priming steel doors and frames.
 - 3. Divisions 15 and 16: Painting mechanical and electrical work is specified in Divisions 15 and 16, respectively.

1.3 DEFINITIONS

- A. "Paint" includes coating systems materials, primers,

emulsions, enamels, stains, sealers and fillers, and other applied materials whether used as prime, intermediate, or finish coats.

1.4 SUBMITTALS

- A. Product Data: Manufacturer's technical information, label analysis, and application instructions for each material proposed for use.
 - 1. List each material and cross-reference the specific coating and finish system and application. Identify each material by the manufacturer's catalog number and general classification.
- B. Samples for initial color selection in the form of manufacturer's color charts.
 - 1. After color selection, the Engineer will furnish color chips for surfaces to be coated.

1.5 QUALITY ASSURANCE

- A. Single-Source Responsibility: Provide primers and undercoat paint produced by the same manufacturer as the finish coats.
- B. Coordination of Work: Review other sections in which primers are provided to ensure compatibility of the total systems for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
 - 1. Notify the Engineer of problems anticipated using the materials specified.
- C. Material Quality: Provide the manufacturer's best quality trade sale paint material of the various coating types specified. Paint material containers not displaying manufacturer's product identification will not be acceptable.
 - 1. Proprietary names used to designate colors or materials are not intended to imply that products named are required or to exclude equal products of other manufacturers.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the job site in the manufacturer's original, unopened packages and containers bearing manufacturer's name and label and the following information:
 - 1. Product name or title of material.

2. Product description (generic classification or binder type).
 3. Federal Specification number, if applicable.
 4. Manufacturer's stock number and date of manufacture.
 5. Contents by volume, for pigment and vehicle constituents.
 6. Thinning instructions.
 7. Application instructions.
 8. Color name and number.
- B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F (7 deg C). Maintain containers used in storage in a clean condition, free of foreign materials and residue.
1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

1.7 JOB CONDITIONS

- A. Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50 deg F (10 deg C) and 90 deg F (32 deg C).
- B. Apply solvent-thinned paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 45 deg F (7 deg C) and 95 deg F (35 deg C).
- C. Do not apply paint in snow, rain, fog, or mist, when the relative humidity exceeds 85 percent, at temperatures less than 5 deg F (3 deg C) above the dew point, or to damp or wet surfaces.
 1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by the manufacturer during application and drying periods.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturer: Subject to compliance with requirements, provide products of one of the following:
 1. PPG Industries, Pittsburgh Paints (Pittsburgh).
 2. Pratt and Lambert (P & L).
 3. The Sherwin-Williams Company (S-W).

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions under which painting will be performed for compliance with requirements for application of paint. Do not begin paint application until unsatisfactory conditions have been corrected.
 - 1. Start of painting will be construed as the Applicator's acceptance of surfaces and conditions within a particular area.

3.2 PREPARATION

- A. General Procedures: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items in place that are not to be painted, or provide surface-applied protection prior to surface preparation and painting. Remove these items if necessary for complete painting of the items and adjacent surfaces. Following completion of painting operations in each space or area, have items reinstalled by workers skilled in the trades involved.
 - 1. Clean surfaces before applying paint or surface treatments. Remove oil and grease prior to cleaning. Schedule cleaning and painting so that dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.
- B. Surface Preparation: Clean and prepare surfaces to be painted in accordance with the manufacturer's instructions for each particular substrate condition and as specified.
 - 1. Provide barrier coats over incompatible primers or remove and reprime. Notify Engineer in writing of problems anticipated with using the specified finish-coat material with substrates primed by others.
 - 2. Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.
 - 3. Ferrous Metals: Clean nongalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with recommendations of the Steel Structures

Painting Council.

- a. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by the paint manufacturer, and touch up with the same primer as the shop coat.
- C. Materials Preparation: Carefully mix and prepare paint materials in accordance with manufacturer's directions.
 - 1. Maintain containers used in mixing and application of paint in a clean condition, free of foreign materials and residue.
 - 2. Stir material before application to produce a mixture of uniform density; stir as required during application. Do not stir surface film into material. Remove film and, if necessary, strain material before using.
 - 3. Use only thinners approved by the paint manufacturer, and only within recommended limits.
- C. Tinting: Tint each undercoat a lighter shade to facilitate identification of each coat where multiple coats of the same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

3.3 APPLICATION

- A. Apply paint in accordance with manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied.
- B. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
 - 1. Paint colors, surface treatments, and finishes are indicated in "schedules."
 - 2. Provide finish coats that are compatible with primers used.
 - 3. The number of coats and film thickness required is the same regardless of the application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. Sand between applications where sanding is required to produce an even smooth surface in accordance with the manufacturer's directions.
 - 4. Apply additional coats when undercoats, stains, or other conditions show through final coat of paint until paint film is of uniform finish, color, and appearance. Give special attention to ensure that surfaces, including edges, corners, crevices, welds, and exposed fasteners, receive a dry film thickness equivalent to that of flat

surfaces.

5. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, convactor covers, covers for finned tube radiation, grilles, and similar components are in place. Extend coatings in these areas as required to maintain the system integrity and provide desired protection.
 6. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Paint surfaces behind permanently fixed equipment or furniture with prime coat only before final installation of equipment.
 7. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, nonspecular black paint.
 8. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
- C. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
1. Allow sufficient time between successive coats to permit proper drying. Do not recoat until paint has dried to where it feels firm, and does not deform or feel sticky under moderate thumb pressure and where application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.
- D. Minimum Coating Thickness: Apply materials at not less than the manufacturer's recommended spreading rate. Provide a total dry film thickness of the entire system as recommended by the manufacturer.
- E. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.
- F. Prime Coats: Before application of finish coats, apply a prime coat of material as recommended by the manufacturer to material that is required to be painted or finished and has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to assure a finish coat with no burn through or other defects due to insufficient sealing.
- G. Stipple Enamel Finish: Roll and redistribute paint to an even and fine texture. Leave no evidence of rolling such as laps, irregularity in texture, skid marks, or other surface imperfections.
- H. Pigmented (Opaque) Finishes: Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections

will not be acceptable.

- I. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, cloudiness, color irregularity, runs, brush marks, orange peel, nail holes, or other surface imperfections.
 - 1. Provide satin finish for final coats.
- J. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not in compliance with specified requirements.

3.4 CLEANING

- A. Cleanup: At the end of each work day, remove empty cans, rags, rubbish, and other discarded paint materials from the site.
- B. Upon completion of painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping, using care not to scratch or damage adjacent finished surfaces.

3.5 PROTECTION

- A. Protect work of other trades, whether to be painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as acceptable to Engineer.
- B. Provide "wet paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others for protection of their work after completion of painting operations.
 - 1. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINT SCHEDULE

- A. NEW METAL DOORS AND FRAMES:
 - 1. Prime Coat: One coat PPG 7-858 or 7-852 Metal Case Rust Inhibitive Primer.
 - 2. Intermediate Coat: One coat PPG 16-1510 Speedhide Int. / Ext. Water Base Alkyd Semi-gloss
 - 3. Finish Coat: One coat PPG 16-510 Speedhide Int. / Ext Water Base Alkyd Semi-gloss.

3.7 INTERIOR PAINT SCHEDULE:

A. METAL DOORS AND FRAMES:

1. Prime Coat: One coat PPG 7-858 or 7-852 Metal Case Rust Inhibitive Primer.
2. Intermediate Coat: One coat PPG 16-1410 Speedhide Int. / Ext. Water Base Alkyd Satin
3. Finish Coat: One coat PPG 16-1410 Speedhide Int. / Ext Water Base Alkyd Satin.

B. EXPOSED STEEL JOIST AND DECK:

1. Clean areas to be painted.
2. Intermediate Coat: One coat PPG 6-160XI Speedhide Flat Alkyd Dryfall.
3. Finish Coat: One coat PPG 6-160XI Speedhide Flat Alkyd Dryfall.

C. GALVANIZED DUCT WORK AND MISC. STEEL:

1. Prime Coat: One coat PPG 17-921 Sealgrip Latex Int. / Ext. Primer.
2. Intermediate Coat: One coat PPG 6-6160XI Speedhide Flat Alkyd Dryfall.
3. Finish Coat: One coat PPG 6-610XI Speedhide Flat Alkyd Dryfall.

D. MASONRY SURFACES:

1. Block Fill: One coat PPG 6-7 Speedhide Int. / Ext. Latex Block Filler.
2. Intermediate Coat: One coat PPG 12-900 Speedhide Pro EV Latex
3. Finish Coat: One coat PPG 16-1410 Speedhide Int. Ext. Water Base Alkyd Satin.

E. DRYWALL SURFACES:

1. Prime Coat: One coat PPG 12-900 Speedhide Pro EV Latex Primer / Sealer.
2. Intermediate Coat: One coat PPG 16-1410 Speedhide Int. / Ext. Water Base Alkyd Satin.
3. Finish Coat: One coat PPG 16-1410 Speedhide Int. / Ext. Water Base Alkyd Satin.

F. PAINTED WOOD TRIM:

1. Prime Coat: One coat PPG 17-921 Sealgrip Latex Int. / Ext Primer.
2. Intermediate Coat: One coat PPG 16-1510 Speedhide Int. Ext. Water Base Alkyd Semi-gloss.
3. Finish Coat: One coat PPG 16-1510 Speedhide Int. Ext. Water Base Alkyd Semi-gloss.

G. STAINED WOOD DOORS, CASEWORK, WOOD BASE AND WOOD CHAIR RAIL:

1. Stain: PPG 77-1460 Sunproof Latex Semi-Transparent Stain.
2. Sealer: Olympic 41061 Water Base Sanding sealer. (after sanding sealer applied all exposed areas must be sanded).
3. Intermediate Coat: One coat Olympic 42786 Satin or 42784 Gloss Urethane. (after intermediate coat lightly sand exposed areas).
4. Finish Coat: One coat Olympic 42786 Satin or 42784 Gloss Urethane.

END OF SECTION 09900

SECTION 10800 - TOILET ACCESSORIES

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 toilet accessory items as scheduled.
- B. Toilet compartments and related accessories are specified in Division 10.

1.3 SUBMITTALS

- A. General: Submit the following according to Conditions of Contract and Division 1 Specifications Sections.
- B. Product data for each toilet accessory item specified, including construction details relative to materials, dimensions, gages, profiles, mounting method, specified options, and finishes.
- C. Setting drawings where cutouts are required in other work, including templates, substrate preparation instructions, and directions for preparing cutouts and installing anchorage devices.
- D. Maintenance instructions including replaceable parts and service recommendations.

1.4 QUALITY ASSURANCE

- A. Inserts and Anchorages: Furnish accessory manufacturers' standard inserts and anchoring devices that must be built into masonry. Coordinate delivery with other work to avoid delay.
- B. Single-Source Responsibility: Provide products of same manufacturer for each type of accessory unit and for units exposed to view in same areas, unless otherwise acceptable to Engineer.

1.5 PROJECT CONDITIONS

- A. Coordination: Coordinate accessory locations, installation, and sequencing with other work to avoid interference with and ensure proper installation, operation, adjustment, cleaning, and servicing of toilet accessory items.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide toilet accessories by one of the following:
 - 1. American Specialties, Inc.
 - 2. Bobrick Washroom Equipment, Inc.
 - 3. Bradley Corporation.

2.2 MATERIALS, GENERAL

- A. Stainless Steel: AISI Type 302/304, with polished No. 4 finish, 0.034-inch (22-gage) minimum thickness.
- B. Mirror Glass: Nominal 6.0-mm (0.23-inch) thick, conforming to ASTM C 1036, Type I, Class 1, Quality q2, and with silvering, electro-plated copper coating, and protective organic coating.
- C. Galvanized Steel Mounting Devices: ASTM A 153, hot-dip galvanized after fabrication.
- D. Fasteners: Screws, bolts, and other devices of same material as accessory unit, or of galvanized steel where concealed.

2.3 PAPER TOWEL DISPENSERS

- A. Surface Mounted Towel Dispensers: Fabricate of stainless steel with hinged front equipped with tumbler lockset.
 - 1. Supplied by Owner installed by GC

2.4 TOILET TISSUE DISPENSERS AND SOAP DISPENSERS

- A. Supplied by Owner installed by GC

2.5 GRAB BARS

- A. Stainless Steel Type: Provide grab bars with wall thickness not less than 0.05 inch (18 gage) and as follows:
1. Mounting: Concealed, manufacturer's standard flanges and anchorages.
 2. Clearance: 1-1/2-inch clearance between wall surface and inside face of bar.
 3. Gripping Surfaces: Smooth, satin finish.
 4. Heavy-Duty Size: Outside diameter of 1-1/2 inches.

2.6 MIRROR UNITS

- A. Stainless Steel Framed Mirror Units: Fabricate frame with angle shapes not less than 0.05 inch (18 gage), with square corners mitered, welded, and ground smooth. Provide in No. 4 satin polished finish.

2.7 FABRICATION

- A. General: Only a maximum 1-1/2-inch-diameter, unobtrusive stamped manufacturer logo, as approved by Engineer, is permitted on exposed face of toilet or bath accessory units. On either interior surface not exposed to view or back surface, provide additional identification by either a printed, waterproof label or a stamped nameplate, indicating manufacturer's name and product model number.
- B. Surface-Mounted Toilet Accessories, General: Except where otherwise indicated, fabricate units with tight seams and joints, exposed edges rolled. Hang doors or access panels with continuous stainless steel piano hinge. Provide concealed anchorage wherever possible.
- C. Framed Mirror Units, General: Fabricate frames for glass mirror units to accommodate wood, felt, plastic, or other glass edge protection material. Provide mirror backing and support system that will permit rigid, tamperproof glass installation and prevent moisture accumulation, as follows:
1. Provide galvanized-steel backing sheet, not less than 0.034 inch (22 gage) and full mirror size, with nonabsorptive filler material. Corrugated cardboard is not an acceptable filler material.
- D. Mirror Unit Hangers: Provide system for mounting mirror units that will permit rigid, tamperproof, and theftproof installation, as follows:

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install toilet accessory units according to manufacturers' instructions, using fasteners appropriate to substrate as recommended by unit manufacturer. Install units plumb and level, firmly anchored in locations and at heights indicated.
- B. Secure mirrors to walls in concealed, tamperproof manner with special hangers, toggle bolts, or screws. Set units plumb, level, and square at locations indicated, according to manufacturer's instructions for type of substrate involved.
- C. Install grab bars to withstand a downward load of at least 250 lbf, complying with ASTM F 446.

3.2 ADJUSTING AND CLEANING

- A. Adjust toilet accessories for proper operation and verify that mechanisms function smoothly. Replace damaged or defective items.
- B. Clean and polish all exposed surfaces strictly according to manufacturer's recommendations after removing temporary labels and protective coatings.

END OF SECTION 10800

SECTION 12304 - LAMINATE CLAD CASEWORK

PART 1 - GENERAL

1.00 RELATED DOCUMENTS:

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

1.01 WORK INCLUDED:

- A. The work includes fabrication and installation of modular laminate clad casework and components, countertops over cabinets, and related items furnished by the same supplier for single source responsibility, as shown on drawings, schedules, and specified herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE:

- A. Sinks and service fixtures, service and waste lines and all connections, vents, electrical service fixtures, hoods and ducting within or adjacent to casework, or otherwise required: Furnished and installed under Mechanical and Electrical Divisions 15 and 16.
- B. Base molding: Furnished and installed under Finishes Division 9.
- C. Appliances, unless specifically noted on plans as included in this section. Blocking within walls where indicated.
- D. General millwork and trim unless specifically noted on plans as included in this section.

1.03 QUALITY ASSURANCE:

- A. Manufacturers products shall be publicly cataloged. Manufacturer shall show evidence of a minimum of five (5) years experience in providing manufactured casework systems for similar types of projects, produce evidence of financial stability, bonding capacity, and adequate facilities and personnel required to perform on this project.

Manufacturer: Subject to compliance with requirements provide Casework from the following:

Stevens
TMI
Countertop Manufacturing, Inc.

1.04 SUBMITTALS:

A. Samples:

1. Submit samples of casework manufacturer's standard decorative laminate colors, patterns and textures for exposed and semi-exposed materials for Engineer's selection. Samples of other materials or hardware shall be made available if requested.
2. Engineer may request representative full-size samples for evaluation prior to approval. Samples may be impounded by engineer/owner until completion of project to ensure compliance with specifications.

B. Production Drawings:

1. Submit CAD production drawings for casework systems and countertops showing plan view layout of units with relation to surrounding walls, doors, windows, and other building components, elevations, ends, cross-sections, service run spaces and location of services.
2. Coordinate production drawings with other work involved.

1.05 PRODUCT HANDLING:

- A. Deliver completed laminate clad casework and countertops only after wet operations in building are completed, store in a ventilated place, protected from the weather, with relative humidity range of 20% to 50%.

1.06 JOB CONDITIONS:

A. Humidity and Temperature Controls:

1. Advise contractor of requirements for maintaining heating, cooling, and ventilation in installation areas as required to reach relative humidity necessary to maintain optimum moisture content. (See Product Handling).

1.07 WARRANTY:

- A. All materials and workmanship covered by this section will carry a three (3) year warranty from date of acceptance.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

- A. Manufacturer and Product Type:
 - 1. For purpose of determining minimum performance and quality standards this specification is based upon TMI modular casework as manufactured by TMI SYSTEMS DESIGN CORPORATION, 50 South Third Avenue West, Dickinson, North Dakota, 58601, a member of the Architectural Woodwork Institute (membership #8913) and Approved Quality Certification Program.

- B. Substitutions:
 - 1. Where specific materials, finish options, construction details, modularity, hardware and test data are specified herein, the casework will be held in strict compliance. Substitutions will be considered prior to bid date provided request is submitted to the engineer, in writing, no later than ten (10) days prior to bid date; substitution request shall list any and all deviations from the specified product. Acceptable substitutions will be identified in future addenda.

2.02 DEFINITIONS AND MATERIALS:

Listed are definitions and materials commonly used in defining decorative laminate clad casework. Refer to FABRICATION section for those items selected for use on this project.

- A. Definitions: Identification of casework components by surface visibility.
 - 1. Open Interiors: Any open storage unit without solid door or drawer fronts and units with full glass insert doors and/or acrylic doors.
 - 2. Closed Interiors: Any closed storage unit behind solid door or drawer fronts, sliding solid doors.
 - 3. Exposed Ends: Any storage unit exterior side surface that is visible after installation.

4. Other Exposed Surfaces: Faces of doors and drawers when closed, tops of cabinets less than 72" above finished floor.
5. Semi-Exposed Surfaces: Interior surfaces which are visible, bottoms of wall cabinets and tops of cabinets 72" or more above finished floor.
6. Concealed Surfaces: Any surface not visible after installation.

B. Core Materials:

1. Particleboard: Medium density 45-50 pound western particleboard of fir or pine meeting or exceeding ANSI A 208.1-1993, M-3 requirements. Thicknesses used are 1/4", 1/2", 3/4", and 1".
2. Hardboard: Prefinished hardboard in 1/4" thickness meeting or exceeding commercial standards CS-251.

C. Decorative Laminates/Veneer Where Applicable:

1. High pressure decorative laminate GP28 (.028), NEMA Test LD-3-1995.
2. High pressure decorative laminate GP50 (.050), NEMA Test LD-3-1995.
3. High pressure decorative laminate PF42 (.042), NEMA Test LD-3-1995.
4. High Pressure cabinet liner CL20 (.020), NEMA Test LD-3-1995.
5. Melamine laminate tested to meet NEMA Test LD-3-1995.
6. High pressure backer BK20 (.020).

D. Laminate Color Selection:

1. Basic cabinet body color:
 - a. To include surfaces of all components, including drawer boxes, to be covered with melamine laminate as a minimum requirement; drawer boxes not matching basic color will be rejected.
 - b. Melamine laminate shall be available in manufacturer's standard dove grey, frosty white, or light beige color. One color only per project.

2. Colors for other cabinet surfaces, grade GP28, shall be selected from the current year Wilsonart "COLOR QUEST" series. A maximum of one (1) color to be selected per unit face and five (5) colors per project. Minimum of 120 color selections available.
3. Colors for countertop grades, GP50 and PF42, shall be selected from the current year Wilsonart standard solid and pattern offering. A maximum of five (5) colors per project.

E. Edging Materials/Colors:

1. 3mm PVC banding, machine applied with waterproof hot melt adhesive with external edges and outside corners of door and drawer fronts, and countertops, machine profiled to 1/8" radius for safety.
2. PVC banding shall be available in colors as selected from Spec Check option categories B and C and qualified herein under the Fabrication Section 2.05 of this specification. All selections color matched to Wilsonart laminates of the same name.

2.03 SPECIALTY ITEMS:

A. Metal Parts:

1. Countertop support brackets, undercounter support frames, legs and miscellaneous metal parts shall be furniture steel, welded, degreased, cleaned, treated and epoxy powder painted in dove grey, frosty white or light beige to match basic cabinet body color, or in a contrasting slate grey or black color.

2.04 CABINET HARDWARE:

A. Hinges:

1. Shall be five knuckle, institutional grade, 2 3/4" overlay type with hospital tip. Steel shall be minimum .095" thick and have minimum of eight (8) edge and leaf fastenings. Hinges shall pass ANSI-BHMA standard A156.9, Grade 1 requirement for both vertical and horizontal set and sag (pair of hinges will hold minimum of 310#); copy of test result shall be provided upon request. Casework manufacturer shall use specifically engineered

screws for attachment of hinges; wood screws shall not be permitted. Doors 48" and over in height shall have three (3) hinges per door. Available in epoxy finish, color to be dove grey, frosty white or light beige to match basic cabinet body color, or in contrasting black, sienna brown, dawn, wildrose, clear teal, hollyberry, larkspur or brushed chrome. Provide magnetic door catch with minimum seven (7) pound pull, attached with screws and slotted for adjustment.

B. Pulls:

1. Door and drawer front pull shall be epoxy finished metal wire style, 96mm spacing on fasteners. Available in dove grey, frosty white, or light beige to match basic cabinet body color, or in contrasting black, sienna brown, dawn, wildrose, clear teal, hollyberry, larkspur, or brushed chrome. Pull design shall be compatible with Americans with Disability Act (ADA), Federal Register Volume 56, No. 144, specifically paragraph 4.27.4. Other pulls may be acceptable pending engineer's approval.

C. Drawer Slides:

1. Shall be Blum style No. BS230M with epoxy finish. Slides will have a 100 pound load rating at full extension and a built-in, positive stop both directions, with self closing feature. Slides shall have a life time warranty as offered by the slide manufacturer.
2. File drawer slides shall be Blum BS430E full extension. Slides shall have a lifetime warranty as offered by the slide manufacturer.
3. Kneespace and pencil drawers shall be equipped with Blum No. 320 for undercounter or support frame mounting.

D. Adjustable Shelf Supports:

1. Shall be injection molded polycarbonate, clear color to blend with selected interior finish, friction fit into cabinet end panels and vertical dividers, readily adjustable on 32mm (approximately 1-1/4") centers. Each shelf support shall have two (2) integral support pins, 5mm diameter, to interface pre-drilled holes, and to prevent accidental rotation of support. The supports shall be automatically adaptable to 3/4" or 1" thick

shelving and shall provide non-tip feature for shelving. Supports are designed to readily permit field fixing of shelf if desired. Structural load testing shall show loading to 1,040 pounds (260 pounds per support) without failure.

2.05 FABRICATION:

- A. Fabricate casework to dimensions, profiles, and details shown.
- B. Cabinet Body Construction:
 - 1. Tops and bottoms shall be joined to cabinet ends and internal cabinet components such as fixed horizontals, rails and verticals shall be joined using 10mm diameter industrial grade hardwood dowels, laterally fluted with chamfered ends, securely glued and clamped under pressure during assembly to secure joints and cabinet squareness. Use minimum of six (6) dowels at each joint for 24" deep cabinets and minimum of four (4) dowels at each joint for 12" deep cabinets.
 - 2. Unless specifically indicated, core shall be 3/4" thick particleboard. Edging and surface finishes as indicated herein.
 - 3. Unit backs shall be 1/4" thick prefinished hardboard, color matched to cabinet interior. Exposed back on fixed or movable cabinets to be 3/4" particleboard, color matched to cabinet interior, exterior surface GP-28 laminate as selected.
 - 4. All fixed undercounter and tall units shall have individual factory applied base, constructed of 3/4" moisture resistant plywood. Base shall be 96mm (nominal 4") high unless otherwise indicated on the drawings.
 - 5. All undercounter units except sink base units, shall be provided with full sub-top. Sink base units shall be provided with open top, front welded steel/epoxy painted sink rail full width at top front edge concealed behind face rail/doors, split back removable access panels and bottom panel to have CL20 high pressure cabinet liner both faces, color to match interior color.
 - 6. All end panels and vertical dividers, except sink base units, shall be prepared to receive adjustable shelf hardware at 32mm (approximately 1-1/4") centers. Door hinges, drawer slides and pull-out

shelves shall mount on line boring to maintain vertical alignment of components.

7. All exposed and semi exposed edges of basic cabinet components shall be factory edged with PVC banding, machine applied with waterproof hot melt adhesive.
 - a. Edging shall be 1mm PVC available in approximately 120 match edge colors to match door/drawer front edging color.
8. Adjustable shelf core shall be 3/4" thick particleboard up to 30" wide, 1" thick particleboard over 30" wide.
 - a. Front edge shall have factory applied 1mm PVC, color to match shelf color.
9. Interior Finish, Units with Open Interiors:
 - a. Sides, top, bottom, horizontal, and vertical members, and adjustable shelving faced with high pressure decorative laminate GP-28 (.028), color from casework manufacturer's full range offering of at least 120 colors.
10. Interior Finish, Units with Closed Interiors:
 - a. Sides, top, bottom, horizontal, and vertical members, and adjustable shelving faced with melamine laminate with matching prefinished back. Available in dove grey, frosty white, or light beige color.
11. Exposed Ends:
 - a. Shall be faced with high pressure decorative laminate GP-28 (.028) color from casework manufacturer's full range offering of at least 120 colors.
12. Wall Unit Bottom:
 - a. Shall be faced with melamine laminate in dove grey, frosty white or light beige to match basic cabinet body color.
13. Wall and Tall Unit Tops:
 - a. The top edge of all wall and tall unit end panels shall be factory edged with 1mm PVC to match basic cabinet body color; raw edges at top of wall and tall end panels will not be permitted.

b. Top surface will be laminated with melamine in dove grey, frosty white or light beige to match basic cabinet body color.

14. Balanced construction of all laminated panels is mandatory. Unfinished core stock surfaces, even on concealed surfaces (excluding edges), will not be permitted. No exceptions.

C. Drawers:

1. Sides, back and sub front shall be particleboard, 1/2" thick, laminated with melamine in dove grey, frosty white or light beige to match basic cabinet body color. The back and sub front are doweled and glued into the sides. Dowels shall be fluted, with chamfered ends and a minimum diameter of 8mm. Top edge is banded with 1mm PVC edging in a matching color.

2. Drawer bottom shall be particleboard, 1/2" thick, laminated with melamine in dove grey, frosty white or light beige to match basic cabinet body color, screwed directly to the bottom edges of the drawer box. Drawer bottom less than 1/2" thick will not be permitted.

3. Paper storage drawers are constructed similar except retaining hood shall be included at the rear of each drawer.

4. Painted finishes on drawer sides and/or bottom will not be permitted.

D. Door/Drawer Fronts:

1. Core for all doors and applied drawer fronts shall be 3/4" thick particleboard. All edges shall be finished as indicated herein.

2. Double doors shall be used on all cabinets in excess of 24" wide.

3. Exterior faces shall be laminated with high pressure decorative laminate GP28, color as selected. Interior face shall be high pressure cabinet liner CL20.

4. All edges shall be finished with 3mm PVC available in dove grey, frosty white or light beige to match basic cabinet body color or in contrasting black, sienna brown, dawn, wildrose, clear teal, hollyberry, or larkspur colors. External edges and

outside corners shall be machine profiled to 1/8" radius.

2.06 DECORATIVE LAMINATE COUNTERTOPS:

- A. All nominal 1-1/4" thick laminate clad countertops shown on drawings shall be constructed with 1-3/16" solid (not built-up) particleboard core. Laminate top face with GP50 (.050) high pressure decorative laminate, with BK20 backer underside. Provide tight joint fasteners where needed. All exposed edges including edges of backsplash where used, shall have 3mm PVC banding machine applied with waterproof hot melt adhesive. Exposed edges and corners shall be machine profiled to 1/8" radius for safety. Edging shall be available in dove grey, frosty white or light beige to match basic cabinet body color or in contrasting black, slate grey, dawn, wildrose, clear teal, hollyberry or larkspur colors.

PART 3 - EXECUTION

3.01 INSPECTION:

- A. The installer must examine the job site and the conditions under which the work under this section is to be performed, and notify the contractor in writing of unsatisfactory conditions. Do not proceed with work under this section until unsatisfactory conditions have been corrected in a manner acceptable to the installer.

3.02 PREPARATION:

- A. Condition casework to average prevailing humidity conditions in installation areas prior to installing.

3.03 INSTALLATION:

- A. Install casework with factory-trained supervision authorized by manufacturer. Erect casework, plumb, level, true and straight with no distortions. Shim as required. Where laminate clad casework abuts other finished work, scribe and cut to accurate fit.
- B. Adjust casework and hardware so that doors and drawers operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.

3.04 CLEANING AND PROTECTION:

2275-1

- A. Repair or remove and replace defective work as directed upon completion of installation.
- B. Clean plastic surfaces, repair minor damage per plastic laminate manufacturer's recommendations. Replace other damaged parts or units.
- C. Advise contractor of procedures and precautions for protection of casework and tops from damage by other trades until acceptance of the work by the owner.

END OF SECTION 12304

